

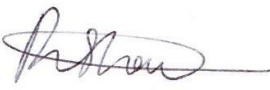
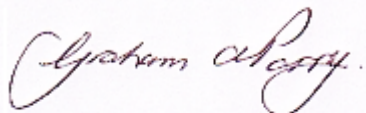
Report for:

**Turner Property Ltd**

Carlisle House, 118 Oxford Road, Reading  
*Noise Impact Assessment*

**Status: Final**

**Date: 16.01.2023**

|                          |                                                                                                                                    |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------|
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| Date                     | 16.01.2023                                                                                                                         |
| Version Number           | A4865/N/01                                                                                                                         |
| Status                   | Final                                                                                                                              |

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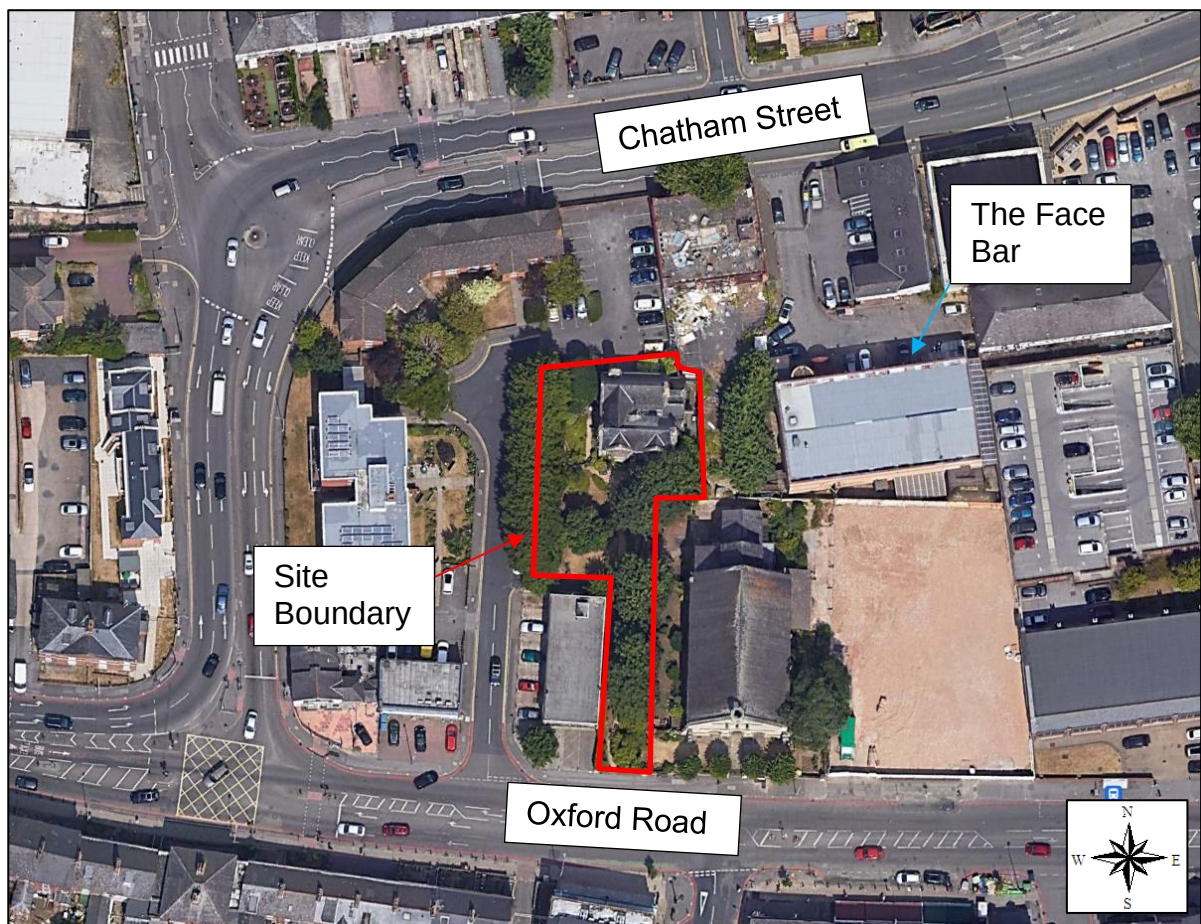
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## 1. INTRODUCTION

ACCON UK Limited (ACCON) has been commissioned by Weston & Co Architect Ltd on behalf of Turner Property Ltd to carry out a noise assessment for the proposed redevelopment of Carlisle House, 118 Oxford Road, Reading. The redevelopment comprises of the conversion of the existing Grade II listing building from four residential units to six residential units and the extension of the roof with an external terrace. Carlisle House is recorded on the Listed Building Register as “Circa 1845, probably by John Billing. Ashlar 2 ½ storey villa with slate roof and extruded chimneys. 2 storey angles bays flanking present (modern) entrance with gables above having 2 light windows to attach. Gabled porch to west.”

The site is located within the administrative boundary of Reading Borough Council (RBC). A site location plan is presented in **Figure 1.1**.

