12 Harpsfield Broadway
Hatfield AL10 9TF

Planning Noise Assessment for a Proposed Change of Use from Offices to Residential Flats

Report ref.

JW1407/17155/0

Issued to

Wastell & Porter Architects Ltd, on behalf of
Collins Property Holdings

Prepared by

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0	Initial report issue	21.08.2017

SECTION **TITLE** **PAGE**

1. INTRODUCTION

Wastell & Porter Architects Ltd, on behalf of Collins Property Holdings, are seeking planning permission for a residential development as part of a Change of Use Application, from offices to flats, at 12 Harpsfield Broadway, Hatfield. As part of this proposal, the noise impact of the surrounding environment on the amenity of prospective residents of the scheme is required to be assessed.

Spectrum Acoustic Consultants have been engaged to undertake the necessary measurements, analyses and assessments to address these issues. The details of noise measurement surveys are set out in this report and, where necessary, mitigating measures required to meet Welwyn Hatfield Borough Council's indicated noise standards.

2. SITE DESCRIPTION AND PROPOSALS

The full site address is 12 Harpsfield Broadway, Hatfield, Hertfordshire AL10 9TF. It is a three storey end of terrace building with a restaurant on the ground floor and two floors of offices above. The upper floors are smaller in area than the ground floor, creating a flat roof/terrace at first floor level to the rear of the offices/proposed flats.

Harpsfield Broadway is a short road that runs parallel with Comet Way (A1001), and contains a single terraced row of mixed uses (offices, flats, a takeaway and a restaurant) which are set back from Comet Way by approximately 25m. The frontages of these properties face onto Harpsfield Broadway to the east, beyond which is Comet Way. There is a Travelodge hotel to the rear (west) of the site, and a Volkswagen car dealership to the north across Jetliner Way.

A site location plan and existing layout drawing is provided in Appendix A.

There are mechanical plant items associated with the existing ground floor restaurant, Roti House, installed on the roof of the single storey section of building, comprising a cellar-cooling condenser and kitchen extract fan. These items are directly overlooked by the rear windows of the upper floors, and surrounding residences.

The proposal includes the construction of new internal partitions at first and second floor levels to create four one-bedroom flats, with two on each level. The existing window openings are to be retained, with new glazed units being provided to meet the required internal noise levels.

The proposed layout drawing is provided in Appendix B.

The noise environment across the site is dominated by road traffic noise, mainly from Comet Way but also from more distant local roads. The noise from surrounding commercial properties is discussed later within this report.

3. STANDARDS AND PLANNING REQUIREMENTS

3.1 NOISE POLICY GUIDELINES - NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

The **National Planning Policy Framework** (NPPF) sets out the government's guidance for local planning authorities and planning application decision-takers.

It says that the planning system should contribute to and enhance the environment by (among other things) preventing development from contributing to, being put at risk from, or being adversely affected by unacceptable levels of noise pollution. (Para. 109)

Paragraph 123 states that planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."

The NPPF refers to the **Noise Policy Statement for England** (NPSE) which sets out the long term vision of Government noise policy as follows: *Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.*

The NPSE aims to clarify the principles and aims in existing policy documents, legislation and guidance that relate to noise. Its noise policy aims are to:

- 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;

…through the effective management and control of environmental, neighbour and neighbourhood noise.

These aims are developed by reference to the concepts NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level). NPSE also refers to SOAEL (Significant Observed Adverse Effect Level).

It recognises that there is no universally applicable threshold for these concepts. Consequently, the SOAEL is likely to be different for different noise sources and receptors and at different times. Even so, significant effects should be avoided, taking account of sustainability aims.

Where noise impact is between LOAEL and SOAEL, the NPSE requires that all reasonable steps should be taken to mitigate adverse effects while taking account sustainable development aims. It notes (para. 2.7) that *the NPSE should consider noise alongside other relevant issues and noise should not to be considered in isolation.*

The **Planning Practice Guide** (PPG) refers to the NPPF and provides further guidance on the interpretation of no, lowest and significant observed adverse effect level described in the NPSE.

The PPG provides a commentary on the noise exposure hierarchy, based on the 'likely average response'.

The PPG recognises a broad range of factors which can influence the relationship between noise level and the impact on those affected. Accordingly, the examples in the table below may not be relevant to a specific development so each should be considered on its merits within the specific context under consideration.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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 in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 1: PPG adverse effect level thresholds

3.2 BS8233:2014 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

The NPPF requires that significant adverse impacts do not arise as a result of new development. Previously, PPG24 referred to BS8233:1999 in relation to specifying acceptable indoor and outdoor noise levels.

This Standard has been updated to *BS 8233:2014 Guidance on sound insulation and noise reduction for buildings* and the 1999 version superseded. The current BS8233 is still considered to provide the appropriate methods for assessing the noise impact of new developments.

BS8233 advises that the main requirements are to provide reasonable resting/sleeping conditions in bedrooms, and good listening conditions in other rooms.

These guidelines make recommendations for absolute noise targets that should not be exceeded inside properties, indicating an appropriate standard for living rooms during the day of $L_{Aeq,16\text{-}hour}$ 35 dB, and for bedrooms during the night of $L_{Aeq,8\text{-}hour}$ 30 dB. In addition, regular individual noise events should be prevented from causing sleep disturbance inside bedrooms at night, not regularly exceeding 45 dB L_{AFmax} during the night time period.

The guidelines in BS8233 are a reflection of those set out in WHO *Guidelines or Community Noise*, which states in relation to night time L_{AFmax} levels, "*For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10 to 15 times per night."*

3.3 BS 4142:2014 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

British Standard document BS 4142:2014 describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes sound from mechanical plant and equipment as well as sound from the loading and unloading of goods and materials at industrial and / or commercial premises.

The principal of assessment under BS4142 is to compare the sound from the source under investigation (if appropriate, with adjustments for duration and character) with the background L_{A90} (the typical minimum sound level) in the absence of the sound to be assessed. The standard states (Section 11):

a) *Typically, the greater this difference, the greater the magnitude of the impact.*
b) *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
c) *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
d) *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

BS4142 requires a 15 minute period L_{A90} level for assessments of night-time sound (7.00 am to 11.00pm) and a 1 hour period L_{A90} for daytime assessments.

Where the sound rating level is assessed to be 10 dB *above* the background sound level, this is generally taken to be a Significant Observed Adverse Effect Level (SOAEL). Where the sound rating level is assessed to be 10 dB *below* the background sound level, this is generally taken to be a Lowest Observed Adverse Effect Level (LOAEL).

3.4 WELWYN HATFIELD BOROUGH COUNCIL POLICY

Spectrum understand that Welwyn Hatfield's Environmental Protection Department's guidelines for acceptability of noise for this type of development are in line with those given in BS8233, which are:

- Internal habitable rooms, daytime $L_{Aeq,16hr}$ 35 dB (07:00-23:00)
- Internal habitable rooms, night time $L_{Aeq,8hr}$ 30 dB (23:00-07:00)
- Internal habitable rooms, night time L_{AFmax} 45 dB (23:00-07:00)

Prior to conducting this investigation, Spectrum contacted Welwyn Hatfield's Environmental Protection Department to obtain the numerical requirements for acceptability that Welwyn Hatfield currently apply to developments of this type and to quantify the issues to be assessed. In summary, their comments were:

- The issues to be assessed are:
  - Road traffic noise affecting the proposed new dwellings
  - Plant noise from any nearby mechanical equipment (BS4142 Assessment)
  - Noise through the floor from the restaurant below
- The numerical criteria listed above would be acceptable
- The report should discuss the mitigation measures necessary to provide acceptable conditions for prospective residents

The surveys and assessments undertaken in this report reflect these requirements.

