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PRIOR APPROVAL APPLICATION FOR DEVELOPMENT OF 31 RESIDENTIAL UNITS AT VALLIS HOUSE, 57 VALLIS ROAD, FROME

NOISE ASSESSMENT

On behalf of:

Vallis House Limited

Report No: P21-340-R01v1
July 2021

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NOISE ASSESSMENT

Report prepared by:
Hepworth Acoustics Ltd
1st Floor Aztec Centre
Aztec West
Almondsbury
Bristol
BS32 4TD

On behalf of:
Vallis House Limited

Report prepared by: Graham Bowland BSc MIOA – Technical Director	
Report checked by: Paul Bassett BSc MSc FIOA – Technical Director	

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1.0 INTRODUCTION

1.1 Hepworth Acoustics was commissioned to carry out a noise assessment relating to a Prior Approval planning application for converting the existing office building, Vallis House, at 57 Vallis Road, Frome, to residential use.

1.2 The purpose of this assessment is therefore to consider the potential impact of noise from neighbouring commercial premises on the future occupiers of the development, in compliance with the requirements of The Town and Country Planning (General Permitted Development) (England) (Amendment) Order 2016.

1.3 It is understood that the development will proceed under Class O of the General Permitted Development Order scheme. This includes the following condition with regards to noise: "*O.2. — (1) Development under Class O is permitted subject to the condition that before beginning the development, 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 — (d) impacts of noise from commercial premises on the intended occupiers of the development*." On this basis, it is necessary to consider noise impact from nearby commercial premises only. Other types of noise, such as road traffic noise, are not required to be considered under the General Permitted Development Scheme.

1.4 The L-shaped building comprises upper-ground and first floor levels across the full building footprint. This is also a lower-ground floor level at the southeast and north parts of the building only, with unenclosed undercroft parking (below the upper-ground floor) intervening between these spaces, opening onto a front hardstanding/parking area, accessed from Vallis Road.

1.5 The front elevations of the building, facing generally east, overlook Vallis Road, with existing residences beyond. Road traffic is the dominant noise source at those elevations.

1.6 To the opposite side of the building is a further hardstanding/parking area. This is accessed via Robins Lane, which branches southwestwards from Vallis Road, giving access to a mostly residential area. This road also gives access to Vallis Trading Estate, which is located to the west of Vallis House.

1.7 The commercial premises at the Trading Estate that are nearest to Vallis House are as follows:

- Royal Mail Sorting Office, comprising a gated front hardstanding/parking area to its southern end, and warehouse style building extending northwards, parallel to the rear elevation to the long side of Vallis House.

- Aggregate Industries, comprising a 2-storey office block extending west from the northwest corner of Vallis House.
- Hawker Joinery, comprising a workshop within a detached warehouse type building, with extract plant louvres to its southern elevation, located to the west of the Aggregate Industries building, and to the north of the Royal Mail building, visible only from the northwest part of Vallis House.

1.8 At the time of this assessment, the Vallis House building is in office use. Much of the building is vacant, though the long section of the L-shaped building is occupied at upper ground floor level. The vacant sections are subdivided into various rooms accessed via common corridors.

1.9 It is understood that all existing windows are to be retained.

1.10 The site location and surroundings are shown in Figure 1.

1.11 The proposed scheme is for 31 self-contained units. The proposed internal floor plans are provided in Figure 2 (lower-ground), Figure 3 (upper-ground) and Figure 4 (first floor).

1.12 The various noise indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 ACOUSTIC CRITERIA

2.1 The *National Planning Policy Framework* (NPPF) 2021 states at paragraph 174 that "*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 … noise pollution …*".

2.2 Further, paragraph 185 states that "*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 …*".

2.3 Paragraph 187 states that: "*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.*

2.4 However, there is as yet no specific guidance on numerical acoustic assessment/design criteria for proposed new residential developments provided in the NPPF, accompanying Technical Guidance document, National Planning Practice Guidance 'Noise', nor the NPSE.

BS 4142

2.5 Relevant guidance is provided in British Standard 4142: 2014 +A1:2019 *Methods for rating and assessing industrial and commercial sound*, which provides methods for rating and assessing sound of an industrial and/or commercial nature.

2.6 BS 4142 requires the 'rating' sound level for the operation to be compared with the L_{A90} background sound level in the absence of the operational noise. An initial estimate of the likely impact of the operation is determined by subtracting the background level from the 'rating' level.

2.7 Where the initial estimate of the impact needs to be modified due to the context, BS 4142 states that all pertinent factors should be taken into account in determining whether the initial estimate of the impact needs to be modified, including:

- The absolute level of sound, including "*where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds background. This especially true at night*."
- The character and level of the residual sound.
- The sensitivity of the receptor and whether dwellings will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as façade insulation treatment.

2.8 It is noted that the Scope of the Standard states that "*The standard is not intended to be applied to the derivation of indoor sound*". In the context of this assessment, it is noted that only internal living areas are proposed at the development, as such comparison to background noise levels may not be relevant in all circumstances.

BS 8233

2.9 British Standard 8233: 2014 *Guidance on sound insulation and noise reduction for buildings* recommends guidance on design criteria for acceptable noise levels within residential accommodation. BS 8233 guidelines for the daytime (0700-2300hrs) and night-time (2300-0700hrs) periods are summarised in Table 1.