**Figure 1.1: Site Location Plan**



This noise assessment is required to determine the impact of existing noise sources which include traffic on Chatham Street and from the entertainment venue the Face Bar on the proposed residential development. Appropriate recommendations for noise mitigation are provided, where required.

## 2. THE NATURE, MEASUREMENT AND EFFECT OF NOISE

Noise is often defined as sound that is undesired by the recipient. Whilst it is impossible to measure nuisance caused by noise directly, it is possible to characterise the loudness of that noise. 'Loudness' is related to both sound pressure and frequency, both of which can be measured. The human ear is sensitive to a wide range of sound levels. The sound pressure level of the threshold of pain is over a million times that of the quietest audible sound. In order to reduce the relative magnitudes of the numbers involved, a logarithmic scale of decibels (dB) is normally used, based on a reference level of the lowest audible sound.

The response of the human ear is not constant over all frequencies. It is therefore usual to weight the measured frequencies to approximate the human response. The resulting 'A' weighted decibel, dB (A), has been shown to correlate closely to the subjective human response.

When related to changes in noise, a change of ten decibels, for example, from 60 dB (A) to 70 dB (A), would represent a doubling in 'loudness'. Similarly, a decrease in noise, for example, from 70 dB (A) to 60 dB (A), would represent a halving in 'loudness'. A change of 3 dB (A) is generally considered to be just perceptible<sup>1</sup>. **Table 2.1** details typical noise levels.

**Table 2.1: Typical Noise Levels**

| Approximate Noise Level (dB(A)) | Example                         |
|---------------------------------|---------------------------------|
| 0                               | Limit of hearing                |
| 30                              | Rural area at night             |
| 40                              | Library                         |
| 50                              | Quiet office                    |
| 60                              | Normal conversation at 1 m      |
| 70                              | In car noise without radio      |
| 80                              | Household vacuum cleaner at 1 m |
| 100                             | Pneumatic drill at 1 m          |
| 120                             | Threshold of pain               |

A glossary of acoustic terminology is provided in **Appendix 1**.

---

<sup>1</sup> Institute of Environmental Management and Assessment (2014). Guidelines for environmental noise impact assessment.

### 3. NOISE ASSESSMENT CRITERIA

This section identifies relevant national and local policy guidance and also other technical guidance documents.

#### 3.1. National Planning Policy Framework

The revised National Planning Policy Framework (NPPF as amended in July 2021) supersedes the 2012, 2018 and 2019 versions of the NPPF. The purpose of the planning system is to contribute to the achievement of sustainable development. There are three dimensions to sustainable development: economic, social and environmental. The environmental role is to contribute to protecting and enhancing our natural, built and historic environment; and as part of this, make effective use of land, help to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate to adapt to climate change including moving to a low carbon economy.

One of the core planning principles is to contribute to conserving and enhancing the natural environment and reducing pollution. Allocations of land for development should prefer land of lesser value, where consistent with other policies in the Framework. The planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.

Paragraph 185 of the NPPF states:

*“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 (see Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food and Rural Affairs, 2010));*
- b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

Additionally, Paragraph 187 states:

*“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.”*

### 3.2. Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) aims to “*through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life”.*

Based on concepts from toxicology, it introduces three ‘Effect Levels’ relevant to the assessment of noise. These are:

- **NOEL: No Observed Effect Level:** This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise;
- **LOAEL: Lowest Observed Adverse Effect Level:** This is the level above which adverse effects on health and quality of life can be detected; and
- **SOAEL: Significant Observed Adverse Effect Level:** This is the level above which significant adverse effects on health and quality of life occur.

### 3.3. Planning Practice Guidance

The Planning Practice Guidance for Noise (PPG-N) was published in March 2014 and most recently updated in July 2019. The PPG-N suggests that the most appropriate and cost-effective solutions to potential noise issues are best identified when good acoustic design needs to be considered early in the planning process.

The PPG-N provides the following advice on how to determine the noise impact on development:

*“Plan-making and decision making need to take account of the acoustic environment and in doing so consider:*

- *Whether or not a significant adverse effect is occurring or likely to occur;*
- *Whether or not an adverse effect is occurring or likely to occur; and*
- *Whether or not a good standard of amenity can be achieved.*

*In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy.” (Paragraph 003 Reference ID 30-003-20190722)*

The document goes on to acknowledge the levels of noise exposure at which an effect may occur as provided in the NPSE and introduces a fourth effect level:

- UAE: Unacceptable Adverse Effect: Extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise lead to psychological stress or physical effects.

Where residential development is proposed in the vicinity of existing businesses, community facilities or other activities that produce noise, the PPG-N advises that the applicant (or 'agent of change') will need to clearly identify the effects of the existing businesses that may cause a nuisance (including noise) and clearly define the mitigation measures being proposed to address any potential significant adverse effects that are identified. The agent of change needs to not only consider the current activities of the business, but the permitted activities too, even if they are not occurring at the time of the application being made. The PPG-N acknowledges that *"It can be helpful for developers to provide information to prospective purchasers or occupants about mitigation measures that have been put in place, to raise awareness and reduce the risk of post-purchase/occupancy complaints."* (Paragraph 009 Reference ID 30-009-20190722).