4. NOISE MEASUREMENT SURVEY

Noise measurements were carried out during site surveys between Wednesday 26th and Monday 31st July 2017. This covers typical mid-week conditions and also the weekend environment. The site surveys include a mix of continuous unattended noise monitoring for the full 5 days' duration, attended measurements of plant noise and observations during peak restaurant trading over the weekend.

4.1 CONTINUOUS UNATTENDED MONITORING

Two noise loggers were used to measure continuously from Wednesday 26th to Monday 31st July 2017; one at the front façade and one at the rear facade. The measurements consisted of contiguous 5 minute periods to present the noise profile throughout the monitoring period and giving a good representation of night-time maximum noise events.

Noise measurement parameters consisted of equivalent continuous (L_{Aeq}) noise levels and maximum (L_{AFmax}) noise levels as well as statistical noise levels (termed L_n, where n is the percentage of time the level is exceeded during the measurement period). Both broadband and octave band measurements were stored for later analysis.

The measurement locations are shown in Appendix B, and are as follows:

Location L1 At the front façade at first floor level, overlooking Harpsfield Broadway and Comet Way.
Location L2 At the rear façade at first floor level, overlooking the plant area for the restaurant below.

In both locations the microphone was positioned 0.5m from the façade as no free-field locations were available. Therefore, measured levels are corrected by -3 dB to obtain the incident noise levels, in accordance with ISO 1996-2:2007 *Acoustics – Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels.*

The following equipment was used for the survey:

Location L1:
- Bruel & Kjaer Type 2250 Sound Level Meter s/n 2726905
- Bruel & Kjaer Type 4189 Microphone s/n 2710995
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 2730220

Location L2:
- Bruel & Kjaer Type 2250 Sound Level Meter s/n 3010857
- Bruel & Kjaer Type 4189 Microphone s/n 3060877
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 2291483

Before and after the survey, the sound level meter was field-calibrated in accordance with the manufacturer's guidelines, and no significant drift was observed. The meters, microphones, and field calibrators are laboratory calibrated biennially in accordance with UKAS procedures or to traceable National Standards.

4.2 ATTENDED MEASUREMENTS AND OBSERVATIONS

The long-term monitoring was supplemented by attended sample measurements during peak trading times of Roti House. Attended measurements were taken on the evening of Saturday 29th July, between 20:30 and 22:00. This is considered to be the peak trading time for the restaurant which, by around 21:00, was observed to be near capacity with only 2-3 empty tables.

Measurements were taken of internal ambient noise within the first floor offices in an attempt to quantify the level of noise transmission through the floor from the restaurant below. This was not detectable within the first floor offices that are proposed as dwellings. The restaurant below had background music which was not audible through the floor, nor were voices from the diners. Audio recordings were taken for reference. The building is concrete-framed, with a thick concrete first floor slab, therefore it is predictable that noise transmission would not be an issue.

Close-up measurements of plant items associated with Roti House were also obtained, which included the condenser unit, kitchen extract fan casing and discharge outlet. These measurements are discussed in more detail in Section 6 below.

4.3 RESULTS

The results of the noise monitoring at L1 and L2 are shown graphically in Appendix C. The results have also been summarised into the relevant daytime (07:00-23:00) and night-time (23:00-07:00) periods.

The numerical L_{AFmax} levels for each 8 hour night-time period have then been sorted by value from highest to lowest. From this, it is possible to read off the 10th highest L_{AFmax} level for each night. This value is then taken as the representative L_{AFmax} for design purposes at the respective monitoring locations. This is in full accordance with the guidance in the WHO "*Guidelines for community noise*" document, which states that, for a good nights' sleep, the L_{AFmax} level should not exceed 45 dB more than 10 to 15 times.

The measured daytime $L_{Aeq,16hr}$ and night time $L_{Aeq,8hr}$,as well as the representative measured night-time L_{AFmax} levels for each day of the survey are summarised in Table 2 below.

Location	Daytime $L_{Aeq,16hr}$ dB (07:00-23:00)	Night Time $L_{Aeq,8hr}$ dB (07:00-23:00)	Design L_{AFmax} dB
Location L1 – Front	65	62	79
Location L2 – Rear	58	53	63

Table 2: Summary of survey results (corrected for façade incident level)

5. ASSESSMENT AND MITIGATION

5.1 INTERNAL NOISE LEVELS

BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* describes a 'more rigorous calculation method' for determining internal noise levels, using octave band data (i.e. more rigorous than for single-number estimates). This is calculated from external noise levels, given the size and sound insulation properties of the building façade elements including glazing and ventilation, as well as acoustic properties of the receiving room, such as the volume and reverberation time. Usually, it is the glazing and, depending upon the particular strategy, the ventilation apertures that admit most noise into residences. It is then a matter of providing façade elements with appropriate acoustic performance to achieve sufficient noise reduction to meet the internal noise target.

The analysis uses:

- External noise levels for daytime $L_{Aeq,16hr}$ and night time $L_{Aeq,8hr}$ and design L_{AFmax} from Table 2 above.
- Room sizes and layouts from the proposed layout drawing in Appendix B.
- External wall and window sizes shown on the proposed layout drawing in Appendix B.
- Typical internal reverberation times for bedrooms and living rooms in occupied dwellings as measured by Spectrum on previous occasions.

The general construction of the building envelope used in the analysis is as follows:

- External wall as per the existing construction (brick with insulated cavity to blockwork lining).
- Thermal double glazed window units having a specification as described below.
- Ventilation to meet the requirements of Part F of the Building Regulations as discussed in the following Section.

Sound insulation data for the façade elements have been taken from standard data provided by BRE and DETR, as well as manufacturer's data.

Appendix D shows the intrusive noise calculations carried out following the method described above, for the first floor flats which are the worst-case examples. The calculations show that the daytime $L_{Aeq,16hr}$ inside living rooms and the night-time $L_{Aeq,8hr}$ and L_{AFmax} levels inside bedrooms meet BS8233 requirements, and detail what mitigation is required in terms of glazing and ventilator performance.

5.2 VENTILATION

Approved Document F of the Building Regulations (ADF) is the document which describes methods of providing adequate ventilation for residents in a building. It focuses on performance-based guidance, suggesting what level of ventilation should be sufficient, rather than how it should be achieved. It recognises that in noisy locations, it may be appropriate to use either sound attenuating background ventilators or mechanical ventilation solutions, depending on the noise level and any planning conditions.

In habitable rooms, there is a requirement for background ventilation, based on the number of bedrooms or total internal floor area, and purge (formerly rapid) ventilation of 4 air changes per hour. ADF provides 4 methods of achieving this ventilation, namely:

1. Background ventilators and intermittent extract fans
2. Passive stack ventilation
3. Continuous mechanical extract
4. Continuous mechanical supply and extract with heat recovery

For this development, Method 1 is proposed for all of the dwellings. This mechanism is described in more detail below.

5.2.1 Background ventilators and intermittent extract fans (method 1)

External air is drawn into habitable rooms of the dwelling through window-mounted trickle vents (one vent per bedroom and two per living room in all locations). Air is drawn through the dwelling and discharged via a mechanical extract fan located in wet areas (e.g. kitchens and bathrooms). Purge ventilation, when required, is provided by opening windows. The component of external intrusive noise entering habitable rooms through trickle ventilation elements is included in the calculations in Appendix D. The acoustic performance is set to ensure acceptable indoor noise levels are met.

5.3 FAÇADE ACOUSTIC SPECIFICATION

There are two standards of façade mitigation proposed due to the difference in external noise level between the front and rear façade of the building. These are set out in Table 3 below. The colour codes correspond to those marked up on the proposed site layout drawings in Appendix E.