Table 1 : BS 8233 Recommended Acoustic Design Criteria

Activity	Location	Internal Noise Levels	
		Daytime 0700-2300hrs	Night-time 2300-0700hrs
Resting	Living room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room / area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

2.10 BS 8233 also states that, "*where development is considered necessary or desirable … the internal target levels* [i.e. those in Table 1] *may be relaxed by up to 5dB and reasonable internal conditions still achieved*".

2.11 BS 8233 clarifies that the above guidance relates only to noise without specific character (e.g. such as that which has a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content) and that where such characteristics are present, lower noise limits might be appropriate.

2.12 The BS 8233 guidelines also assume normal diurnal fluctuations in external noise. *"In cases where local conditions do not follow a typical diurnal pattern … an appropriate alternative period, e.g. 1 hour, may be used".*

2.13 Further, BS 8233 states that if there is a reliance on closed windows to meet the guide values, "*there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level*". It is stated that assessments should be based on a room with "*adequate ventilation provided (e.g. trickle ventilators should be open)*".

2.14 BS 8233 also recognises that regular individual noise events at night can cause sleep disturbance. Peaks of noise from individual events are usually described in terms of L_{Amax} values and these can be highly variable and unpredictable. ProPG: Planning & Noise (2017) states that "*in most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events*".

ProPG: Planning & Noise

2.15 ProPG: Planning & Noise 'Professional Practice Guidance on Planning & Noise' 2017 provides "*guidance on a recommended approach to the management of noise within the planning system in England*". The scope of the ProPG is restricted to sites that are exposed predominantly to noise from transportation sources. However, the recommended approach is also stated as being suitable where some industrial or commercial noise contributes to the acoustic environment provided that it is "*not dominant*".

2.16 Where applicable, ProPG recommends a staged approach to assessment. Stage 1 is an initial site noise risk assessment, indicating whether the proposed site is considered to pose a negligible, low, medium or high risk from a noise perspective. Stage 2 is a full assessment to consider good acoustic design. The guidelines of ProPG in terms of suitable acoustic design criteria are broadly consistent with the guidance of BS 8233, as summarised in Table 1 above.

3.0 NOISE SURVEY

3.1 A noise survey was undertaken at the site over the course of Monday 22 and Tuesday 23 February 2021, including the night-time period.

3.2 This included noise monitoring at two external locations over a continuous 22-hour period, commencing at 1300hrs on Monday 22 February 2021. To note, the intention had been to monitor noise over a complete 24-hour period, however unexpectedly strong winds, sufficient to affect the noise measurements, arose after about 1100hrs on Tuesday 23 February 2021, and hence the monitoring was curtailed at that time.

3.3 Both continuous noise monitoring locations were external, at 1m laterally from first-floor windows. The locations are identified as Location 1 and Location 2 in Figure 1. It is noted, however, that those annotations are also intended to identify additional corresponding internal and external noise measurements locations, as discussed below.

3.4 Location 1 is representative of worst-case conditions in relation to any noise from the Royal Mail sorting office and also from Vallis Road and Robins Lane. Location 2 is representative of worst-case conditions in relating to any noise from Hawker Joinery.

3.5 The noise monitoring results are presented graphically in Appendix II.

3.6 The external overall noise levels determined by way of the above monitoring are set out in Table 2. The daytime $L_{Aeq,16hr}$ and night-time $L_{Aeq,8hr}$ noise exposure levels are obtained from the logarithmic average of all measured $L_{Aeq,5min}$ noise measurement samples over each of those periods at each location. To provide a robust interpretation of ProPG guidelines relating to L_{Amax}, the overall night-time L_{Amax} noise level has been determined for assessment purposes as the measured $L_{Amax,5min}$ exceeded no more than 5 times over the full night-time period at each location.

Table 2 : Overall Road Traffic Noise Levels at Locations 1-2

Location	Daytime (0700-2300hrs)	Night-time (2300-0700hrs)	
	dB $L_{Aeq,16hr}$	dB $L_{Aeq,8hr}$	dB L_{Amax}
1	58	50	69
2	52	44	66

3.7 At both locations, some supplementary daytime noise measurements were carried out internally, with windows partially open, and also (using an adjacent room) with windows closed. The internal noise measurement results are tabulated in Appendix II.

3.8 Comparison of the measured internal noise levels with concurrent external monitoring results indicates the following typical noise reductions (outside to inside), based on L_{Aeq}:

- Location 1 – 19dB via a partially open window / 28dB via closed windows
- Location 2 – 19dB via a partially open window / 24dB via closed windows

3.9 This demonstrates good consistency between locations, especially based on partially open windows. Given that the existing windows are of the same specification throughout the building, the difference in reductions via closed windows may be attributed, in part, to differing frequency content of the external noise. Also, a better measurement in terms of minimising the effects of background noise was possible at Location 1 due to the higher external levels, dictated by road traffic noise.

3.10 At Location 1, some supplementary noise measurements were also carried out externally at upper-ground floor level (i.e. one storey down from the continuous monitoring height). The relevant measurement results are tabulated in Appendix II. Comparison of the noise measurements at the two heights indicate that noise levels at upper ground floor are typically 6dB lower than those at first floor level. This is due to an existing stone wall separating the parking area to the south of Vallis House from Robins Lane and also Vallis Road.