It is important to understand that as the PPG-N does not specifically provide any advice with respect to noise levels/limits for different sources of noise, it is appropriate to consider other sources of advice and guidance documents when considering whether new developments would be sensitive to the prevailing acoustic environment and the PPG-N signposts a number of appropriate guidance documents.

### 3.4. Reading Borough Council

Reading Borough Council's Local Plan was adopted in November 2019. Policy EN16 Pollution and Water Resources identifies that noise sensitive developments should not be subject to high levels of noise. The relevant parts of policy EN16 and CC8 has been reproduced below.

#### *"EN16: POLLUTION AND WATER RESOURCES*

*Proposals for development that are sensitive to the effects of noise or light pollution will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution."*

Paragraph 4.2.90 also identifies that the Professional Practice Guidance on Planning and Noise (ProPG) as referenced at **Section 3.5.1** of this report provides appropriate guidance on the design of residential developments in respect of noise.

#### CC8: SAFEGUARDING AMENITY

*"Development will not cause a detrimental impact on the living environment of existing residential properties or unacceptable living conditions for new residential properties, in terms of:*

*[Bullet points 1 – 4 not relevant to Noise]*

- *Noise and disturbance;*
- *Artificial lighting;*

- *Vibration*

### 3.4.1. Pre-application Advice (Reference EP/740246)

Pre-application advice from Environmental Protection were received from Rebecca Moon, the Environmental Health Officer (EHO) at RBC on 11<sup>th</sup> August 2022. Relevant parts of the pre-application advice has been reproduced below.

#### *"Noise Impact on Development"*

*A noise assessment should be submitted in support of applications for new residential proposed in noisy areas. The development is set back from Chatham Street and Oxford Road therefore road noise is not a significant concern, however the Face Bar is situated in close proximity which holds late night music events. The new occupants are at risk of noise disturbance and the glazing and any other noise attenuation associated with the roof extension will need to be designed accordingly.*

*The noise assessment will be assessed against the recommendations for internal noise levels within dwellings and external noise levels within gardens / balconies in accordance with BS 8233:2014 and WHO guidelines for Community Noise and also appropriate guidance for noise from entertainment venues. The report should identify any mitigation measures that are necessary to ensure that the recommended standard is met.*

*The noise assessment data should also include noise events (L<sub>A</sub>Max) and the design should aim to prevent noise levels from noise events exceeding 45dB within bedrooms at night, as this is linked with sleep disturbance.*

*I recommend a condition is attached to any consent requiring a noise assessment to be submitted prior to commencement of development and any approved mitigation measures implemented prior to occupation to show that recommended noise levels in the table above can be met.*

*The noise assessment will need to identify the external noise levels impacting on the proposed site.*

*Noise mitigation is likely to focus on the weak point in the structure; glazing. Given that the acoustic integrity would be compromised should the windows be opened, ventilation details must also be provided, where mitigation relies on closed windows. Ventilation measures should be selected which do not allow unacceptable noise ingress and should provide sufficient ventilation to avoid the need to open windows in hot weather, however non-openable windows are not considered an acceptable solution due to the impact on living standards.*

*I recommend the following condition. If necessary the condition could be amended to make allowances for the building being listed for example by adding the caveat 'where is it practicable for the listed building'.*

#### **N9 NOISE ASSESSMENT & MITIGATION RESIDENTIAL (TO BE SUBMITTED)**

*No development shall commence on site until a detailed scheme, informed by an assessment of the current noise environment, for protecting the dwellings from the external noise environment of the area has been submitted to and approved, in writing, by the Local*

*Planning Authority. The scheme itself shall be designed, specified and constructed so that the sound insulation performance of the structure and the layout of the dwellings are such that the indoor ambient noise levels do not exceed the values detailed in Table 4 of BS 8233:2014 and the and that the individual noise events do not exceed 45 dB LA,max,F more than 10 times a night and should also be designed to protect the dwellings from noise from the Face Bar. Where opening windows will lead to an internal noise level increase of 5 dBA or greater above BS 8233:2014 recommended internal levels, the scheme shall include provision of alternative mechanical ventilation with minimum performance equivalent to a mechanical heat recovery (MVHR) system with cool air bypass as an alternative means of cooling and ventilation. Noise from the system should not result in BS8233 internal levels being exceeded.*

*Thereafter, the development shall not be carried out other than in accordance with the approved scheme which shall be completed before any part of the accommodation hereby approved is occupied, unless the Local Planning Authority otherwise agrees in writing.*

*REASON: These details are required due to insufficient information being contained within this submission and in order to safeguard the amenity of occupants in accordance with Policy CC8 of the Reading Borough Local Plan 2019."*

### **3.5. Noise Guidance**

#### **3.5.1. Professional Practice Guidance on Planning and Noise: New Residential Development**

The Professional Practice Guidance (ProPG) on *Planning and Noise for New Residential Development* was published in May 2017 and was produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England.

The recommended approach detailed in the ProPG includes a framework to enable situations where noise is not an issue to be clearly determined, and to help identify the extent of risk at noisier sites. The recommended approach provides opportunities to incorporate effective design interventions that will enable residential development to proceed in areas that might otherwise have been considered unsuitable.

