Proposed Residential Development

11 Grenville Street, London WC1N 1LZ

soundsolution CONSULTANTS

Acoustic Design Statement

TECHNICAL REPORT

38681-R2

Proposed Residential Development

Acoustic Design Statement

Prepared for: Tal Arc Limited, Rear of 8 Dollis Road, Access from 2a Crescent Road London N3 1HP

Site location: 11 Grenville Street, London WC1N 1LZ

Table of Contents

soundsolution CONSULTANTS
Cornwall Suite, Dencora Business Centre, Whitehouse Road, Ipswich IP1 5LT
Tel: 01473 464 727 | info@sscmail.co.uk | www.soundsolutionconsultants.co.uk
VAT No. 844 9267 90 | Registration No. 5651834
Registered Address: 2 Lemons Hill, Tattingstone, Ipswich, Suffolk IP9 2NH

PROJECT NUMBER:	38681	DOCUMENT REFERENCE:	38681-R2
ORIGINATED		CHECKED	
L. Denson BSc. (Hons) MSc. MIOA Principal Consultant		D. Attwell BEng. (Hons) MIOA Acoustic Consultant	
RELEASE	DATE	CHANGE DESCRIPTION	
1	19/08/2022	First Issue	
2	07/09/2022	Minor changes to layout drawings	

1 INTRODUCTION

1.1 A ground floor residential development has been proposed at 11 Grenville Street, London WC1N 1LZ (hereinafter, "The Site") under the General Permitted Development Order (GPDO[1], as amended). A site plan highlighting the development site boundary in red has been provided in Appendix B.

1.2 The existing site has been noted to comprise the ground floor of a 4-storey middle terrace building overlooking Grenville Street with an underpass to the Colonnade. The Site has previously been granted planning permission for residential conversion of the upper floors with the ground floor commercial space retained, by the London Borough of Camden under application number *2017/4551/P*, 28th November 2019.

1.3 Sound Solution Consultants Ltd (SSC) has been commissioned to produce this report, to accompany a planning application to the London Borough of Camden under the General Permitted Development Order (GPDO[1], as amended) for the conversion of the basement level commercial space at 11 Grenville Street into a residential apartment (as indicated in Appendix C scheme design). The requirement for a noise impact assessment from any commercial premises on the intended occupiers of the proposed development has been noted from the GPDO Amendment Order 2021 for *Class MA – commercial, business, and service uses to dwellinghouses*.

1.4 SSC has previously provided a noise impact assessment in relation to the approved development *2017/4551/P*, document reference "37195 R2", in relation to the proposed residential upper floors and ground floor commercial space. Previously obtained site survey data from 14th – 15th September 2021 (detailed in Appendix D) has been used as directly relevant to this assessment.

1.5 The Site has been noted within a predominantly residential area overlooking Grenville Street with residential flats noted adjacent either side and to the rear, with student residential accommodation located directly opposite.

1.6 A site-based study of environmental sound has been used to evaluate the acoustic environment at The Site. The methodology of assessment will refer to current practice and guidance documents which determine health limits and noise impacts and is guided by the incident noise sources.

1.7 A Glossary of Acoustic Terms has been provided in Appendix A that may assist with the terminology used within this report.

[1] The Town and Country Planning (General Permitted Development) (England) Order 2015. Latest Amendment dated April 2021

2 NOISE CRITERIA

THE TOWN AND COUNTRY PLANNING (GENERAL PERMITTED DEVELOPMENT) (ENGLAND) ORDER 2015 (AS AMENDED)

2.1 The GPDO has been created as part of a general policy objective to consolidate a number of statutory instruments in relation to town and country planning in England. The Order sets out classes of development for which a grant of planning permission is automatically given, provided that no restrictive condition is attached or that the development is exempt from the permitted development rights.

2.2 Permissions under the GPDO have usually been subject to certain limitations and conditions, including in some cases a condition that the developer applies to the local planning authority for a determination as to whether their prior approval is required for certain impacts before the developer can begin.

2.3 The 2021 amendment order stated within "*Class MA – commercial, business and service uses to dwellinghouses*" conditions MA.2. that "*Before beginning development under Class MA, the developer must apply to the local planning authority for a determination as to whether the prior approval of the authority will be required as to—*

(a) transport impacts of the development, particularly to ensure safe site access;

(b) contamination risks in relation to the building;

(c) flooding risks in relation to the building;

(d) impacts of noise from commercial premises on the intended occupiers of the development;

(e) where—

(i) the building is located in a conservation area, and

(ii)the development involves a change of use of the whole or part of the ground floor,

the impact of that change of use on the character or sustainability of the conservation area;

(f) the provision of adequate natural light in all habitable rooms of the dwellinghouses;

(g) the impact on intended occupiers of the development of the introduction of residential use in an area the authority considers to be important for general or heavy industry, waste management, storage and distribution, or a mix of such uses;

(h) where the development involves the loss of services provided by—

(i) a registered nursery, or

(ii)a health centre maintained under section 2 or 3 of the National Health Service Act 2006, the impact on the local provision of the type of services lost; and

(i) where the development meets the fire risk condition, the fire safety impacts on the intended occupants of the building"

2.4 The above highlighted part (d) is relevant to this assessment.

BS 4142:2014+A1:2019 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

2.5 The British Standard BS 4142:2014 +A1:2019 "Methods for Rating and Assessing Industrial and Commercial Sound" describes methods for rating and assessing sound of an industrial or commercial nature. The scope of the standard includes relevant topics for commercial development, such as sound from fixed installations (mechanical and electrical plant and equipment). The standard is applicable to the determination of rating levels for sources of sound as well as ambient, background and residual levels. The Standard was amended in June 2019.

2.6 Certain acoustic features can increase the significance of impact that might be expected from a comparison of the specific sound level to the background sound level where these features are likely to affect perception and response. Where such features are present at the assessment location, a character correction (or penalty) to the specific sound level is made to obtain the rating level. This can be approached from subjective, objective and reference methods.

+ Tonality: A correction of 0dB to +6dB for sound ranging from not tonal to prominently tonal.

+ Impulsivity: A correction of up to +9dB can be applied for sound that is impulsive.

+ Intermittency: A penalty of +3dB can be applied if on/off conditions are readily distinctive within the reference time interval over the period of the greatest amount of on-time.

+ Other characteristics: A penalty of +3dB can be applied in the absence of all other defined characteristics, where the specific sound contains a distinctive feature in the residual acoustic environment.

2.1 Character corrections are normally added arithmetically where more than one feature is present, however, if any single feature is dominant to the exclusion of others, then it may be appropriate to reduce the correction or apply a zero correction for the minor characteristics. The rating sound level is equal to the specific sound level if there are no acoustic features present or expected to be present.

2.2 The significance of sound depends upon both the margin by which the rating level exceeds the background sound level and the context in which the sound occurs. An initial estimate of the impact of the specific sound is made by subtracting the measured background sound level from the rating level. The context of the development is important in assessing the impact.

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

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context. A difference of around + 5 dB is likely to be an indication of an adverse impact, depending on the context.

- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or significant adverse impact. Where the rating level does exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

2.3 The scope of the Standard recognises that human response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact can depend on various factors such as the exceedance to the background level, its absolute level, time of day and change in environment, as well as local attitudes to the source of sound and character of the neighbourhood.