Commentary on Noise at Location 1

3.11 In general, the dominant noise source at Location 1 throughout the survey period was general road traffic on Vallis Road and Robins Lane. Aircraft noise was also noted.

3.12 Noise associated with the Royal Mail sorting office was limited. During the afternoon period, there were some very occasional light vehicle movements, prior to the gate be locked in the late afternoon. Just before 0530hrs the following morning, the sorting office re-opened, though with no significant noise generation at that time.

3.13 After about 0600hrs, some noise from movement of trolleys outside was noted, however this was faint, with all such activity taking place close to the front of the sorting office building, hence screened from Vallis House by the edge of the building. Over this period a number of staff arrived in private cars. Road traffic noise was also broadly representative of daytime levels by this stage of the morning.

3.14 Shortly after 0700hrs a large Royal Mail lorry arrived at the site, and reversed into the marked-out location on the ground in front of the sorting office building. The lorry was unloaded and reloaded with trolleys over the period of about 1-hour. Noise from this activity was audible externally, or internally with windows open, but at a low level relative to ambient noise from road traffic. The activity noise was sporadic over that period, with lengthy periods without noticeable noise.

3.15 Over the period of about 0830-1000hrs, about 20 Royal Mail panel vans were loaded, sometimes using a trolley pushed across the hardstanding, before setting off on rounds. By about 1200hrs, panel vans had begun to return and were parked up.

3.16 It is not considered feasible to provide a meaningful initial estimate of impact of noise from the Royal Mail operations to BS 4142, as it was not possible to separate noise from that site from general road traffic noise. This allies with the subjective impression that noise generation at the Royal Mail site is not significant. This is consistent with expectation, given the proximity of existing residences on Robins Lane that have a clear view to the main activity area at the sorting office site, i.e. around its south elevation.

3.17 Consequently, it is appropriate to assess areas to the south of Vallis House, nearest to the Royal Mail site, based on the approach set out in ProPG: Planning & Noise, as this is applicable where some industrial or commercial noise contributes to the acoustic environment provided that it is "*not dominant*".

Commentary on Noise at Location 2

3.18 In general, the dominant noise source at Location 2 throughout the main part of the daytime was a combination of commercial noise and general ambient noise. Aircraft noise was also noted. Throughout the night-time, residual ambient noise was the main sound in the area.

3.19 Some noise associated with Hawker Joinery was audible during their daytime operational hours. This generally comprised a low level of steady machinery noise emanating from the workshop building, with occasional other fluctuating noise, and occasional short bursts of noise from an extract fan exhaust located on the south elevation of the workshop. The workshop was closed in the late afternoon and staff were noted leaving before 1800hrs. There was no noise noted from the premises overnight and works did not commence until after 0700hrs the following morning.

3.20 There was generally no notable noise observed from the Aggregate Industries offices. There is a very small air conditioning unit mounted to the wall close to Vallis House. This was operating during the survey but noise emissions were so low as to not be measurable over the ambient noise.

3.21 Further west, there are two Mitsubishi VRF-type condenser units, located in an open-topped, lightweight timber enclosure. Adjacent to this, interrupting line-of-sight from the units to Vallis House, there is a slightly more solidly constructed smoking shelter. The units were not operating during the survey, potentially due to low office occupancy during Covid-19 lockdown. It was not possible to determine the specific model of the units, however typically these types of units have a sound power level of up to about 80dBA. Based on distance, screening, and source and surface directivity, it is likely that the two units would give rise to a noise level of about 50dBA at 1m from Vallis House.

3.22 Noise was also noticeable in this area from occasional passing private cars and light vans.

Survey Details

3.23 Noise monitoring was undertaken externally at first floor level at Location 1 using a Norsonic 140 Type 1 Integrating Sound Level Meter (serial no. 1406529) and at Location 2 using a Norsonic 118 Type 1 Integrating Sound Level Meter (serial no. 31617).

3.24 All other noise measurements were undertaken using a using a Bruel & Kjaer 2260 Type 1 Integrating Sound Level Meter (serial no. 2467014). Calibration checks were carried out using a Bruel & Kjaer Acoustic Calibrator, Type 4231 (serial no. 2389221) before and after the survey, and no variation in calibration level was observed.

3.25 The measurement microphones were fitted with windshields.

3.26 Weather conditions during the survey were generally cold, dry, clear and generally calm, with a light southerly breeze. Winds increased slightly during the morning of Tuesday 23 February 2021, becoming suddenly rather strong after about 1100hrs, hence curtailment of the noise survey at that time.

4.0 NOISE ASSESSMENT & RECOMMENDATIONS

4.1 The overall noise levels set out in Table 2 for Locations 1 and 2 fall into the 'low' risk category as set out in the Stage 1 guidance of ProPG.

4.2 As set out in Section 3.0, at Location 1, this is a suitable basis of assessment of noise impact, as the commercial noise is not dominant at any time. Consideration of the road traffic noise is not necessary under Class O of the General Permitted Development scheme. However, consideration of the overall (commercial and traffic) noise levels provides a highly robust basis in this case for taking account of any noise associated with the Royal Mail sorting office.