The ProPG provides advice for Local Planning Authorities and developers, and their respective professional advisers. It aims to complement Government planning and noise policy and guidance. In particular, it strives to:

- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- Encourage the process of good acoustic design in and around new residential developments;
- Outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- Improve understanding of how to determine the extent of potential noise impact and effect; and

- Assist the delivery of sustainable development.

The two sequential stages of the recommended approach are:

- Stage 1: an initial noise risk assessment of the proposed development site; and
- Stage 2: a systematic consideration of four key elements.

The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:

- Element 1: demonstrating a “Good Acoustic Design Process”;
- Element 2: observing internal “Noise Level Guidelines”;
- Element 3: undertaking an “External Amenity Noise Assessment”; and
- Element 4: consideration of “Other Relevant Issues”.

**Figure 3.1** below identifies the guidance given in the ProPG when undertaking the risk assessment stage for a site.

**Figure 3.1: Phase 1 – Noise Risk Assessment**

| Noise Risk Assessment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Potential Effect Without Noise Mitigation | Pre-Planning Application Advice                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Indicative Daytime Noise Levels<br/><math>L_{Aeq, 16hr}</math></p> <p>Indicative Night-time Noise Levels<br/><math>L_{Aeq, 8hr}</math></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <p>Increasing risk of adverse effect</p>  | <p>High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.</p> <p>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 demonstrates that a significant adverse noise impact will be avoided in the finished development.</p> <p>At low noise levels, the site is likely to be acceptable from a noise perspective provided that 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 in the finished development.</p> |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | No adverse effect                         | These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p>Notes:</p> <ol style="list-style-type: none"> <li>Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.</li> <li>Indicative noise levels are the combined free-field noise levels from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".</li> <li><math>L_{Aeq, 16hr}</math> is for daytime 0700 - 2300, <math>L_{Aeq, 8hr}</math> is for night-time 2300 - 0700.</li> <li>An indication that there may be more than 10 noise events at night (2300 - 0700) with <math>L_{AFmax} &gt; 60</math> dB means the site should not be regarded as negligible risk.</li> </ol> |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

**Figure 3.2** below identifies the internal noise level criteria provided in the ProPG.

**Figure 3.2: ProPG Noise Levels**

| Activity                   | Location         | 0700-2300 Hours      | 2300-0700 Hours                                            |
|----------------------------|------------------|----------------------|------------------------------------------------------------|
| 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 $L_{Aeq,8hr}$<br>45 dB $L_{AFmax}$ <sup>Note 4</sup> |

**Notes:**

1. The Table provides recommended internal  $L_{Aeq}$  target levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.
2. The internal  $L_{Aeq}$  target levels shown in the Table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the internal  $L_{Aeq}$  target levels recommended in the Table.
3. These internal  $L_{Aeq}$  target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.
4. Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or  $L_{AFmax}$ , depending on the character and number of events per night. Sporadic noise events could require separate values. 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  $L_{AFmax}$  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 (see Appendix A).
5. Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal  $L_{Aeq}$  target levels should not normally be exceeded, subject to the further advice in Note 7.
6. Attention is drawn to the requirements of the Building Regulations.
7. Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal  $L_{Aeq}$  target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal  $L_{Aeq}$  levels start to exceed the internal  $L_{Aeq}$  target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal  $L_{Aeq}$  levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form (**see Section 3.D**).

### 3.5.2. British Standard BS 8233:2014

BS 8233 *Guidance on sound insulation and noise reduction for buildings* has a number of design criteria for intrusive external noise without a specific character. The guidelines are designed to achieve reasonable resting/sleeping conditions in bedrooms and good listening conditions in other rooms. The most appropriate noise levels for the residential environment are reproduced in **Table 3.1**.

**Table 3.1: Indoor Ambient Noise Levels for Dwellings**

| Activity                   | Location         | Daytime<br>0700 hrs to 2300 hrs | Night-time<br>2300 hrs to 0700 hrs |
|----------------------------|------------------|---------------------------------|------------------------------------|
| 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 $L_{Aeq,8hr}$                |

Although there are no limits set for external noise levels in BS 8233 the following guidance is provided at paragraph 7.7.3.2:

*“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB  $L_{Aeq,T}$ , with an upper guideline value of 55 dB  $L_{Aeq,T}$  which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.”*

### 3.5.3. World Health Organization Guidelines for Community Noise

The World Health Organization (WHO) has developed the *Guidelines for Community Noise* (CNG) designed to minimise the adverse effects of noise. The guidelines relevant to residential noise exposure are detailed in **Table 3.2**. For each specific environment, the stated noise levels are the maximum noise levels to avoid the health effect noted.