PROPG: PLANNING AND NOISE – NEW RESIDENTIAL DEVELOPMENT (2017)

2.4 Professional Practice Guidance on Planning and Noise has been developed by a working group consisting of representatives from the Association of Noise Consultants (ANC), Institute of Acoustics (IOA), Chartered Institute of Environmental Health (CIEH) and practitioners from a planning and local authority background. The guidance was made effective in May 2017 to provide a recommended approach to the management of noise within the planning system in England. The document draws upon the legislation, guidance and standards available at the time of publication and reflects the Noise Policy Statement for England (NPSE), the National Planning Policy Framework (NPPF) and Planning Practice Guidance (such as PPG-Noise), as well as other authoritative sources of guidance.

2.5 The ProPG recommended approach involves two sequential stages covering an initial noise risk assessment and then full assessment considering four key elements. These cover a good acoustic design process, observing internal noise level guidelines, undertaking an external amenity area noise assessment and consideration of other relevant noise issues.

2.6 The scope of ProPG considers new residential development that will be predominantly exposed to airborne noise from transportation sources. In cases where the site is exposed to noise of an industrial and/or commercial nature, this shall be considered at Stage 1 of the ProPG approach.

2.7 ProPG provides a summary of internal noise level guidelines as part of Stage 2 assessment requirements. These guidelines are derived from British Standard BS 8233:2014 *Guidance on Sound Insulation and Noise Reduction for Buildings* and The World Health Organisation *Guidelines for Community Noise* (1999).

Activity	Location	Daytime 07:00 – 23:00	Night-time 23:00 – 07:00
Resting	Living room	35 dB $L_{Aeq, 16\,h}$	-
Dining	Dining room / area	40 dB $L_{Aeq, 16\,h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16\,h}$	30 dB $L_{Aeq, 8\,h}$ 45 dB $L_{Amax(F)}$

Table 1 – ProPG Internal Noise Level Guidelines.

2.8 The use of dB $L_{Amax(F)}$ as a health indicator during the night should be treated in correlation with the overall dB $L_{Aeq, T}$ value, considering the number of transient events that occur on a regular basis.

3 ENVIRONMENTAL SURVEY SUMMARY

3.1 An environmental noise survey has been previously undertaken at the front and rear of The Site (SSC report 37195 R1); the details have been provided in Appendix D and data summarised in this section.

3.2 The environmental survey was been undertaken between Tuesday 14th to Wednesday 15th September 2021 to quantify sound levels at the development site in accordance with BS 4142.

BACKGROUND AND AMBIENT SOUND LEVELS

3.3 The 'typical' background sound levels have been reported in this section in accordance with BS 4142 as established from histograms of the recorded dB $L_{A90,\ 15min}$ data at Positions 1 and 2, shown in Appendix D. The measurement locations have been used to describe the underlying climate at the front and rear of the Site.

3.4 In line with Section 8.1.4 of BS 4142, the monitoring duration should reflect the range of background noise levels for the period assessed. In practice, there is no single level for background sound as this is a fluctuating parameter, although a representative value of the period should be used. Note this is not either the lowest or mean average value of dB $L_{A90,\ 15min}$.

Measurement Data			Background Sound Pressure Level, dB $L_{A90,\ 15\ min}$ re. 20µPa	
Position	Time HH:MM	Period Description	Range	Typical
1 (Front)	07:00 – 23:00	Day	49 - 61	55
	23:00 – 07:00	Night	46 - 53	47
2 (Rear)	07:00 – 23:00	Day	44 - 52	46
	23:00 – 07:00	Night	42 - 45	43

Table 2 – Background sound level dB $L_{A90,\ T}$ summary at development site.

3.5 The following average equivalent sound pressure levels dB $L_{Aeq,\ T}$ have been established as representative without the proposed development in operation.

Measurement Data			Ambient Sound Pressure Level, dB $L_{Aeq,\ T}$ re. 20µPa	
Position	Time HH:MM	Period Description	15-min Range	Average
1 (Front)	07:00 – 23:00	Day	56 - 69	64
	23:00 – 07:00	Night	50 - 63	56
2 (Rear)	07:00 – 23:00	Day	45 - 58	53
	23:00 – 07:00	Night	43 - 47	45

Table 3 – Ambient sound level dB $L_{Aeq,\ T}$ summary at development site.

4 NOISE IMPACT FROM COMMERCIAL PREMISES

4.1 GPDO 2021 part (d) of part (MA.2) requires consideration of impacts of noise from commercial premises on the intended occupiers of the proposed development. BS 4142 has been recognised as the industry standard methodology for assessing industrial/commercial noise impacts on proposed developments.

4.2 It has been noted from the site survey that there were no identifiable industrial or commercial sound sources audibly affecting The Site during the daytime, and that there are no commercial premises identified in the immediate vicinity, where the surrounding buildings are generally of residential use.

4.3 Building services plant associated with the student accommodation of International Hall on (Lansdowne Terrace) opposite The Site, has been noted at ground level, consisting of 1 no. wall mounted single condenser and extract louvre. These plant items have been noted as inaudible from the site survey measurement positions, where anonymous (transportation) noise has been observed as dominant, from Grenville Street and the surrounding road network.

4.4 General plant emissions from surrounding buildings, including any high-level roof plant, have been deemed insignificant to the assessment. Rooftop air handling units (AHUs) have been identified associated with the International Hall, nominally 36 m from The Site and fully screened by the roof/building profile. Other nearby commercial premises have been identified as Sainsbury's Bloomsbury and the Hare and Tortoise public house, both nominally 50 m from the site boundary, and fully screened by buildings with no direct line-of-sight.

4.5 It is acknowledged that the need to assess noise impact from environmental sources is precluded under the general permitted development order. Notwithstanding, the methodology provided within ProPG has been used to review the noise risk on the proposal and inform on suitable sound insulation specifications and ventilation strategies to inform the scheme design.

4.6 Industry guidance describes that where commercial activity is not dominant, it does not need to be assessed separately outside of a ProPG site risk assessment. Therefore, a detailed BS 4142 assessment has been deemed unnecessary for the proposal, where a suitable scheme of glazing and ventilation has been described in the next section as commensurate mitigation of ambient noise affecting The Site.

4.7 It has been shown from the previous noise impact assessment (37195 R2) submitted for the approved application *2017/4551/P* (for the upper floors), that a suitable ventilation and glazing strategy can be provided to protect future occupants from the ambient noise climate affecting the site, notably dominated by transportation sources. Where commercial sound sources have been deemed 'not dominant' in this assessment, it has been considered useful to provide similar recommendations for mitigating façade sound insulation, based on Pro PG industry guidance.

5 GOOD ACOUSTIC DESIGN PROCESS

5.1 **Although GPDO legislation does not specifically require assessment of anonymous transportation noise for permitted development, it can be shown that suitable internal noise levels can be achieved (based on BS 8233) in relation to dominant transportation noise. Commercial noise impacts have been considered insignificant to the assessment from Section 4. The following site risk assessment and recommended specifications have therefore been based on ProPG guidance.**

5.2 ProPG states it is imperative for acoustic design to be considered at an early stage of the development control process, as to avoid unreasonable acoustic conditions and prevent those which are unacceptable. This follows overarching planning guidance on noise, to mitigate adverse effects, prevent significant effects and avoid those which are unacceptable.