4.3 Based on the overall noise levels at Location 1, and the differences in the internal noise levels identified, the internal noise levels set out in Table 3 are predicted.

Table 3 : Internal Noise Levels – Location 1

Window	Daytime (0700-2300hrs)	Night-time (2300-0700hrs)	
	dB $L_{Aeq,16hr}$	dB $L_{Aeq,8hr}$	dB L_{Amax}
Partially Open	39	31	50
Closed	30	22	41

4.4 The above indicates that internal noise levels will be slightly in excess of BS 8233 / ProPG guideline values with windows partially open, but well within those values with windows closed.

4.5 At Location 2, it is considered appropriate to provide an assessment of commercial noise with reference to BS 4142 for the daytime situation. Although noise levels in this part of the site are somewhat lower, being screened from road traffic noise, the main noise during the daytime is of a commercial nature. Most of the time, this is a low level of noise from Hawker Joinery. Higher levels of noise are from cars and small vans passing close to Location 2, however to provide a robust assessment in line with BS 4142, as the vehicles are on the Trading Estate, they are included as a component of the commercial noise in our analysis.

4.6 To provide an initial estimate of impact of daytime commercial noise at Location 2, in line BS 4142, a representative 1-hour daytime noise level has been taken as the logarithmic average of noise measurements during the period 0700-1700hrs, which was 54dB $L_{Aeq,1hr}$. This is considered appropriate in this case, rather than the worst-case hour, as the worst-case measurements were in fact due to the very occasional vehicles passing in this part of the site.

4.7 The representative level has been corrected for residual noise based on the average noise level over the hour commencing at 1800hrs, i.e. the first full hour after Hawker Joinery noise ceasing completely, which was 50dB $L_{Aeq,1hr}$, hence giving a 'specific sound level' (L_s) attributable to Hawker Joinery of 52dB $L_{Aeq,1hr}$.

4.8 To ensure a robust assessment, it is appropriate to add to this the predicted likely noise level attributable to the VRF condenser units of Aggregate Industries at Location 2, i.e. 50dB $L_{Aeq,1hr}$, hence giving an overall specific sound level of 54dB $L_{Aeq,1hr}$.

4.9 A +3dB acoustic feature penalty is applicable to account for the intermittent nature of certain components of the noise, hence giving a 'rating level' of 57dB $L_{Ar,Tr}$.

4.10 Comparison of the rating level to the modal average of the L_{A90} background noise levels that were measured over the hour commencing at 1800hrs, which is considered representative for this assessment, gives a difference of +17dB. Therefore, the initial numerical assessment indicates that commercial noise at Location 2 may be likely to be of a significant adverse impact, depending on the context, and in the absence of any noise mitigation measures.

4.11 As stated in Section 2.0, where the initial estimate of the impact needs to be modified due to the context, BS 4142 states that all pertinent factors should be taken into account. This includes the absolute level of the sound, the character and level of the residual sound, and also whether dwellings will incorporate design measures that secure good acoustic conditions.

4.12 In this situation, it is noted firstly that, the absolute levels of daytime noise are low, even in the presence of commercial noise. It is also noted that there is good scope for the incorporation of design measures into the residential development that will secure good internal acoustic conditions.

4.13 Based on the representative 1-hour commercial noise levels at Location 2 (including Aggregate Industries VRF condenser units) and the measured overall night-time noise levels, and the differences in internal noise levels identified, the internal noise levels set out in Table 4 are predicted.

Table 4 : Internal Noise Levels – Location 2

Window	Daytime (0700-2300hrs)	Night-time (2300-0700hrs)	
	dB $L_{Aeq,1hr}$	dB $L_{Aeq,8hr}$	dB L_{Amax}
Partially Open	35	25	47
Closed	30	20	42

4.14 Table 4 indicates that daytime internal noise levels will just achieve the BS 8233 / ProPG guideline values with windows partially open, but will be within those values with windows closed by a margin of 5dB, based on a representative hour. Importantly, it is noted that the relevant BS 8233 guidelines described in Section 2.0, including the internal design criteria set out in Table 1 (of this report), relate only to noise without specific character, and that where these characteristics are present, lower noise limits might be appropriate. It is considered that a 5dB lower limit would be appropriate in this case, and hence that lower level would be achieved with windows closed.

4.15 In the context of the daytime-only operations in question, it is considered that a reliance on closed windows to achieve optimal acoustic conditions would be acceptable, noting that even with windows open the representative external noise level would not give rise to an exceedance of BS 8223 guideline values. Occupants would have the option during the daytime to open and close windows as necessary, to regulate ventilation and noise control accounting for their own activities (i.e. as opposed to during the night-time when it would not be practicable to be opening and closing windows).

4.16 On this basis, accounting for the context, it is considered appropriate to adjust the conclusion of the initial BS 4142 assessment to one of low impact.

4.17 Table 4 also indicates that night-time noise will also generally be well within the BS 8233 / ProPG guideline values, save for a potential very slight exceedance in the target L_{Amax} value, only when windows are open. However, it is again considered appropriate to base the assessment on a situation with window closed, as there is no commercial noise present at night.

4.18 Based on the above assessment it is not considered that any specific noise mitigation measures are required for the proposed development. Suitable internal acoustic conditions may be achieved by way of the existing fenestration.