Façade Performance colour code	Glazing		Ventilators (in open position)			
	R_w (C_{tr}) (dB)	Example Product	$D_{n,e,w}$ (C_{tr}) (dB)	Type	Quantity	Example Product
Red	36 (-7)	Double glazing 10/12/4	44 (-2)	Through-frame window slot-vent	2x in each Living Room 1x in each Bedroom	Greenwood *EHA574 Acoustic Trickle Vent*
Blue	31 (-6)	Double glazing 4/12/4	33 (-1)	Through-frame window slot-vent	2x in each Living Room 1x in each Bedroom	Greenwood *4000S standard hit-and-miss trickle vent*

Table 3: Minimum acoustic performance requirements of façade elements
[Typical glazing build-ups provided by Pilkington Glass and Saint-Gobain]

Please note the example products and glazing build-ups provided are for information only. It is the acoustic performance requirement that must be met, which the chosen manufacturer must be able to demonstrate compliance for the selected products. It is also important that products are selected using the correct acoustic terms identical to those given here, which are R_w+C_{tr} for glazing units, and $D_{n,e,w}$+C_{tr} for ventilators in the open position.

6. ASSESSMENT OF NOISE FROM COMMERCIAL ACTIVITY

6.1 MEASURED NOISE LEVELS

The Specific sound level has been determined through direct measurement at the assessment location, which is the proposed rear bedroom window of the first floor flat. The impact of the restaurant plant noise is greatest during the night time period, when background sound levels are low.

During the night, the CellarCool condenser operates intermittently, which is clearly visible on the trace given in Appendix C which shows clear 'steps' where this item of equipment is switching on/off. From this, the Specific Level of this condenser is taken as $L_{Aeq,15min}$ 58 dB for the night time period.

During the daytime, the Specific Level also consists of noise from the kitchen extract fan, which is observed to operate intermittently until 11pm each evening. With both the kitchen extract fan and CellarCool condenser operating together, the Specific Level is $L_{Aeq,1hr}$ 62 dB for the daytime period.

In addition to the noise logger profile at the assessment location, measurements of noise from individual items were taken at close proximity to each element. These results are summarised below:

Item	SPL at 0.5m $L_{Aeq,T}$ dB
CellarCool Condenser	72
Kitchen extract fan – discharge outlet	82
Kitchen extract fan – fan casing	69

Table 4: At-source noise levels of component plant items

6.2 RATING LEVEL

In Section 9.1, BS4142 states:

> *Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level.*
>
> *NOTE 2 The rating level is equal to the specific sound level if there are no such features present or expected to be present.*

In Section 9.2, BS4142 states:

> *Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed.*
>
> *Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention.*

Two noise sources are required to be assessed; the kitchen extract fan and the condenser. Both items have a tone that is just perceptible at the assessment location. They also both operate intermittently in a way that is readily distinctive against the residual acoustic environment. In order to present a robust assessment, a 5 dB character correction has therefore been added to account for intermittency and tonality, as described in Section 9.2 of BS4142.

Accordingly, the Rating level from mechanical plant is L_{Aeq} 67 dB during the day (kitchen extract and condenser operating) and L_{Aeq} 63 dB during the night (condenser only).

6.3 BACKGROUND SOUND

BS4142 defines background sound level as the *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.*

It goes on to add a number of comments and directions, including:

> *The background sound level is an underlying level of sound over a period, T, and might in part be an indication of relative quietness at a given location. It does not reflect the occurrence of transient and/or higher sound level events and is generally governed by continuous or semi-continuous sounds.*
>
> *In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.*

Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound.

8.1.2 Where possible, measure the background sound level at the assessment location(s). If this is not possible measure at an alternative location where the residual sound is comparable to the assessment location(s). A detailed justification for considering this should be reported.

In determining whether an alternative location is suitable for carrying out measurements of the background sound level it is important to take account of all contributing factors that might influence the measurement and assessment procedure. As far as is practicable, uncertainty in any measurement at an alternative location ought to be minimized and the extent of uncertainty reported.

In practice, there is no "single" background sound level as this is a fluctuating parameter. However, the background sound level used for the assessment should be representative of the period being assessed.

Taking all of these factors into account, the representative Background Levels are $L_{A90,15min}$ 47 dB during the night and $L_{A90,1hr}$ 52 dB during the day.

6.4 BS4142 ASSESSMENT

6.4.1 Night – Condenser only

The Rating Level at the most affected façade is 63 dB and the representative Background Level is 47 dB. Therefore, the excess of Rating Level over Background is +16 dB.

6.4.2 Day – Condenser and kitchen extract

The Rating Level at the most affected façade is 67 dB and the representative Background Level is 52 dB. Therefore, the excess of Rating Level over Background is +15 dB.

6.5 CONTEXT

BS4142 says:

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 a significant adverse impact.

Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

1) The absolute level of sound.

2) The character and level of the residual sound compared to the character and level of the specific sound.

3) The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:

i) facade insulation treatment;
ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
iii) acoustic screening.

There is no definitive guidance on the degree to which the above effects mitigate or exacerbate the assessment of the impact of industrial noise. However, the following comments specific to this development ought to be considered:

- The site is in a well-established mixed use area
- New residents will come to an area where the commercial activity already exists
- The development will include façade sound insulation, including requisite ventilation as described above in this report
- The impact of plant noise at the proposed new residential windows will be similar to that of the existing adjacent residential windows

6.6 POTENTIAL MITIGATION

As stated above, BS4142 advises that "*Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context".* It is therefore considered desirable to reduce the level of noise from the mechanical plant by around 15 dBA. For each item of plant, an outline scheme of mitigation to achieve this might include:

CellarCool condenser

- Relocate the condenser to a more distant or shielded location (e.g. ground floor at rear of restaurant)
- Or, house the unit within an acoustic enclosure with an insertion loss of around 15 dBA

Kitchen extract

- Relocate the kitchen extract to a more distant or shielded location (unlikely to be possible)
- Or, replace the fan unit with a quieter model (unlikely to be a model that is 15 dB quieter)
- Or, install an in-line silencer downstream of the fan with an insertion loss of around 15 dBA, and install an acoustic enclosure/lagging around the fan casing with an insertion loss of around 10 dBA.

As there are various options for noise reduction to be considered, it is recommended that a "scheme to be agreed" type Condition be included in any Permission, to allow a detailed scheme to be developed.

7. CONCLUSION

Wastell & Porter Architects Ltd, on behalf of Collins Property Holdings, are seeking planning permission for a Change of Use Application from offices to flats, at 12 Harpsfield Broadway, Hatfield. To accompany the application, the noise impact of the surrounding environment on the amenity of prospective residents of the scheme has been assessed.