5.3 In terms of ProPG initial site risk assessment, the front façade (overlooking Grenville Street) has been considered 'medium risk' as the worst-case facade (the general permitted development order notwithstanding). Where a medium noise risk has been noted, the pre-planning application advice stated in ProPG is as follows:

"As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development."

INTERNAL NOISE LEVEL GUIDELINES

5.4 ProPG provides a summary of internal noise level guidelines as part of Stage 2 assessment that have been replicated in Table 1 of this assessment.

5.5 The method adopted to achieve suitable internal noise level guidelines has been based upon information contained within the recent ANC publication, The AVO Guide[2] . This has provided an approach as to how the competing aspects of thermal and acoustic comfort can be managed and has been written to reflect the requirements of ProPG and overarching planning requirements.

5.6 Given the initial site risk assessment in the worst-case, as medium risk, it has been considered commensurate to judge suitable façade components in terms of windows and ventilation.

5.7 The range of whole dwelling ventilation strategies for development has been taken from The Building Regulations 2010 Approved Document F (2013, as amended) Means of Ventilation. An outline appraisal for suitability has been provided using Table B2 of the AVO Guide.

[2] Acoustics Ventilation and Overheating Residential Design Guide Version 1.1, January 2020.

Ventilation Strategy (according to ADF) Front facade	Typical windows and vent	Higher acoustic performance windows and vent
System 1: Intermittent extract fans System 2: Passive stack ventilation	✘	✓
System 3: Continuous mechanical extract (MEV)	✘	✓
System 4: Continuous mechanical supply and extract with heat recovery (MVHR)	✘	✓

Table 4 – Outline appraisal of ventilation strategies in accordance with ADF.

5.8 The following specifications have been based on calculations to the detailed method in section G2.1 of BS 8233 (equivalent to the method in BS EN 12354-3). Room sizes have been based on the floor plans provided in Appendix C. Conservative corrections have been made from the measurement positions relative to ground level, following CRTN[3]. A nominal (conservative) reduction of 5 dB has been applied to the measurements taken at Position 1 to account for screening to the side (bedroom) elevation.

5.9 An adaptation term has been provided for all specifications following the method ISO 717-1:2013. This includes a comparison between the normalised, A-weighted sound spectrum for day and night against the adaptation curves for C and C_{tr}. In this instance the relevant spectrum adaptation term at the front façade is C_{tr} as has been confirmed by visual comparison. As the dominant sound source has been identified as road traffic, this is also directly relevant from Table A1 of ISO 717-1.

5.10 The existing façade insulation and ventilation systems in place at The Site has not been established; therefore, the minimum specifications for windows and ventilators have been provided in the below Table.

Façade component		Specification	Metric w/ Adaptation Term	Example Configuration or Proprietary Product
Windows	Lightwell	≥ 31	dB $R_w + C_{tr}$	4mm / 16mm / 6mm double glazing.
	Side			
Single trickle ventilator*	Lightwell	≥ 40	dB $D_{ne,w} + C_{tr}$	Acoustic trickle vent, *Passivent AL-dB 40*.
	Side			

** If more than one ventilator is proposed per room, the specification would increase, see Table 6.*

Table 5 – Minimum specifications for windows and ventilators.

5.11 In the case of System 1 and System 2, where the total number of ventilators need to achieve a suitable Equivalent Area for the entire dwelling, each habitable room may need to contain more

[3] The Calculation of Road Traffic Noise, CRTN. Department of Transport Welsh Office, 1988.

than one trickle vent. In this instance, the performance of the ventilator will need to increase (by a factor 10 x log_{10} [n], where n is the number of vents per room). For example:

Façade component	Quantity in Room Façade	Specification	Metric with Adaptation Term
Ventilators (per habitable room)	1	≥ 40	dB $D_{ne,w} + C_{tr}$
	2	≥ 43	
	3	≥ 45	

Table 6 – Minimum specifications for ventilators, where one or more are used per habitable room.

5.12 The advice in this section has considered the internal ambient noise level with closed windows. The AVO guide requires that consideration has also been given to the overheating condition. With an advocated and simplistic insertion loss of 13 dB from external to internal areas with an open window, the following summary has been provided for the worst-affected façade with both closed and open windows.

Level 1 Risk Assessment following the AVO Guide			Internal ambient noise level dB re. 20 µPa		
Location	Windows	Ventilation State	Day dB $L_{Aeq,T}$	Night dB $L_{Aeq,T}$	Max dB $L_{Amax(F)}$
Lightwell / Side	Window closed and ventilators open	Building Ventilation	29	21	42
	Windows partially open	Overheating Ventilation	49	41	62

Table 7 – Estimated IANL from different ventilation conditions.

5.13 In case of closed windows, building ventilation conditions have been shown to provide suitable internal ambient noise levels following ProPG and AVO, given that predicted values in the above Table do not exceed those in Table 1.

5.14 The potential for adverse effects with open windows depends upon both the internal ambient noise level and the frequency and duration of the overheating condition. There is no known appraisal[4] to determine the latter. The AVO guide provides that such assessment should be optional, based on the external sound levels.

5.14.1 It has been noted from the AVO guide, that a material change in behaviour may occur with internal ambient noise levels of > 50 dB $L_{Aeq,T}$ (07:00 – 23:00) during the day, > 42 dB $L_{Aeq,T}$ or > 65 dB $L_{Amax(F)}$ (23:00 – 07:00) during the night.

5.14.2 These values have not been exceeded by the simple calculations provided in the above Table, therefore providing the initial estimation that opening windows could be acceptable at the development when accounting for the worst-case façade.

[4] CIBSE Technical Memorandum 59. Design methodology for the assessment of overheating risk in homes.

6 CONCLUSIONS

6.1 A study of environmental sound affecting the proposed residential change of use has been carried out at 11 Grenville Street, London WC1N 1LZ.

6.2 Sound from commercial sources has been assessed in Section 4 to satisfy the requirements of the GPDO (2015, as amended). A detailed BS 4142 assessment has not been deemed necessary where no commercial premises have been identified in the immediate vicinity The Site; where any mechanical services plant noise from surrounding buildings may be contributing the ambient sound climate, this has been considered 'not dominant' and subjectively indistinguishable from site observation.

6.3 Where commercial sound as been determined as 'not dominant', ProPG industry guidance has been followed to provide recommendations for suitable mitigating glazing and ventilation elements against the prevailing ambient sound climate, described in Section 5.

6.4 On the basis that design recommendations within this report have been adopted, it follows that any significant adverse noise impacts will be avoided in the finished development, as to accord with overarching planning guidance for new residential development.

Appendix A: Glossary of Acoustic Terms

'A' weighting dB(A): Correction applied to the frequency range of a noise in order to approximate the response of the human ear. Noise measurements are often A-weighted using an electronic filter in the sound level meter.

Attenuation: Sound reduction, measured in decibels (dB).

Ambient Sound: The totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far. Note: The ambient sound comprises the residual sound and the specific sound when present.

Background sound level: A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

Calibration: A check of the function of a sound level meter by comparing the meter reading with a known sound pressure level.

Decibel (dB): The unit of sound level and noise exposure measurement. The range of audible sound pressures is approximately 0 dB to 140 dB.

Frequency (Hz): The pitch of the sound, measured in Hertz.