**Table 3.2: WHO Community Noise Guideline Values**

| Specific Environment | Critical Health Effect(s)                                          | Period Noise Level   | Maximum Noise Level |
|----------------------|--------------------------------------------------------------------|----------------------|---------------------|
| Outdoor Living Area  | Serious annoyance, daytime and evening                             | 55 dB $L_{Aeq,16hr}$ | -                   |
|                      | Moderate annoyance, daytime and evening                            | 50 dB $L_{Aeq,16hr}$ | -                   |
| Dwelling, Indoors    | Speech intelligibility and moderate annoyance, daytime and evening | 35 dB $L_{Aeq,16hr}$ |                     |
| Inside bedrooms      | Sleep disturbance, night-time                                      | 30 dB $L_{Aeq,8hr}$  | 45 dB $L_{AFmax}$   |
| Outside bedrooms     | Sleep disturbance with window open                                 | 45 dB $L_{Aeq,8hr}$  | 60 dB $L_{AFmax}$   |

The WHO guidelines state, with respect to the  $L_{Amax}$  threshold, that “for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB  $L_{Amax}$  more than 10-15 times per night (Vallet and Vernet 1991)”. Therefore, ACCON consider that it is appropriate to assess against the tenth highest  $L_{AFmax}$  level during the night-time period as opposed to the highest level in order to represent typical  $L_{AFmax}$  levels and provide a realistic compromise between protection from sleep disturbance and achievable mitigation.

### 3.6. Target Noise Levels

The target external and internal noise levels for new residential dwellings have been derived from the ProPG, BS 8233, the WHO guidelines and guidance from Reading Borough Council.

#### 3.6.1. External Noise Levels

Noise levels within private amenity areas (i.e communal gardens and private balconies) should achieve a noise level within or below the range of 50 dB to 55 dB  $L_{Aeq, 16hr}$  in respect of traffic noise.

#### 3.6.2. Internal Noise Levels

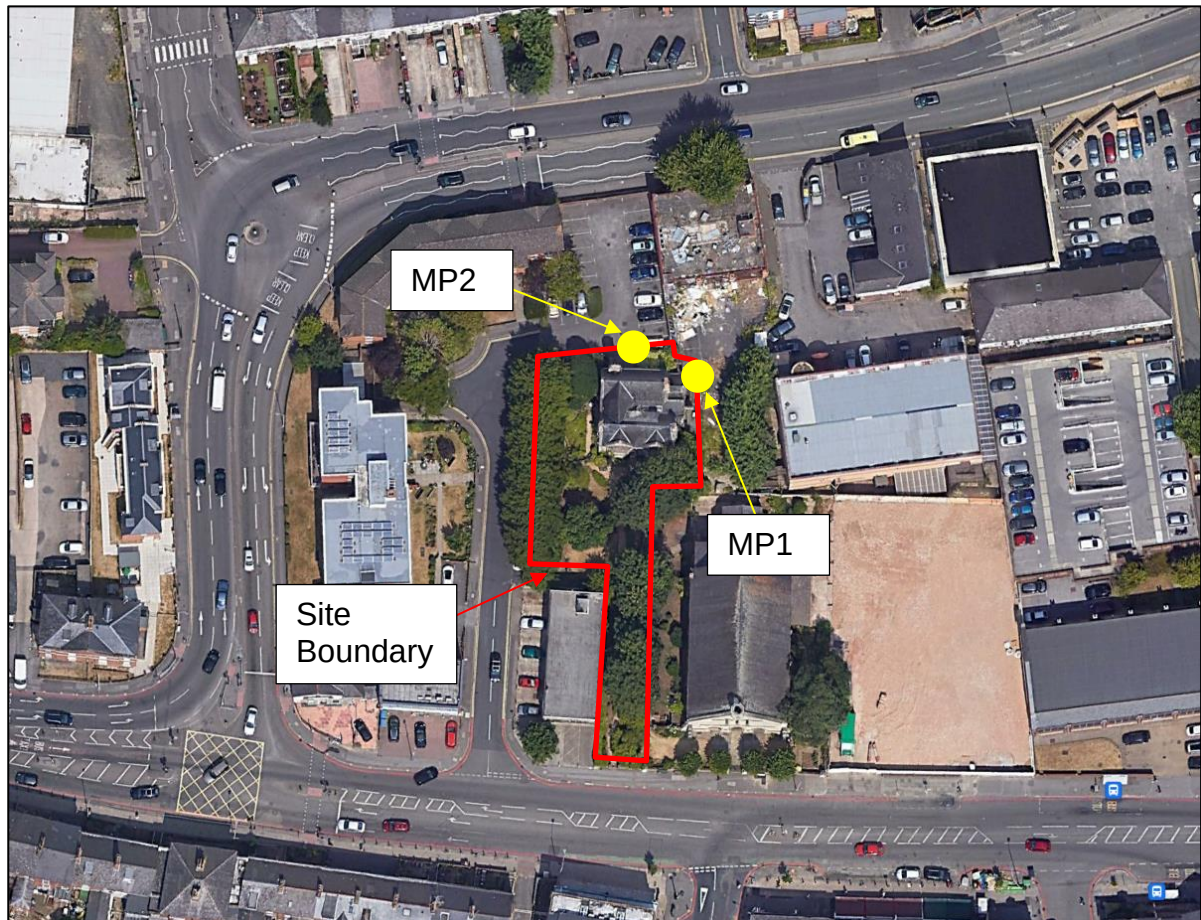
Noise levels within habitable rooms (i.e. living rooms and bedrooms) should achieve a daytime noise level not exceeding 35 dB  $L_{Aeq, 16hr}$  and a night-time noise level not exceeding 30 dB  $L_{Aeq, 8hr}$ . Maximum noise levels ( $L_{AFmax}$ ) should not normally exceed 45 dB internally more than 10 times during the night-time.