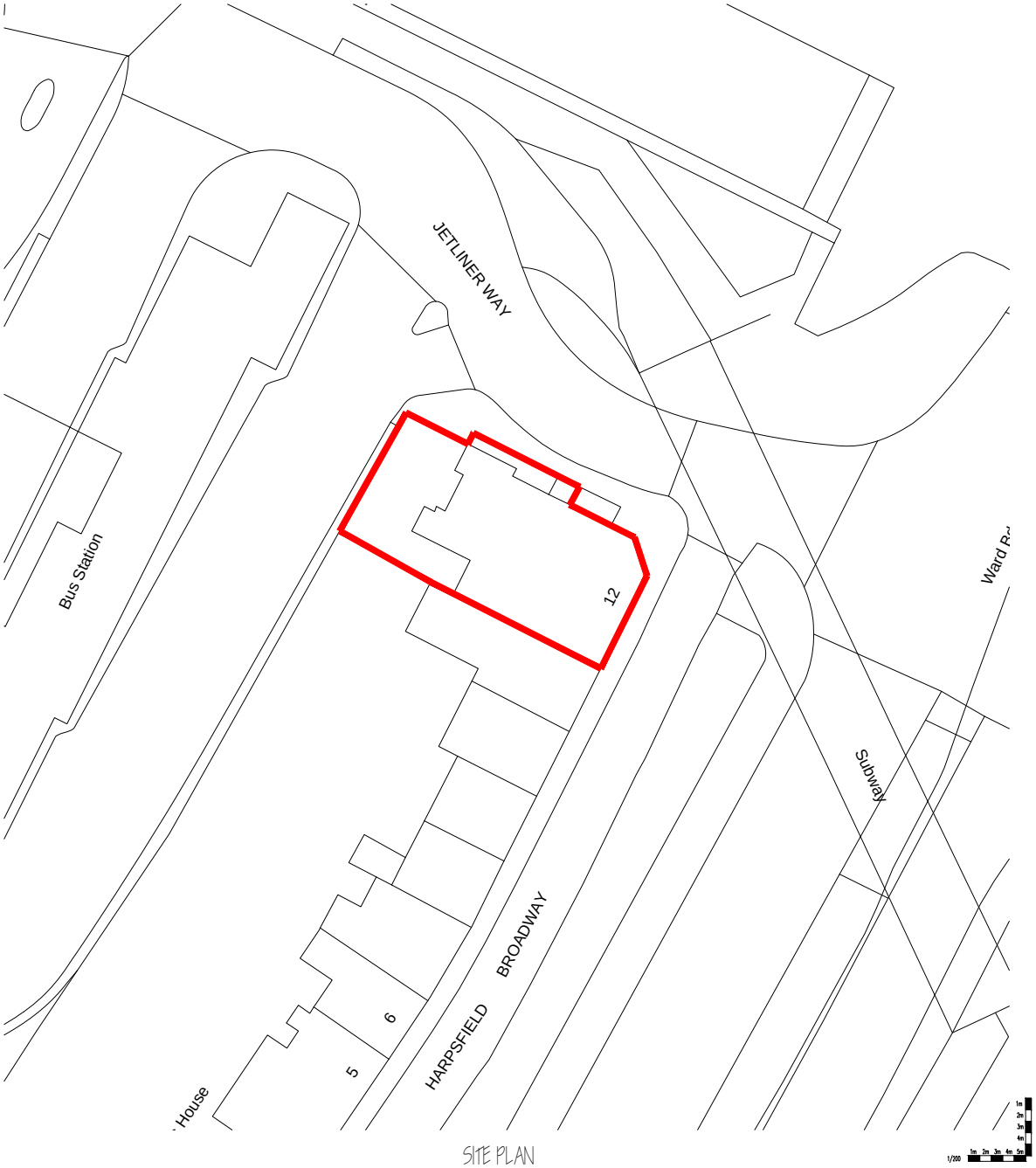
This report describes the appropriate noise guidelines; the noise measurements undertaken; the calculations and analyses carried out and the outline noise mitigation measures necessary in order to achieve the indoor and industrial noise standards that Welwyn Hatfield Borough Council consider acceptable.

The requisite standards can be secured by the imposition of suitable planning conditions attached to the permission for the development.

Report Code: E/RT/EH

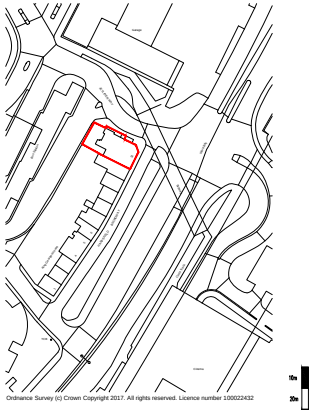
APPENDIX A

Site location plan and existing layout drawing



SITE PLAN

1/200



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LOCATION PLAN

1/1250

Wastell &Porter

JOB No.	1896
DWRG No	02
SCALE	1/200 1/1250 @A1
DATE	FEB 2017
DRAWN	MS
CLIENT	MR ANDREW COLLINS

12 HARPSFIELD BROADWAY
HATFIELD
HERTS AL10 9TF

SITE & LOCATION PLANS

Wastell & Porter Architects Limited
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Email: contact@wastellporter.co.uk
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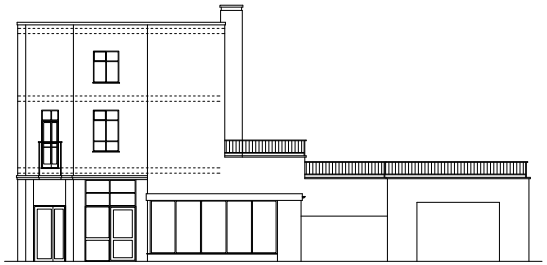
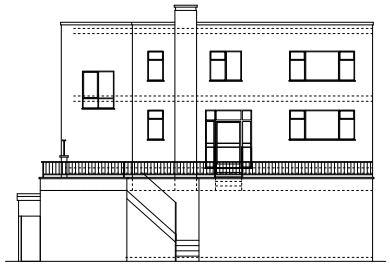
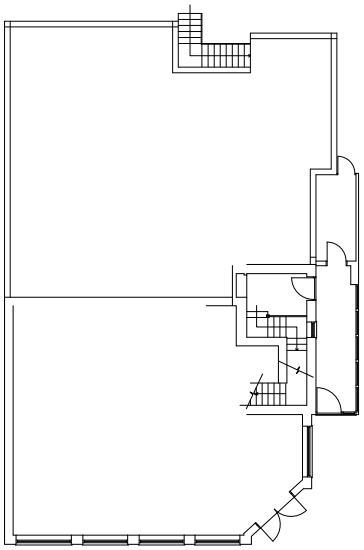
EXISTING FRONT ELEVATION