LAeq,T: The A-weighted equivalent continuous sound pressure level during a period. It is the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period, T.

Octave-bands: A division of the frequency range into recognised bands.

Rating level, LAr,Tr: The specific sound level plus any adjustment for the character of the sound.

Residual sound: Ambient sound remaining in the absence of the specific sound or that it is supressed as not to contribute to the ambient sound level.

Residual sound level, Lr or Leq,T: The equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given reference time interval, T.

Sound pressure level (SPL): The basic measure of sound, expressed in decibels, usually measured with an appropriate frequency weighting (e.g. the A-weighted SPL in dB(A)).

Sound power level (Lw): The sound energy radiated per unit time by a sound source measured in watts (W). Sound power can be weighted (e.g. A-weighted) and is not influenced by environmental or physical factors such as weather or distance.

Specific sound: Sound source being assessed.

Specific sound level, Ls or Leq,T: The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval, T.

Appendix B: Annotated Site Location Plan

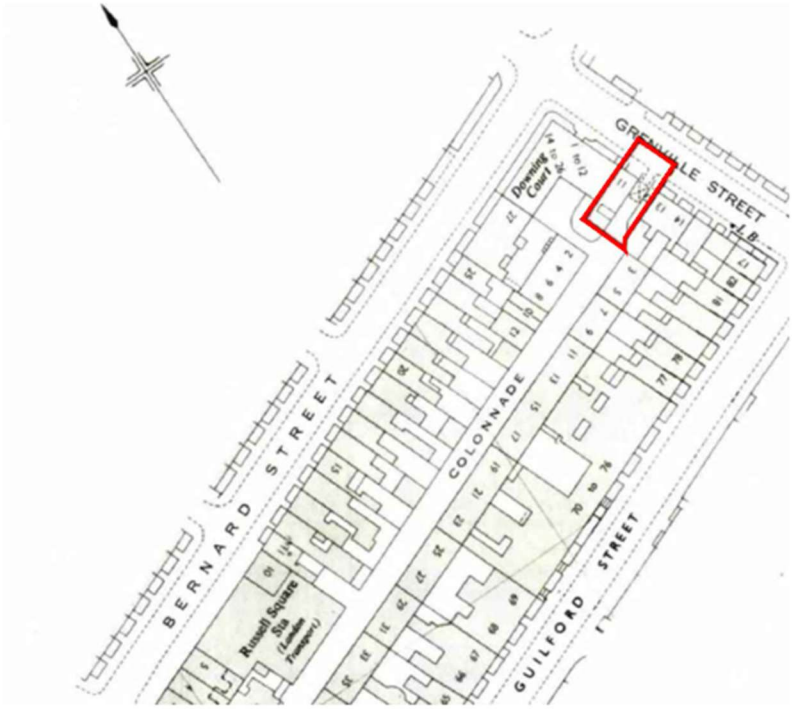


Figure B1 – Site location plan.

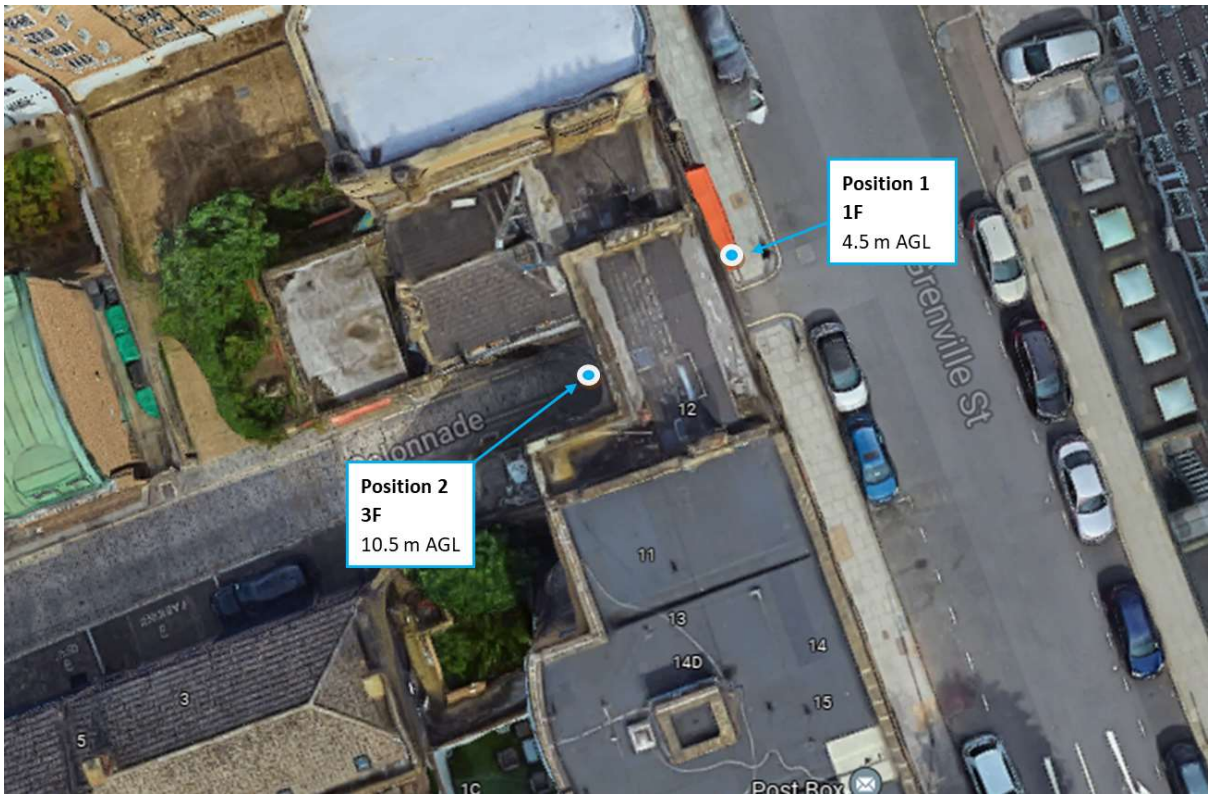


Figure B2 - Site plan annotated for measurement positions (from previous survey report 37195 R2 for approved application 21/00230/PFUL2).

Appendix C: Scheme Design

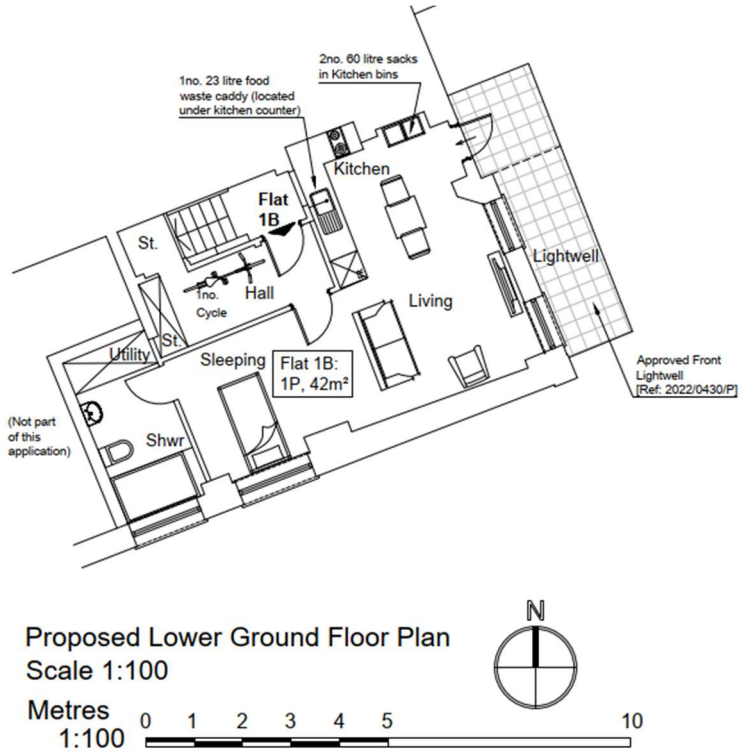


Figure C1 – Proposed development plans.