## 4. NOISE MEASUREMENT SURVEY

A noise measurement survey was carried out in order to determine the extent to which the site is currently affected by noise.

Noise measurements were carried out between 1045 hrs on Thursday 15<sup>th</sup> December 2022 and 1405 hrs on Friday 16<sup>th</sup> December 2022. Two semi-permanent noise monitoring positions were utilised. The noise measurement positions have been identified in **Figure 4.1**.

**Figure 4.1: Noise Measurement Positions**



The weather conditions on Thursday 15<sup>th</sup> December 2022 were dry with 0% cloud cover, the wind was recorded as from a north westerly direction with speeds of 1.5 m/s and a daytime temperature of -2°C.

At the end of the noise measurement period on Friday 16<sup>th</sup> December 2022, there was 0% cloud cover. There was wind from a westerly direction with speeds of less than 1 m/s and a daytime temperature of 3°C.

The noise measurements utilised two Class 1 Sound Level Meters: a Svantek 971 and a Rion NL-52. Both sound level meters hold current certificates of calibration, which are available upon request. The equipment has been field calibrated before and after the measurement period to ensure that it had remained within reasonable calibration limits ( $\pm 0.5$  dB).

Measurement Position 1 (**MP1**) was located at first floor level on the eastern façade of the building, overlooking the Face Bar. The microphone was mounted at a distance of 1 m from the building façade at a height of approximately 4 m above ground level. The ambient noise climate was dominated by road traffic noise from Oxford Road and Chatham Street. Entertainment noise from The Face Bar was audible between the hours of 2030 hrs to 2230 hrs.

Measurement Position 2 (**MP2**) was located at first floor level on the northern façade of the building, looking towards Chatham Street. The microphone was mounted at a distance of 1 m away from the building façade at a height of approximately 4 m above ground level. The ambient noise climate was dominated by road traffic on Chatham Street.

A summary of the measured free-field noise levels is identified in **Table 4.1**. The free-field noise levels have been calculated by applying a correction of -3 dB to convert the measured façade noise levels to free-field noise levels. It should be noted that entertainment noise from the Face Bar was audible at **MP1** between 2030 hrs to 2230 hrs, however the overall measured noise levels are not increased as a result of this and therefore this period of time has been included in the overall noise measurement results.

**Table 4.1: Summary of Measured Free-field Noise Levels**

| Position   | Period (hours)      | $L_{Aeq, T}$ (dB) | $L_{AFmax}$ (dB) | Average $L_{A10, T}$ (dB) | Average $L_{A90, T}$ (dB) |
|------------|---------------------|-------------------|------------------|---------------------------|---------------------------|
| <b>MP1</b> | 0700 hrs – 2300 hrs | 51                | 69               | 54                        | 45                        |
|            | 2300 hrs – 0700 hrs | 46                | 61 (60)          | 49                        | 38                        |
| <b>MP2</b> | 0700 hrs – 2300 hrs | 54                | 73               | 58                        | 47                        |
|            | 2300 hrs – 0700 hrs | 50                | 64 (64)          | 53                        | 39                        |

Note: The levels stated are logarithmic average for  $L_{Aeq, T}$  and arithmetic average for  $L_{A10, T}$  and average  $L_{A90, T}$ . The  $L_{AFmax}$  is the average of the highest hourly maximum sound levels measured during the measurement period. The  $L_{AFmax}$  in brackets is the tenth highest  $L_{AFmax}$  noise levels measured during the measurement period.

## 5. NOISE IMPACT ASSESSMENT

### 5.1. Stage 1: ProPG Initial Site Noise Risk Assessment

The noise survey demonstrated that the daytime noise level principally from road traffic noise from Oxford Road on the east façade of Carlisle House is 51  $L_{Aeq, 16hr}$  and the night-time noise level is 46  $L_{Aeq, 8hr}$ . The daytime noise level on the north façade of Carlisle House overlooking Chatham Street is 54  $L_{Aeq, 16hr}$  and the night-time noise level is 50  $L_{Aeq, 8hr}$ . These measured noise levels at the east and north façade indicated that the site is generally of a low risk of adverse noise effect during the daytime period. During the night-time period the site is of a low to medium risk of adverse effect.

### 5.2. Stage 2: Noise Impact Assessment

#### 5.2.1. External Noise Levels

The predicted daytime external noise levels ( $L_{Aeq, 16hr}$ ) are compared against the target external noise level range of 50 dB to 55 dB  $L_{Aeq, 16hr}$  or below within amenity areas. Amenity areas are terraces. It should be noted that the external noise level range guidance specifically relates to traffic noise and the east of the proposed development is also affected by entertainment and patron noise from the Face Bar when it is operational.

**Table 5.1** identifies the daytime external noise levels within external amenity spaces of the proposed development utilising the measured noise levels as a worst-case.