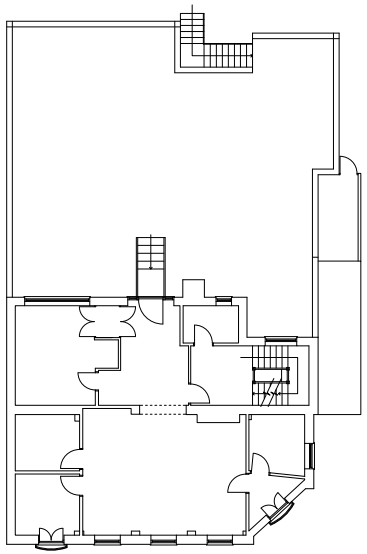
EXISTING SIDE ELEVATION



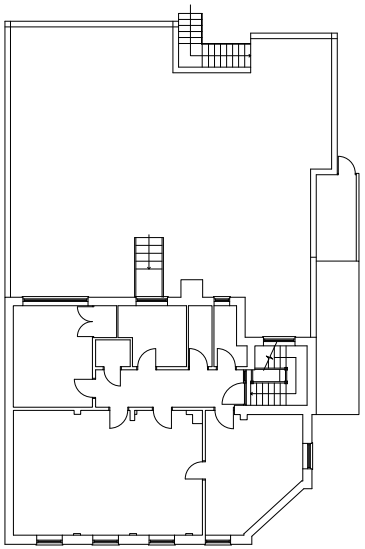
EXISTING REAR ELEVATION



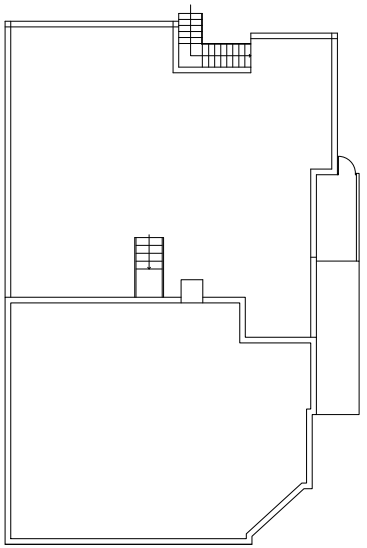
EXISTING GROUND FLOOR PLAN



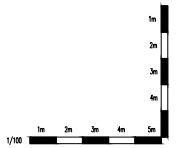
EXISTING FIRST FLOOR PLAN



EXISTING SECOND FLOOR PLAN



EXISTING ROOF PLAN



Wastell &Porter

JOB No.	1896
DWRG No	01
SCALE	1/100 @A1
DATE	FEB 2017
DRAWN	MS
CLIENT	MR. ANDREW COLLINS

12 HARPSFIELD BROADWAY
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EXISTING PLANS
& ELEVATIONS

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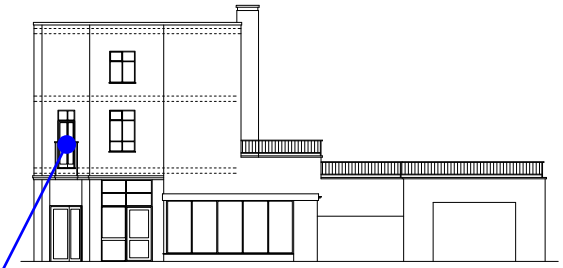
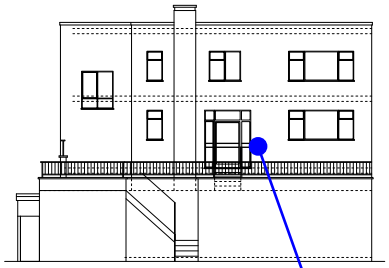
APPENDIX B

Proposed layout drawing

PROPOSED FRONT ELEVATION (UNCHANGED)



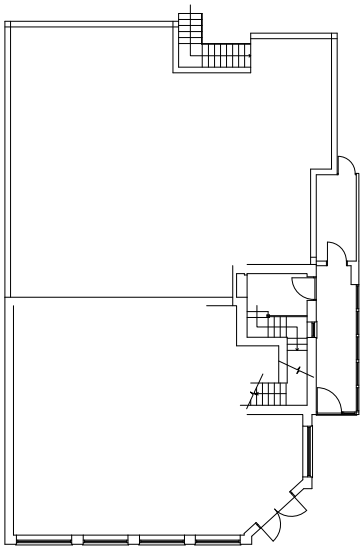
PROPOSED SIDE ELEVATION (UNCHANGED)



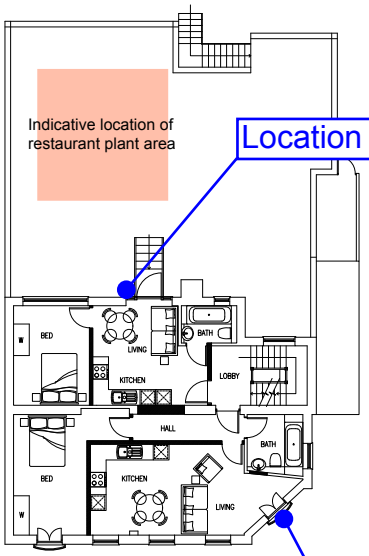
PROPOSED REAR ELEVATION (UNCHANGED)

Location L1

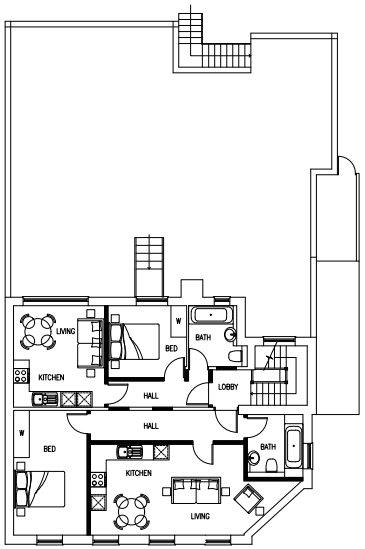
Location L2



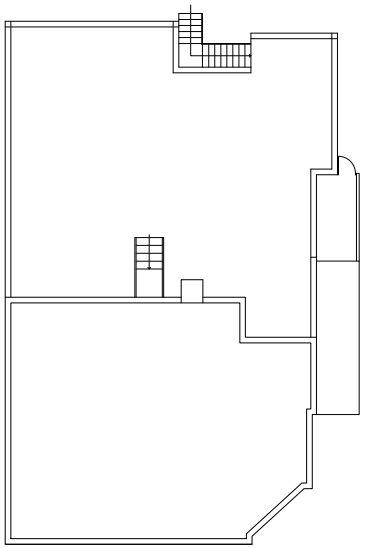
PROPOSED GROUND FLOOR PLAN (UNCHANGED)



PROPOSED FIRST FLOOR PLAN 1:100



PROPOSED SECOND FLOOR PLAN 1:100



PROPOSED ROOF PLAN (UNCHANGED)

Location L1

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JOB No.	1896
DWRG No	PL01
SCALE	1/100 @A1
DATE	FEB 2017
DRAWN	MS
CLIENT	MR ANDREW COLLINS