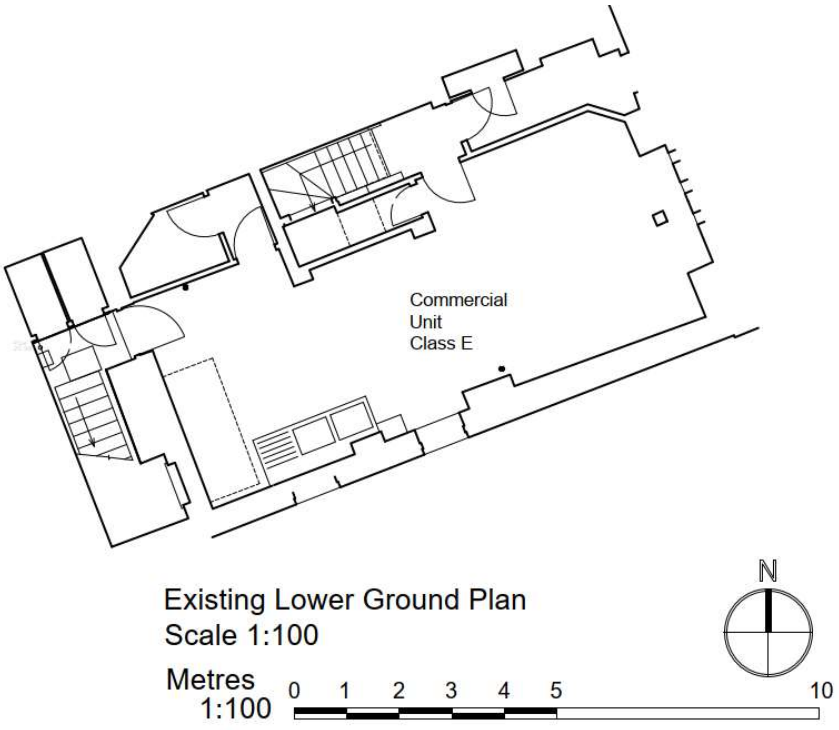


Figure C2 – Existing basement floor plan.

Figure C3 – Proposed east elevation

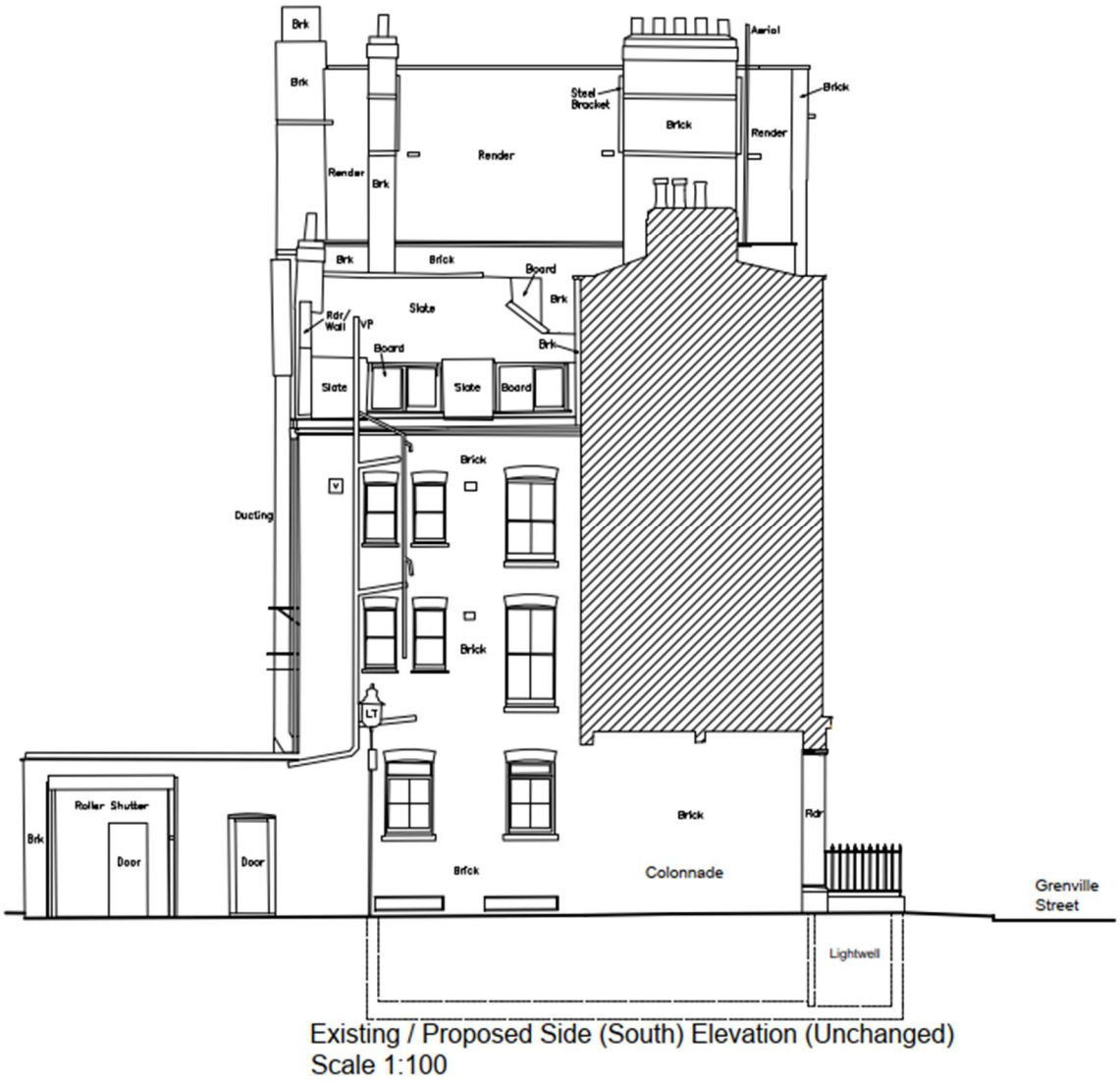


Figure C4 – Proposed south elevation

Appendix D: Environmental Survey

The following survey information has been taken from SSC report 37195 R2 as submitted for the approved development ref. 21/00230/PFUL2 (PP-09431799).

The equipment used conforms to BS EN 61672-1:2003 (Class 1) for sound level meters and BS EN 60942 (Class 1) for sound calibrators; with at least traceable calibration history valid; no greater than two years for sound level meters and one year for sound calibrators, relevant to the times of the site assessment.