**Table 5.1: External Amenity Area Noise Levels**

| Façade                         | External Noise Level $L_{Aeq, 16hr}$ (dB) | Within or Below Target Noise Level Range? |
|--------------------------------|-------------------------------------------|-------------------------------------------|
| GF North Terrace               | 54                                        | ✓                                         |
| Second Floor East Roof Terrace | 51                                        | ✓                                         |

It can be identified in **Table 5.1** that balconies and terraces would experience noise levels no greater than the target range of 50 - 55 dB  $L_{Aeq, 16hr}$  and therefore noise mitigation specific to external noise levels is not required.

#### 5.2.2. Internal Noise Levels

BS 8233 states that “if partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB”. The WHO guidelines also state that a slightly open window would results in “a [sound] reduction for outside to inside of 15 dB”.

**Table 5.2** presents the measured external noise levels at the building facades. The noise measurements at **MP1** are considered to be representative of the south and east facades and the noise measurement at **MP2** is considered to be representative of the north and west facades. **Table 5.2** also identifies the minimum combined façade sound reduction required to achieve the target internal noise levels.

**Table 5.2: Noise Levels in Habitable Rooms with Open Windows**

| Facade | Measured External Noise Levels (dB) |                                      |                                  | Predicted Internal Noise Levels (dB)<br>With Open Windows |                                      |                                  | Minimum Combined Façade Sound Reduction Required dB(A) |
|--------|-------------------------------------|--------------------------------------|----------------------------------|-----------------------------------------------------------|--------------------------------------|----------------------------------|--------------------------------------------------------|
|        | Daytime<br>L <sub>Aeq</sub> , 16hr  | Night-time<br>L <sub>Aeq</sub> , 8hr | Night-time<br>L <sub>AFmax</sub> | Daytime<br>L <sub>Aeq</sub> , 16hr                        | Night-time<br>L <sub>Aeq</sub> , 8hr | Night-time<br>L <sub>AFmax</sub> |                                                        |
| North  | 54                                  | 50                                   | 64                               | 39                                                        | 35                                   | 49                               | 20                                                     |
| East   | 51                                  | 46                                   | 60                               | 36                                                        | 31                                   | 45                               | 16                                                     |
| South  | 51                                  | 46                                   | 60                               | 36                                                        | 31                                   | 45                               | 16                                                     |
| West   | 54                                  | 50                                   | 64                               | 39                                                        | 35                                   | 49                               | 20                                                     |

**Table 5.2** identifies the predicted internal noise levels with windows open, assuming that a partially open window provides 15 dB sound reduction. It can be seen that the predicted internal noise levels with windows open exceed the target internal noise levels set out in **Section 3.6.2** by a maximum of 4dB. Therefore, the assessment considers the façade reduction required to achieve the internal noise level criteria with closed windows. The highest level of sound reduction required is 20 dB(A) for the north and west façade to ensure that the target internal noise levels are not exceeded in habitable rooms.

The proposed floor plans are identified in **Figure F.1** to **Figure F.6**.

Noise mitigation measures to achieve the target internal noise levels are discussed in **Section 6.2**.

### 5.2.3. Noise from the Face Bar

The measured one-third octave band noise levels during a period where noise break-out from the Face Bar was perceptibly high are presented in **Figure 5.1**. The one-third octave band noise levels are compared against a period just before the Face Bar opened and was not operating. These noise levels present the worst-case likely noise levels emanating from the Face Bar. It can be identified that there is a prominent spectral feature at 20 Hz, 25 Hz and 125 Hz.

The noise measurement survey also identified “ancillary noise” associated with the Face Bar as a potential issue. This refers to noise from vehicles and pedestrians attending the Face Bar which occurs in the evening periods in addition to the break-out noise from music discussed below.