12 HARPSFIELD BROADWAY
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PROPOSED PLANS
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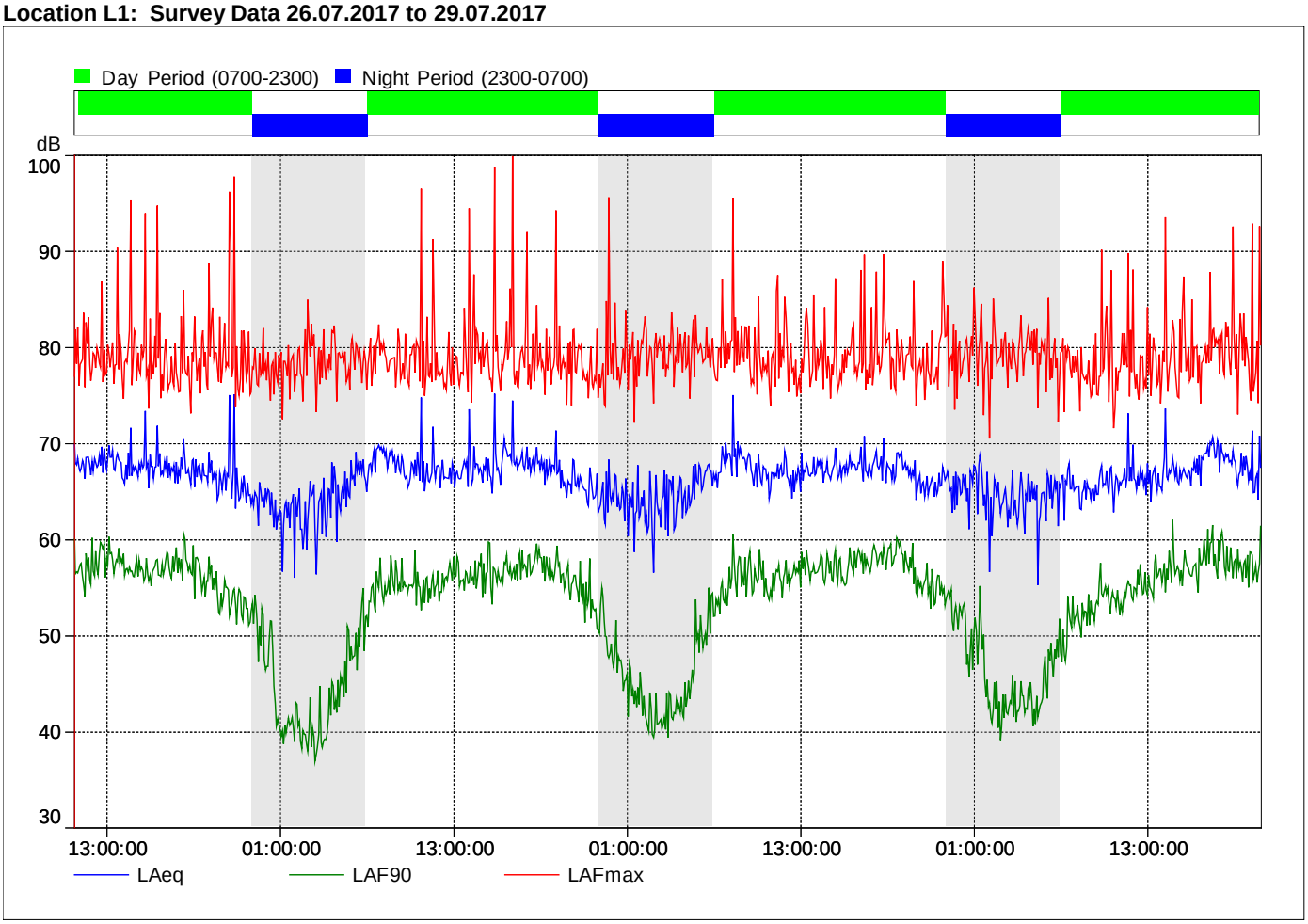
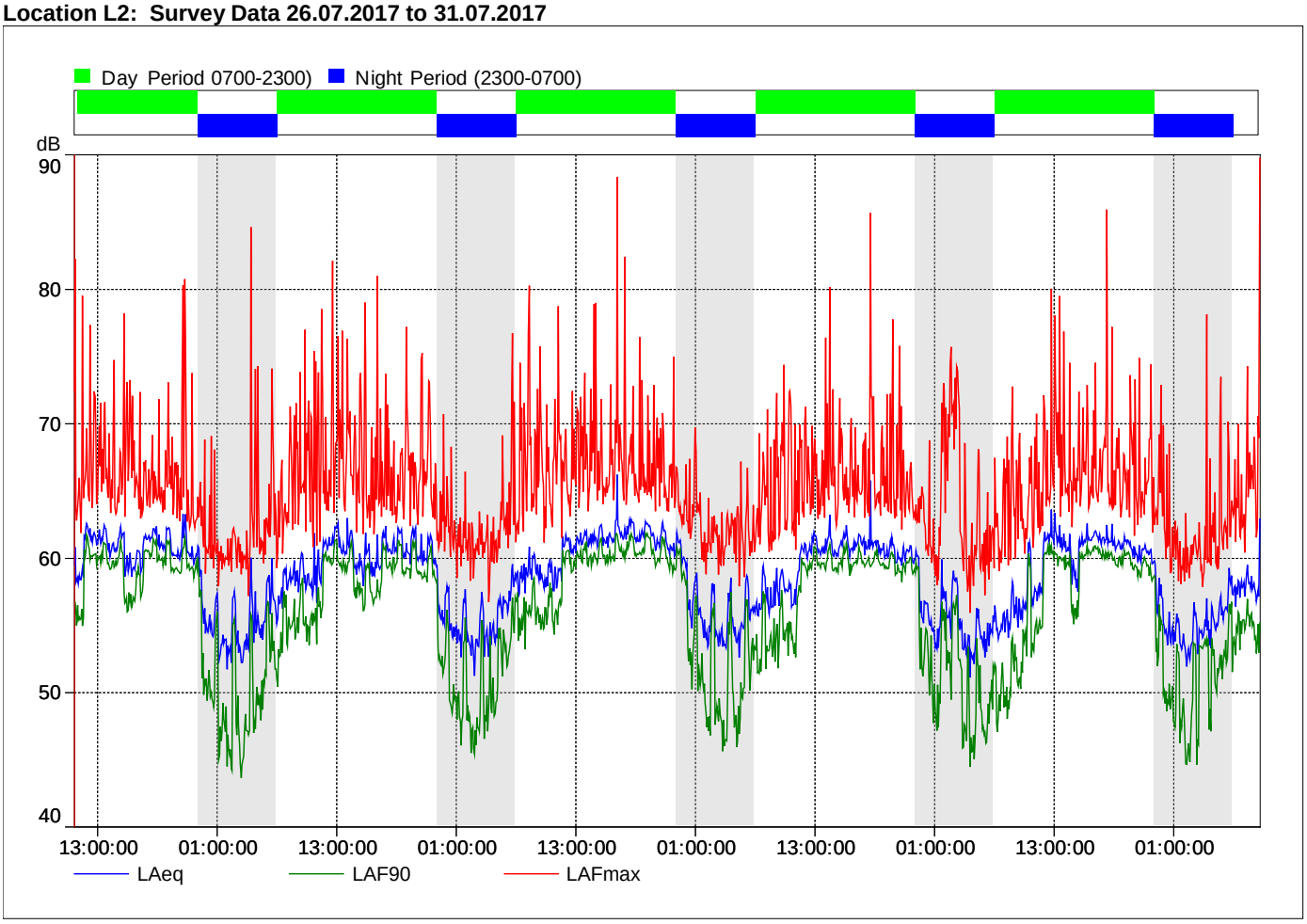
APPENDIX C

Noise survey results

Location L1: Survey Data 26.07.2017 to 29.07.2017



Location L2: Survey Data 26.07.2017 to 31.07.2017



APPENDIX D

Intrusive noise level calculations

Date: 21/08/2017 **Project No:** 17155 **Project:** Harpsfield Broadway, Hatfield

Receiver room for this calculation: First floor flat, front living room

Estimated Indoor Ambient Noise Levels - Living Room

Estimation of the indoor ambient noise level in a room based on the external noise levels and façade sound insulation taken from equations in Section G.2.1 of BS8233:2014

$$L_{internal} = L_{external} - \Sigma R + 10 \log S + 10 \log T - 10 \log 0.163V + 3 + C$$

Where: -

- $L_{internal}$ - estimated indoor reverberant sound pressure level
- $L_{external}$ - measured external sound pressure level (LAeq, 16hr) - i.e. the design external LAeq
- C - correction factor to convert the measured external sound pressure level to 'free field' (6dB for measurements within millimetres of the façade, 3dB for mesurements 2m from the façade)
- Σ R - overall sound reduction of the facade
- T - reverberation time inside the room in question
- V - volume of the room in question

		Octave Band Centre Frequency (Hz)							
External Noise Spectral Data	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
LAeq, 16hr	**65**	70	63	61	60	62	57	49	42
Façade Correction Factor, C		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduction of façade elements									
Double glazing Rw(ctr) 36(-7) dB									
e.g. Pilkington 10/12/4	Area:	6.6	m^2						
	R:	21	25	22	33	40	43	44	44
Masonry Wall (from BS8233)									
	Area:	15.6	m^2						
	R:	34	40	44	45	51	56	60	63
Greenwood EHA574 (Acoustic trickle)									
Dnew+ctr 42 dB	Number of:	2							
	D_{ne}	30	34	40	39	42	49	43	43
Room Data									
Living Room reverberation time		0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3
Total Façade Area		22.2	m^2						
Room Volume		57	m^3						
Overall sound reduction of the facade									
Combined sound reduction		24.5	28.6	27.0	35.5	40.4	45.5	42.4	42.4
		Octave Band Centre Frequency (Hz)							
Estimated Indoor Noise Level	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
	33	**50**	**39**	**38**	**28**	**24**	**14**	**9**	**0**