Position No.	Manufacturer	Model No.	Description	Serial No.
1	Larson Davis	LxT (SE)	3rd octave band sound level meter	3934
	Larson Davis	PRMLxT1L	Microphone preamplifier (low range)	29332
	Larson Davis	337B02	½" electret microphone	146990
2	Larson Davis	LxT (ST)	3rd octave band sound level meter	4170
	Larson Davis	PRMLxT1L	Microphone preamplifier (low range)	36076
	Larson Davis	337B02	½" electret microphone	151485
1 & 2	Larson Davis	CAL200	Sound level calibrator	11165

Table D1 – Sound monitoring equipment.

Validation checks at the end of the survey demonstrated acceptable drift across all parts of the study, across the sound level measurement equipment used, of ≤ 0.20 dB. Interval data was recorded at the measurement location at 1-minute and 15-minute periods, time synchronised to GMT.

Weather conditions at the times of site attendance were deemed acceptable for surveying.

Weather conditions	Start	Finish	Additional comments
Wind velocity	< 5m/s Average < 0m/s Gust	< 5m/s Average < 0m/s Gust	Rain was present during the setup of the survey. But noted stop within a hour of survey commencement. Therefore, not deemed to have a significant impact on results.
Wind direction	East	Southwest	
Cloud cover/rain	80 %, 5mm rain	0 %, no rain	
Temperature	18 °C	21 °C	

Table E2 – Recorded weather conditions.

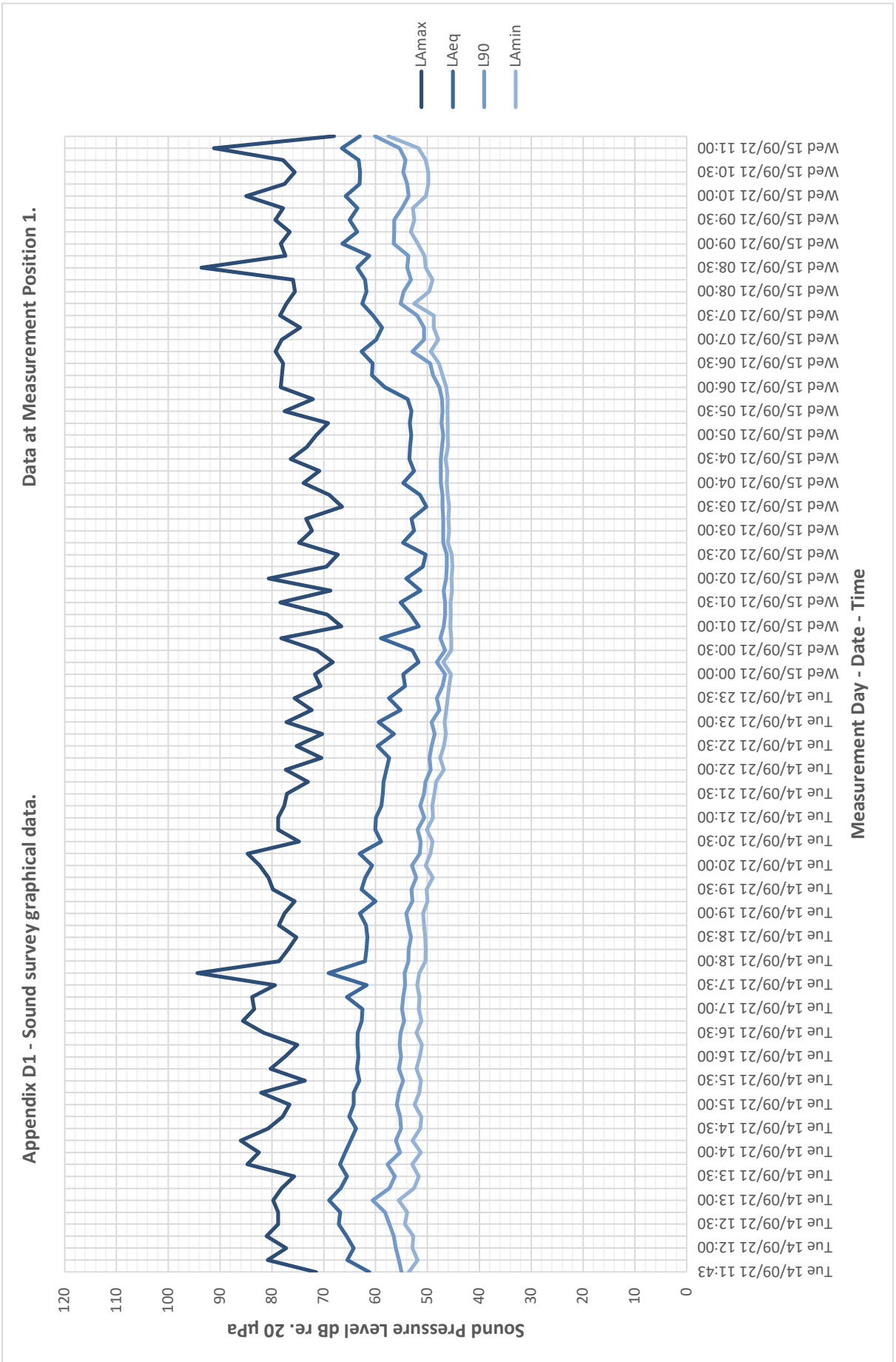
Interval noise data was recorded at the measurement positions on site from Tuesday 14th September 2021 to Wednesday 15th September 2021 at 15-minute periods, time synchronised to BST and between sound level meters. Weather conditions at the times of reported site measurements were deemed to be conducive to environmental surveying, being absent of strong winds (<< 5m/s) and rain over the reported period.