5.0 SUMMARY AND CONCLUSIONS

5.1 Hepworth Acoustics has undertaken a noise assessment relating to a Prior Approval application for converting the existing office building, Vallis House, at 57 Vallis Road, Frome, to residential use, to consider the potential impact of noise from neighbouring commercial premises on the future occupiers of the development, in compliance with the requirements of The Town and Country Planning (General Permitted Development) (England) (Amendment) Order 2016.

5.2 A noise survey has been undertaken at the site and daytime and night-time noise levels have been determined.

5.3 Based on the results of the noise survey, the noise levels at the site have been assessed with reference to relevant British Standards and guidance documents and are considered to be low impact.

5.4 It has been determined that no specific mitigation measures are necessary at the proposed development in order to achieve suitable acoustic levels for the future residents of the new dwellings.

Figure 1: Site Location

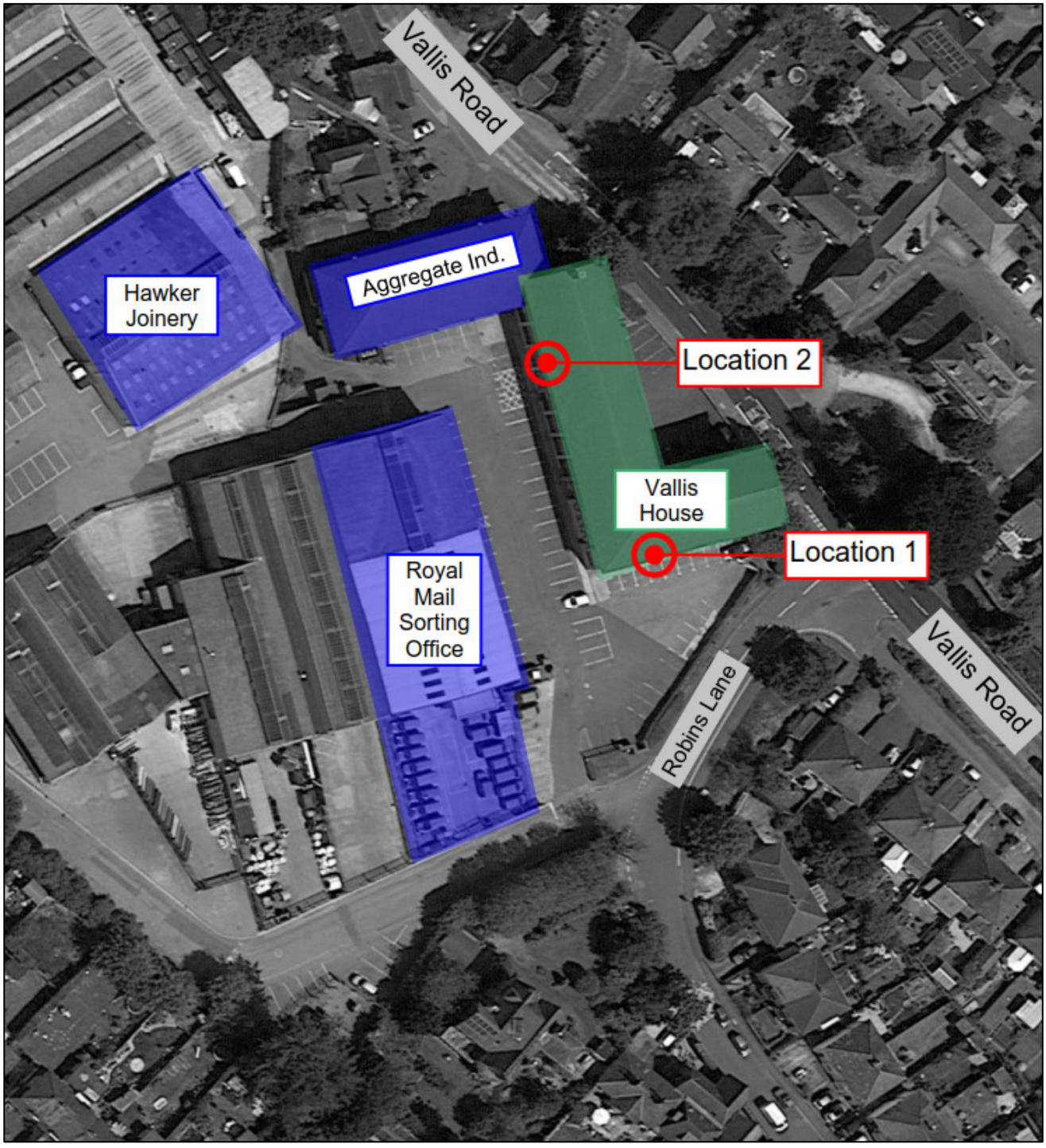


Figure 2: Proposed Lower-Ground Floor Layout