Date: 21/08/2017 **Project No:** 17155 **Project:** Harpsfield Broadway, Hatfield

Receiver room for this calculation: First floor flat, front bedroom

Estimated Indoor Ambient Noise Levels - Bedroom

Estimation of the indoor ambient noise level in a room based on the external noise levels and façade sound insulation taken from equations in Section G.2.1 of BS8233:2014

$$L_{internal} = L_{external} - \Sigma R + 10 \log S + 10 \log T - 10 \log 0.163V + 3 + C$$

Where: -

$L_{internal}$ - estimated indoor reverberant sound pressure level

$L_{external}$ - measured external sound pressure level (LAeq, 8hr) - i.e. the design external LAeq

C - correction factor to convert the measured external sound pressure level to 'free field' (6dB for measurements within millimetres of the façade, 3dB for mesurements 2m from the façade)

Σ R - overall sound reduction of the facade

T - reverberation time inside the room in question

V - volume of the room in question

		Octave Band Centre Frequency (Hz)							
External Noise Spectral Data	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
LAeq, 8hr	**62**	66	58	57	59	59	53	45	38
Façade Correction Factor, C		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduction of façade elements									
Double glazing Rw(ctr) 36(-7) dB									
e.g. Pilkington 10/12/4 Area:		2.1	m^2						
R:		21	25	22	33	40	43	44	44
Masonry Wall (from BS8233)									
Area:		4.9	m^2						
R:		34	40	44	45	51	56	60	63
Greenwood EHA574 (Acoustic trickle)									
Dnew+ctr 42 dB Number of:		1							
D_{ne}		30	34	40	39	42	49	43	43
Room Data									
Bedroom Reverberation Time		0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.3
Total Façade Area		7	m^2						
Room Volume		37	m^3						
Overall sound reduction of the facade									
Combined sound reduction		23.9	28.0	26.9	34.5	39.0	44.6	40.7	40.8
		Octave Band Centre Frequency (Hz)							
Estimated Indoor Noise Level	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
	27	**43**	**31**	**31**	**25**	**20**	**8**	**4**	**0**

Date: 21/08/2017 **Project No:** 17155 **Project:** Harpsfield Broadway, Hatfield

Receiver room for this calculation: First floor flat, front bedroom

Estimated Indoor Ambient Noise Levels - Bedroom Lmax

Estimation of the indoor ambient noise level in a room based on the external noise levels and façade sound insulation taken from equations in Section G.2.1 of BS8233:2014

$$L_{internal} = L_{external} - \Sigma R + 10 \log S + 10 \log T - 10 \log 0.163V + 3 + C$$

Where: -

- $L_{internal}$ - estimated indoor reverberant sound pressure level
- $L_{external}$ - measured external sound pressure level (LAFMax) - i.e. the design external LAFM
- C - correction factor to convert the measured external sound pressure level to 'free field' (6dB for measurements within millimetres of the façade, 3dB for mesurements 2m from the façade)
- Σ R - overall sound reduction of the facade
- T - reverberation time inside the room in question
- V - volume of the room in question

			Octave Band Centre Frequency (Hz)						
External Noise Spectral Data	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
LAFMax	**79**	81	72	74	79	75	67	59	54
Façade Correction Factor, C		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduction of façade elements									
Double glazing Rw(ctr) 36(-7) dB									
e.g. Pilkington 10/12/4	Area:	2.1	m^2						
	R:	21	25	22	33	40	43	44	44
Masonry Wall (from BS8233)									
	Area:	4.9	m^2						
	R:	34	40	44	45	51	56	60	63
Greenwood EHA574 (Acoustic trickle)									
Dnew+ctr 42 dB	Number of:	1							
	D_{ne}	30	34	40	39	42	49	43	43
Room Data									
Bedroom Reverberation Time		0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.3
Total Façade Area		7	m^2						
Room Volume		37	m^3						
Overall sound reduction of the facade									
Combined sound reduction		23.9	28.0	26.9	34.5	39.0	44.6	40.7	40.8
			Octave Band Centre Frequency (Hz)						
Estimated Indoor Noise Level	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
	45	**58**	**45**	**48**	**45**	**36**	**22**	**18**	**12**

Date: 21/08/2017 **Project No:** 17155 **Project:** Harpsfield Broadway, Hatfield

Receiver room for this calculation: First floor flat, rear living room

Estimated Indoor Ambient Noise Levels - Living Room

Estimation of the indoor ambient noise level in a room based on the external noise levels and façade sound insulation taken from equations in Section G.2.1 of BS8233:2014

$$L_{internal} = L_{external} - \Sigma R + 10 \log S + 10 \log T - 10 \log 0.163V + 3 + C$$

Where: -

- $L_{internal}$ - estimated indoor reverberant sound pressure level
- $L_{external}$ - measured external sound pressure level (LAeq, 16hr) - i.e. the design external LAeq
- C - correction factor to convert the measured external sound pressure level to 'free field' (6dB for measurements within millimetres of the façade, 3dB for mesurements 2m from the façade)
- Σ R - overall sound reduction of the facade
- T - reverberation time inside the room in question
- V - volume of the room in question

		Octave Band Centre Frequency (Hz)							
External Noise Spectral Data	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
LAeq, 16hr	**58**	61	59	60	55	54	48	40	33
Façade Correction Factor, C		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduction of façade elements									
Basic double glazing Rw(ctr) 31(-6) dB									
e.g. Pilkington 4/12/4 Area:		3.8	m^2						
R:		18	24	20	25	35	38	35	35
Masonry Wall (from BS8233)									
Area:		4.2	m^2						
R:		34	40	44	45	51	56	60	63
Hit and miss trickle vent (Dnew+Ctr 32 dB)									
e.g. Greenwood 4000S Number of:		2							
D_{ne}		30	38	37	34	30	34	37	46
Room Data									
Living Room reverberation time		0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3
Total Façade Area		8	m^2						
Room Volume		37	m^3						
Overall sound reduction of the facade									
Combined sound reduction		19.9	26.3	22.8	26.0	25.8	29.7	31.9	36.7
		Octave Band Centre Frequency (Hz)							
Estimated Indoor Noise Level	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
	34	**43**	**35**	**38**	**30**	**28**	**19**	**8**	**0**

Date: 21/08/2017 **Project No:** 17155 **Project:** Harpsfield Broadway, Hatfield

Receiver room for this calculation: First floor flat, rear bedroom

Estimated Indoor Ambient Noise Levels - Bedroom

Estimation of the indoor ambient noise level in a room based on the external noise levels and façade sound insulation taken from equations in Section G.2.1 of BS8233:2014

$$L_{internal} = L_{external} - \Sigma R + 10 \log S + 10 \log T - 10 \log 0.163V + 3 + C$$

Where: -

$L_{internal}$ - estimated indoor reverberant sound pressure level

$L_{external}$ - measured external sound pressure level (LAeq, 8hr) - i.e. the design external LAeq

C - correction factor to convert the measured external sound pressure level to 'free field' (6dB for measurements within millimetres of the façade, 3dB for mesurements 2m from the façade)