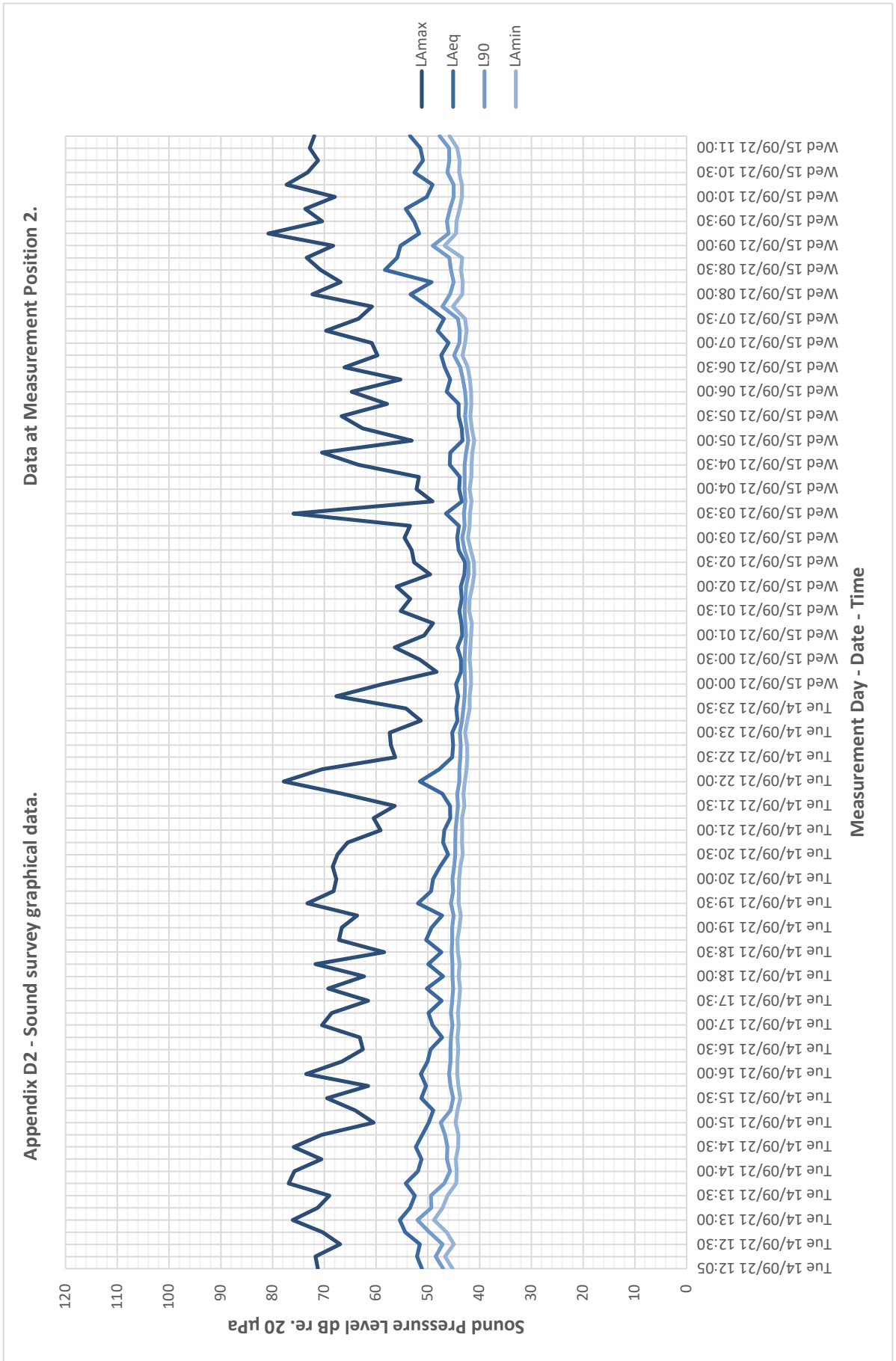
Sound levels at the front of the development site, at Position 1, were relevant to high street traffic along Grenville Street. A typical diurnal pattern can be seen with ambient and background levels increasing during the daytime and decreasing into the night. Intermittent high peaks are understood to have occurred from passing sirens.

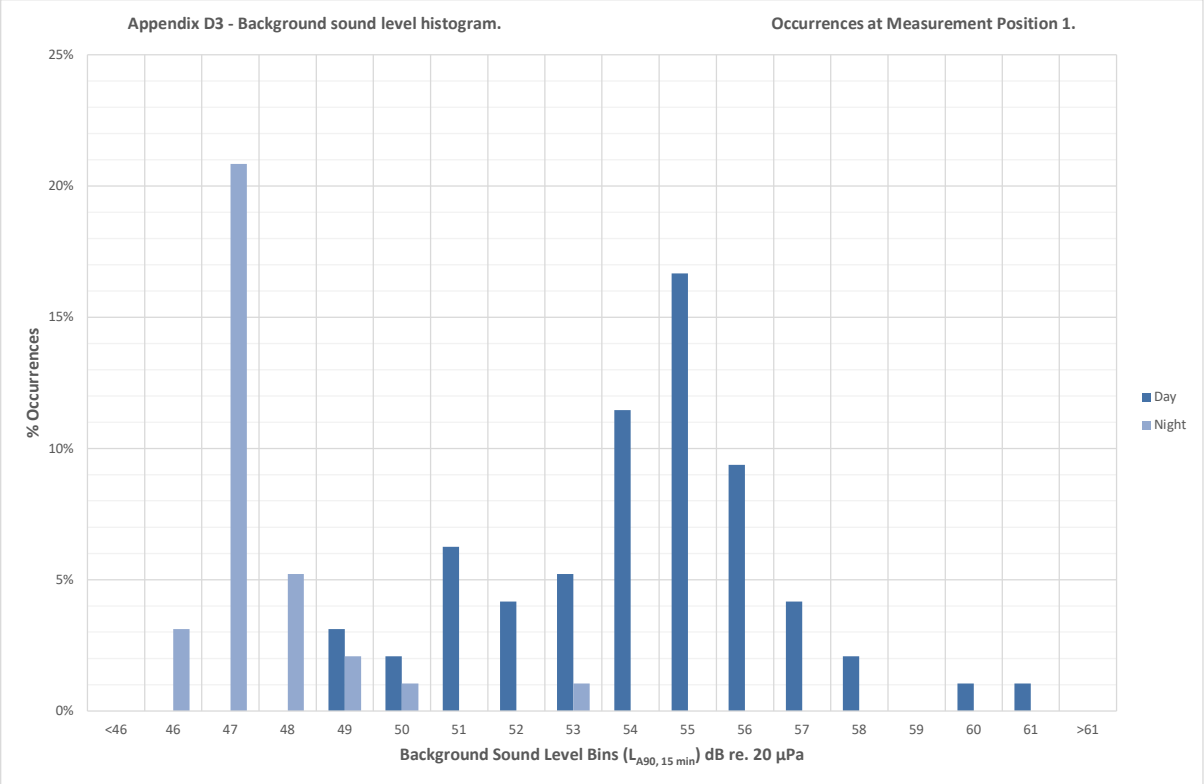
At the rear of the development site, the relative levels at Position 2 were markedly lower comprising of low-level ambient traffic emanating over the adjacent buildings from surrounding road network.

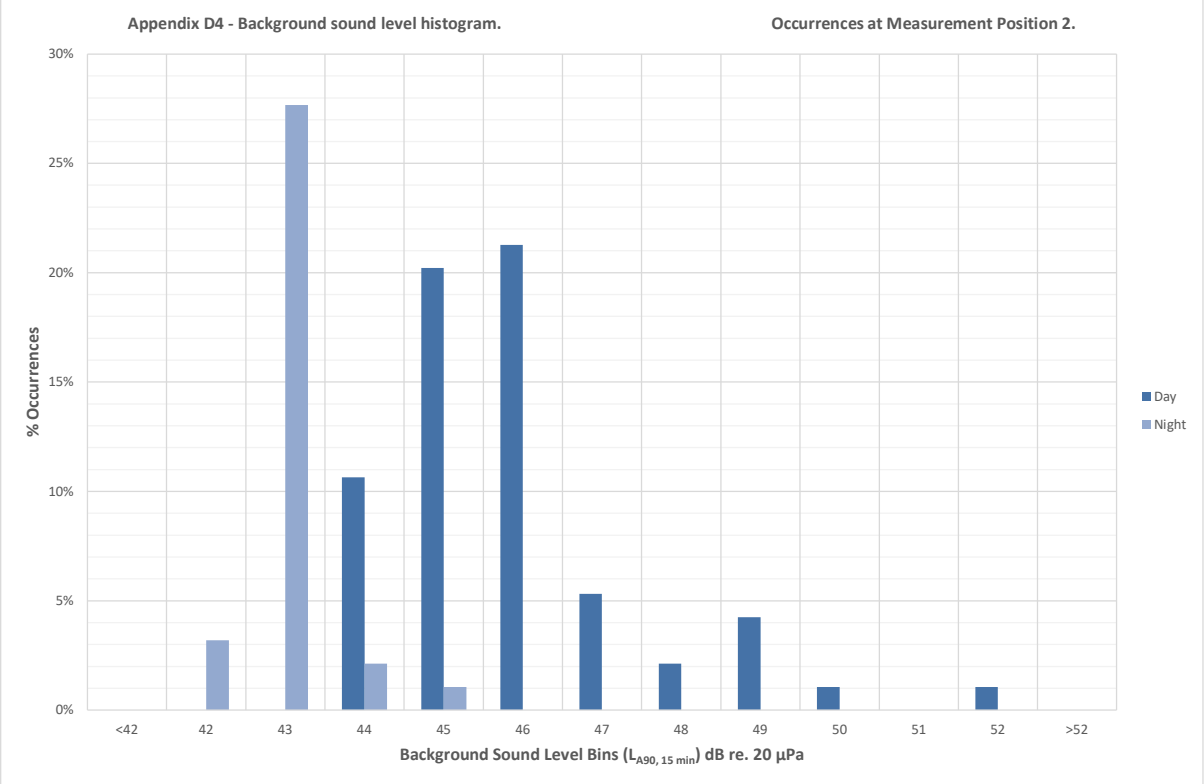
Figure D1 - Site photo showing measurement Poisiton 1.