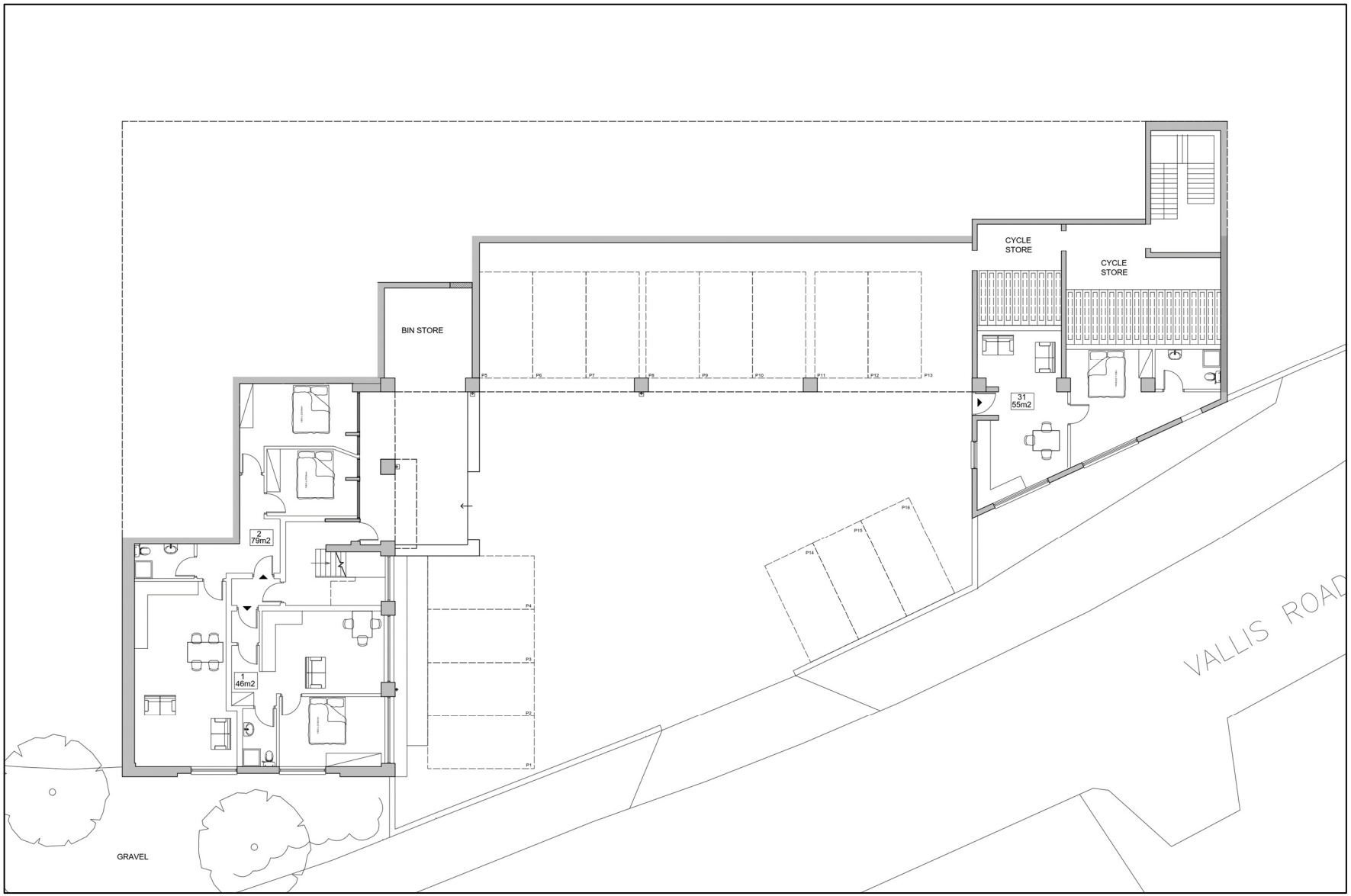


Figure 3: Proposed Upper-Ground Floor Layout

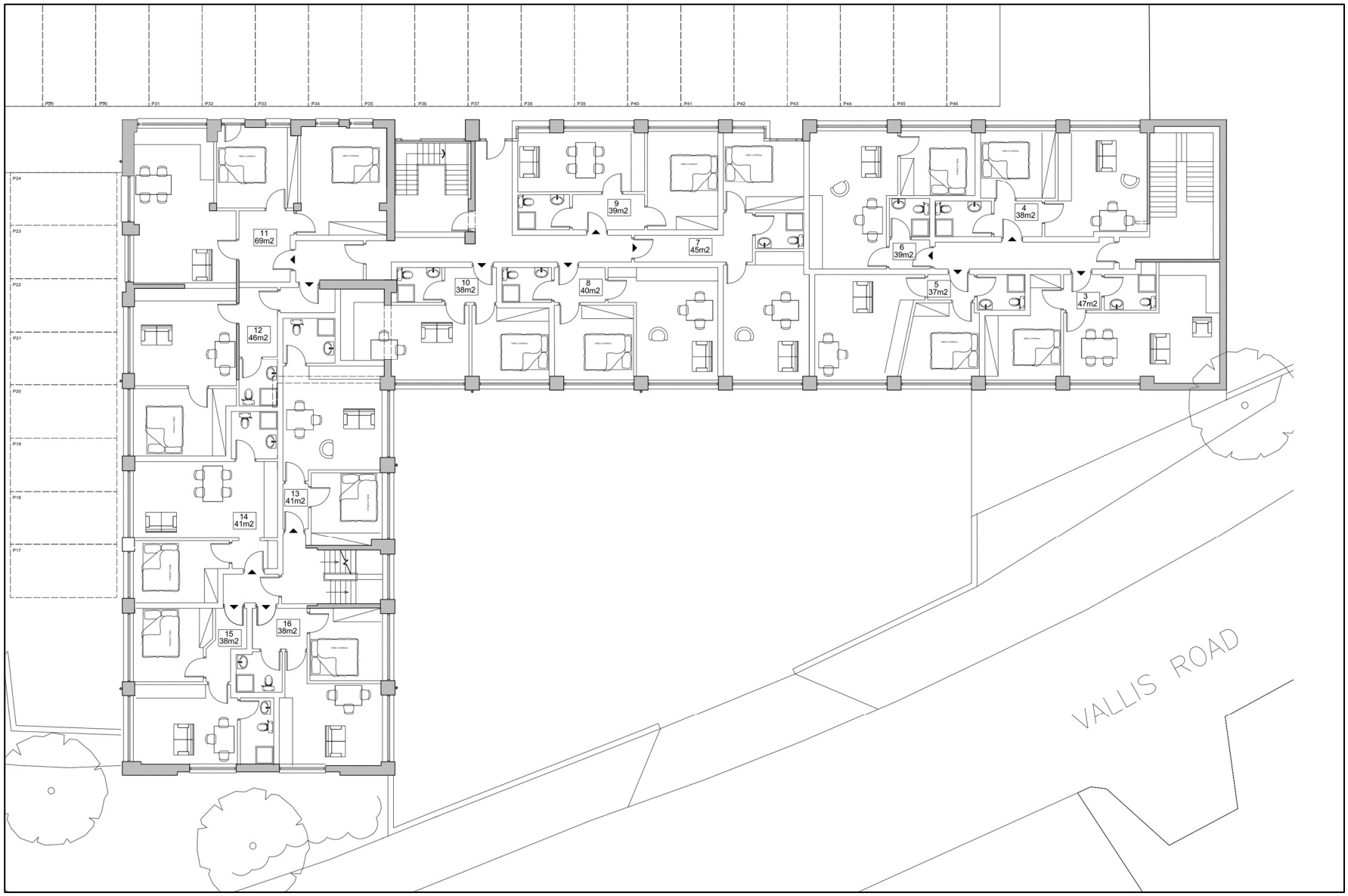


Figure 4: Proposed First Floor Layout

Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

L_{Aeq} This is the A–weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A–weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.

L_{Amax} This is the maximum A-weighted noise level that was recorded during the monitoring period.

L_{A10} This is the A-weighted noise level exceeded for 10% of the time period. L_{A10} is used as a measure of road traffic noise.

L_{A90} This is the A-weighted noise level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise.

Appendix II: Noise Survey Results

Location 1 – Supplementary Measurements, Internal, First Floor, Window Partially Open

Date	Time		Noise Level dB			
	Start	End	L_{Aeq}	L_{Aeq}	L_{Aeq}	L_{Aeq}
22/02/2021	16:00	16:05	37	45	41	28
22/02/2021	16:05	16:10	37	46	40	27
22/02/2021	16:10	16:15	38	53	41	29
22/02/2021	16:15	16:20	39	45	41	32
22/02/2021	16:20	16:25	39	50	41	34
22/02/2021	16:25	16:30	38	48	41	31