Σ R - overall sound reduction of the facade

T - reverberation time inside the room in question

V - volume of the room in question

		Octave Band Centre Frequency (Hz)							
External Noise Spectral Data	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
LAeq, 8hr	**53**	55	52	51	51	49	43	35	29
Façade Correction Factor, C		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduction of façade elements									
Basic double glazing Rw(ctr) 31(-6) dB									
e.g. Pilkington 4/12/4 Area:		2.7	m^2						
R:		21	24	20	25	35	38	35	35
Masonry Wall (from BS8233)									
Area:		4.8	m^2						
R:		34	40	44	45	51	56	60	63
Hit and miss trickle vent (Dnew+Ctr 32 dB)									
e.g. Greenwood 4000S Number of:		1							
D_{ne}		30	38	37	34	30	34	37	46
Room Data									
Bedroom Reverberation Time		0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.3
Total Façade Area		7.5	m^2						
Room Volume		27	m^3						
Overall sound reduction of the facade									
Combined sound reduction		23.5	27.7	24.1	27.7	28.4	32.3	34.2	38.3
		Octave Band Centre Frequency (Hz)							
Estimated Indoor Noise Level	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
	27	**34**	**27**	**29**	**26**	**22**	**12**	**2**	**0**

Date: 21/08/2017 **Project No:** 17155 **Project:** Harpsfield Broadway, Hatfield

Receiver room for this calculation: First floor flat, rear bedroom

Estimated Indoor Ambient Noise Levels - Bedroom Lmax

Estimation of the indoor ambient noise level in a room based on the external noise levels and façade sound insulation taken from equations in Section G.2.1 of BS8233:2014

$$L_{internal} = L_{external} - \Sigma R + 10 \log S + 10 \log T - 10 \log 0.163V + 3 + C$$

Where: -

- $L_{internal}$ - estimated indoor reverberant sound pressure level
- $L_{external}$ - measured external sound pressure level (LAFMax) - i.e. the design external LAFM
- C - correction factor to convert the measured external sound pressure level to 'free field' (6dB for measurements within millimetres of the façade, 3dB for mesurements 2m from the façade)
- Σ R - overall sound reduction of the facade
- T - reverberation time inside the room in question
- V - volume of the room in question

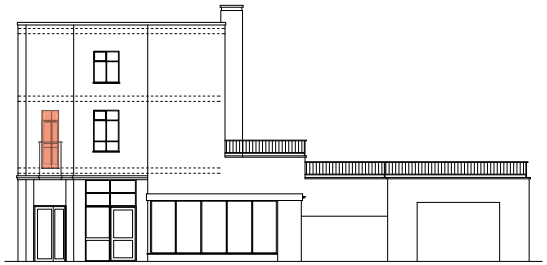
			Octave Band Centre Frequency (Hz)						
External Noise Spectral Data	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
LAFMax	**63**	71	68	60	60	58	55	50	50
Façade Correction Factor, C		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduction of façade elements									
Basic double glazing Rw(ctr) 31(-6) dB									
e.g. Pilkington 4/12/4 Area:		2.7	m^2						
R:		21	24	20	25	35	38	35	35
Masonry Wall (from BS8233)									
Area:		4.8	m^2						
R:		34	40	44	45	51	56	60	63
Hit and miss trickle vent (Dnew+Ctr 32 dB)									
e.g. Greenwood 4000S Number of:		1							
D_{ne}		30	38	37	34	30	34	37	46
Room Data									
Bedroom Reverberation Time		0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.3
Total Façade Area		7.5	m^2						
Room Volume		27	m^3						
Overall sound reduction of the facade									
Combined sound reduction		23.5	27.7	24.1	27.7	28.4	32.3	34.2	38.3
			Octave Band Centre Frequency (Hz)						
Estimated Indoor Noise Level	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
	37	**50**	**43**	**38**	**35**	**31**	**24**	**17**	**12**

APPENDIX E

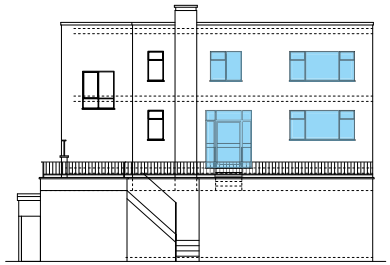
Façade acoustic specification

Wastell &Porter

PROPOSED FRONT ELEVATION (UNCHANGED)



PROPOSED SIDE ELEVATION (UNCHANGED)



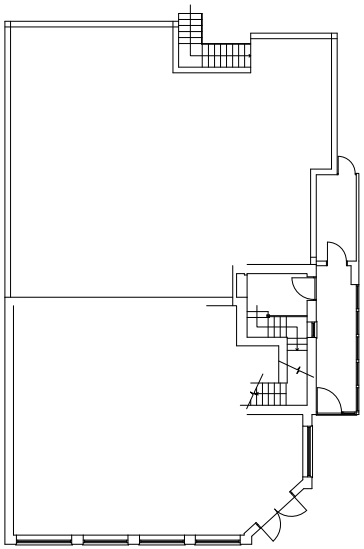
PROPOSED REAR ELEVATION (UNCHANGED)

Minimum acoustic performance requirements of facade elements:

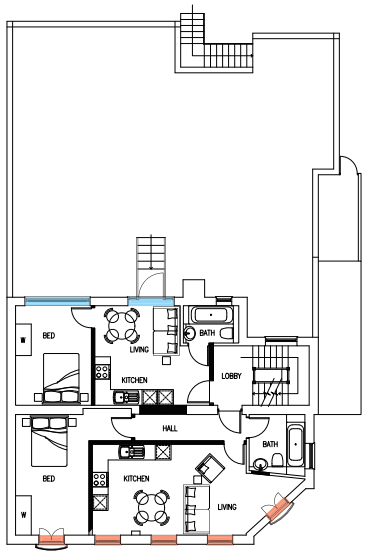
Glazing: Rw+ctr 29 dB
Ventilation: Acoustic Trickle Vents Dn,e,w+ctr 42 dB
(2x in living rooms, 1x in bedrooms)

Glazing: Rw+ctr 25 dB
Ventilation: Trickle Vents Dn,e,w+ctr 32 dB
(2x in living rooms, 1x in bedrooms)

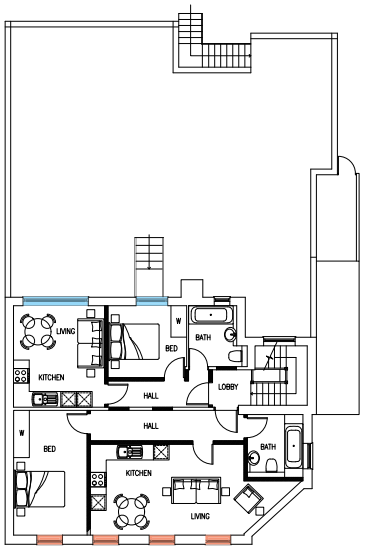
No requirement



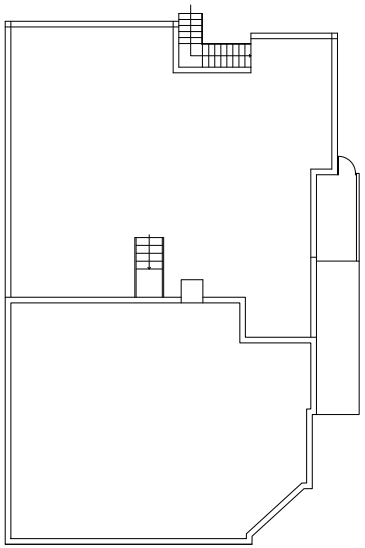
PROPOSED GROUND FLOOR PLAN (UNCHANGED)



PROPOSED FIRST FLOOR PLAN 1:100



PROPOSED SECOND FLOOR PLAN 1:100



PROPOSED ROOF PLAN (UNCHANGED)

JOB No.	1896
DWRG No	PL01
SCALE	1:100 @A1
DATE	FEB 2017
DRAWN	MS
CLIENT	MR ANDREW COLLINS

12 HARPSFIELD BROADWAY
HATFIELD
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PROPOSED PLANS
& ELEVATIONS

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