Figure D2 - Site photo showing measurement Position 2.


LAmax
LAeq
L90
LAmin
Appendix D1 - Sound survey graphical data.
Data at Measurement Position 1.
Sound Pressure Level dB re. 20 µPa
0
10
20
30
40
50
60
70
80
90
100
110
120
Measurement Day - Date - Time
Tue 14/09/21 11:43
Tue 14/09/21 12:00
Tue 14/09/21 12:30
Tue 14/09/21 13:00
Tue 14/09/21 13:30
Tue 14/09/21 14:00
Tue 14/09/21 14:30
Tue 14/09/21 15:00
Tue 14/09/21 15:30
Tue 14/09/21 16:00
Tue 14/09/21 16:30
Tue 14/09/21 17:00
Tue 14/09/21 17:30
Tue 14/09/21 18:00
Tue 14/09/21 18:30
Tue 14/09/21 19:00
Tue 14/09/21 19:30
Tue 14/09/21 20:00
Tue 14/09/21 20:30
Tue 14/09/21 21:00
Tue 14/09/21 21:30
Tue 14/09/21 22:00
Tue 14/09/21 22:30
Tue 14/09/21 23:00
Tue 14/09/21 23:30
Wed 15/09/21 00:00
Wed 15/09/21 00:30
Wed 15/09/21 01:00
Wed 15/09/21 01:30
Wed 15/09/21 02:00
Wed 15/09/21 02:30
Wed 15/09/21 03:00
Wed 15/09/21 03:30
Wed 15/09/21 04:00
Wed 15/09/21 04:30
Wed 15/09/21 05:00
Wed 15/09/21 05:30
Wed 15/09/21 06:00
Wed 15/09/21 06:30
Wed 15/09/21 07:00
Wed 15/09/21 07:30
Wed 15/09/21 08:00
Wed 15/09/21 08:30
Wed 15/09/21 09:00
Wed 15/09/21 09:30
Wed 15/09/21 10:00
Wed 15/09/21 10:30
Wed 15/09/21 11:00


Appendix D2 - Sound survey graphical data.
Data at Measurement Position 2.
LAmax
LAeq
L90
LAmin
Sound Pressure Level dB re. 20 µPa
0
10
20
30
40
50
60
70
80
90
100
110
120
Measurement Day - Date - Time
Tue 14/09/21 12:05
Tue 14/09/21 12:30
Tue 14/09/21 13:00
Tue 14/09/21 13:30
Tue 14/09/21 14:00
Tue 14/09/21 14:30
Tue 14/09/21 15:00
Tue 14/09/21 15:30
Tue 14/09/21 16:00
Tue 14/09/21 16:30
Tue 14/09/21 17:00
Tue 14/09/21 17:30
Tue 14/09/21 18:00
Tue 14/09/21 18:30
Tue 14/09/21 19:00
Tue 14/09/21 19:30
Tue 14/09/21 20:00
Tue 14/09/21 20:30
Tue 14/09/21 21:00
Tue 14/09/21 21:30
Tue 14/09/21 22:00
Tue 14/09/21 22:30
Tue 14/09/21 23:00
Tue 14/09/21 23:30
Wed 15/09/21 00:00
Wed 15/09/21 00:30
Wed 15/09/21 01:00
Wed 15/09/21 01:30
Wed 15/09/21 02:00
Wed 15/09/21 02:30
Wed 15/09/21 03:00
Wed 15/09/21 03:30
Wed 15/09/21 04:00
Wed 15/09/21 04:30
Wed 15/09/21 05:00
Wed 15/09/21 05:30
Wed 15/09/21 06:00
Wed 15/09/21 06:30
Wed 15/09/21 07:00
Wed 15/09/21 07:30
Wed 15/09/21 08:00
Wed 15/09/21 08:30
Wed 15/09/21 09:00
Wed 15/09/21 09:30
Wed 15/09/21 10:00
Wed 15/09/21 10:30
Wed 15/09/21 11:00


Appendix D3 - Background sound level histogram.
Occurrences at Measurement Position 1.
% Occurrences
25%
20%
15%
10%
5%
0%
<46
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
>61
Background Sound Level Bins ($L_{A90, 15\ min}$) dB re. 20 µPa
Day
Night


Appendix D4 - Background sound level histogram.
Occurrences at Measurement Position 2.
% Occurrences
30%
25%
20%
15%
10%
5%
0%
<42
42
43
44
45
46
47
48
49
50
51
52
>52
Background Sound Level Bins ($L_{A90, 15\ min}$) dB re. 20 µPa
Day
Night

Appendix E: Calculations

Calculation Summary according to BS 8233:2014 Section G2.1, from BS EN 12354-3:2000.									
Ref	Room Name	Sound Insulation Scheme, dB				Criteria, dB(A)			Pass / Fail Design Vs Criteria
						35	30	45	
		Wall	Glazing	Façade Vent(s)	Roof	Day	Night	Max	
		R_w	R_w	$D_{ne,w}$	R_w	dB(A)	dB(A)	dB(A)	
1	Living room / Bedroom	57	35	40	-	23	17	35	PASS

Table E1 – Noise break-in calculation summary.

Appendix F: Acousticians Qualifications and Status

Lee Denson BSc. (Hons) MSc. MIOA

Position Held:	Principal Acoustic Consultant.
Qualifications:	BSc. (Hons) Music Technology.
	MSc. Music Technology.
	Institute of Acoustics Diploma; Acoustics & Noise Control
Affiliations:	Member of the Institute of Acoustics.
Acoustics Experience:	9 years.
Core Competences:	Building Acoustics, Noise & Vibration from Building Services.

Dominic Attwell BEng. (Hons) MIOA

Position Held:	Senior Acoustic Consultant.
Qualifications:	BSc. (Hons) Audio Acoustics.
Affiliations:	Member of the Institute of Acoustics.
Acoustics Experience:	6 years.