22/02/2021	16:30	16:35	38	49	41	33
22/02/2021	16:35	16:40	37	50	40	31
23/02/2021	07:00	07:05	40	55	43	32
23/02/2021	07:05	07:10	41	52	44	33
23/02/2021	07:10	07:15	39	47	42	31
23/02/2021	07:15	07:20	41	52	44	34
23/02/2021	07:20	07:25	40	49	43	32
23/02/2021	07:25	07:30	41	55	43	35

Location 1 - Supplementary Measurements, Internal, First Floor, Windows Closed

Date	Time		Noise Level dB			
	Start	End	L_{Aeq}	L_{Aeq}	L_{Aeq}	L_{Aeq}
22/02/2021	16:45	16:50	30	41	32	25
22/02/2021	16:50	17:00	28	40	31	23
22/02/2021	17:00	17:05	29	40	32	24
22/02/2021	17:05	17:10	35	63	34	20
22/02/2021	17:10	17:15	30	45	33	22
22/02/2021	17:15	17:20	31	57	32	23
22/02/2021	17:20	17:25	31	46	33	22
22/02/2021	17:25	17:30	28	44	30	22

Location 1 - Supplementary Measurements, External, Upper Ground Floor

Date	Time		Noise Level dB			
	Start	End	L_{Aeq}	L_{Aeq}	L_{Aeq}	L_{Aeq}
23/02/2021	09:30	09:35	52	71	55	47
23/02/2021	09:35	09:40	51	67	53	47
23/02/2021	09:40	09:45	52	66	55	47
23/02/2021	09:46	09:50	52	64	54	48
23/02/2021	09:50	09:55	53	72	55	47
23/02/2021	10:00	10:05	51	67	53	46
23/02/2021	10:05	10:10	51	64	54	46

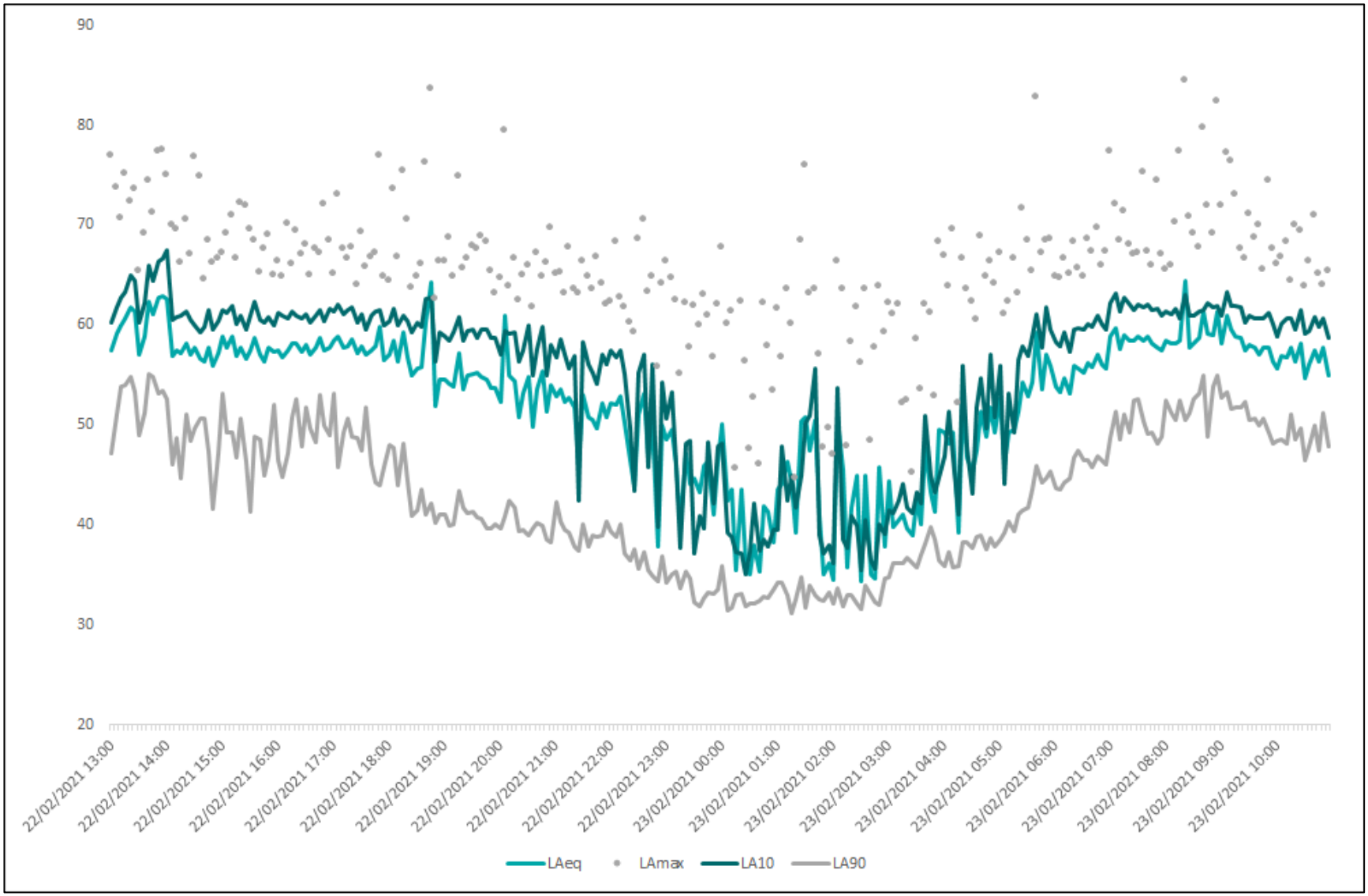
Location 2 - Supplementary Measurements, Internal, First Floor, Window Partially Open

Date	Time		Noise Level dB			
	Start	End	L_{Aeq}	L_{Aeq}	L_{Aeq}	L_{Aeq}
22/02/2021	14:25	14:30	34	51	37	30
22/02/2021	14:30	14:35	36	61	36	30
22/02/2021	14:35	14:40	33	43	36	30
22/02/2021	14:40	14:45	35	51	37	30
22/02/2021	14:45	14:50	34	55	36	30
22/02/2021	14:50	14:55	31	48	32	30
22/02/2021	14:55	15:00	34	43	37	30
22/02/2021	15:00	15:05	34	48	36	30

Location 2 - Supplementary Measurements, Internal, First Floor, Windows Closed

Date	Time		Noise Level dB			
	Start	End	L_{Aeq}	L_{Aeq}	L_{Aeq}	L_{Aeq}
22/02/2021	15:10	15:15	28	36	29	26
22/02/2021	15:15	15:20	28	39	30	26
22/02/2021	15:20	15:25	28	45	30	26
22/02/2021	15:25	15:30	28	45	30	26
22/02/2021	15:30	15:35	28	47	29	25
22/02/2021	15:35	15:40	28	40	29	25
22/02/2021	15:40	15:45	27	38	29	25
22/02/2021	15:45	15:50	27	35	29	25

Location 1 – Continuous Monitoring, External, First Floor



Location 2 – Continuous Monitoring, External, First Floor