**Figure 5.1: Comparison of 1/3<sup>rd</sup> Octave Noise Levels With and Without the Face Bar Active**

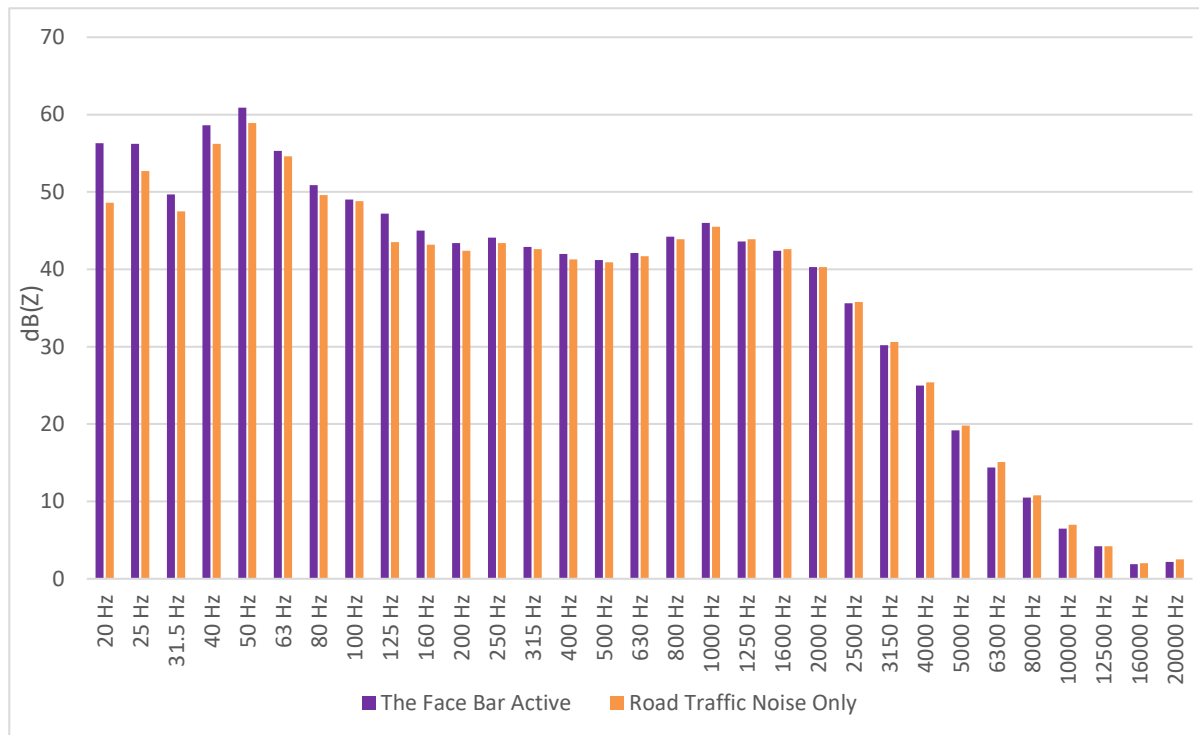


**Table 5.3** identifies the measured external unweighted noise levels at 20 Hz, 25 Hz and 125 Hz at the east façade of Carlisle House. It can be determined that the activity at the Face Bar results in an increase of 7.7 dB at 20 Hz, 3.5 dB at 25 Hz and 3.7 dB at 125 Hz.

**Table 5.3: Measured Noise Levels from the Face Bar**

| 1/3 Octave Band (Hz) | Unweighted External Noise Level with music noise | Unweighted External Noise Level without music noise | Difference (dB) |
|----------------------|--------------------------------------------------|-----------------------------------------------------|-----------------|
| 20 Hz                | 56.3                                             | 48.6                                                | 7.7             |
| 25 Hz                | 56.2                                             | 52.7                                                | 3.5             |
| 125 Hz               | 47.2                                             | 43.5                                                | 3.7             |

Ancillary noise from people was noted to be regularly occurring throughout the evening with people talking outside the Face Bar, however, road traffic remained the dominant source of noise. It is considered that any noise mitigation measures proposed to address road traffic noise will also readily mitigate break-out noise and ancillary noise from the Face Bar.

## 6. NOISE MITIGATION MEASURES

### 6.1. External Noise Levels

**Section 5.2.1** indicates that the external noise levels within all proposed amenity areas would be within the target noise level range. Therefore, additional noise mitigation is not required for external amenity areas.

### 6.2. Internal Noise Levels

**Section 5.2.2** has identified the minimum combined building façade sound reductions required for the proposed residential dwellings.

**Section 5.2.3** has identified that break-out noise from the Face Bar is audible at the east façade of Carlisle House with prominent spectral features at 20 Hz, 25 Hz and 125 Hz. However, it should be noted that glazing manufacturers rarely provide sound reduction specifications below the 100 Hz third octave band. It should also be noted that there are no windows to habitable rooms above the lower ground floor level of the east façade which overlooks the Face Bar. **Figure 6.1** provides a photograph of the east façade of Carlisle House which faces directly towards the Face Bar music venue.

**Figure 6.1: Photograph of the East Facade of Carlisle House**



It is assumed that the external wall construction provides a minimum sound reduction of 50 dB  $R_w$  (it can be seen in **Figure 6.1** that the wall construction of Carlisle House is of a thick stone façade.) the glazing and any ventilation openings will be the weakest elements of the building façade.

The required attenuation of 20 dB(A) is achievable through the provision of a 4 mm single glazed window system, such as the glazing presently installed at Carlisle House. Standard single glazing also provides a minimum sound reduction of 17 dB at the lower frequencies such that noise from the Face Bar should not result in complaints occurring.

The predicted internal noise levels with windows open does not exceed the BS 8233 recommended internal noise levels by 5 dB or greater and therefore alternative mechanical ventilation is not required in line with the EHO comments in **Section 3.4.1**.

## **7. ACOUSTIC DESIGN STATEMENT**

### **7.1. Initial Site Noise Risk Assessment**

The initial site noise risk assessment has identified that the site is generally at a low risk of adverse noise effect during the daytime and of a low to medium risk of adverse noise effect during the night-time period.

### **7.2. External Noise Levels**

The assessment of external noise levels relating to traffic noise identifies that the private external amenity areas will experience noise levels within the target range of 50 – 55 dB L<sub>Aeq, 16hr</sub> for the daytime.

### **7.3. Internal Noise Levels**

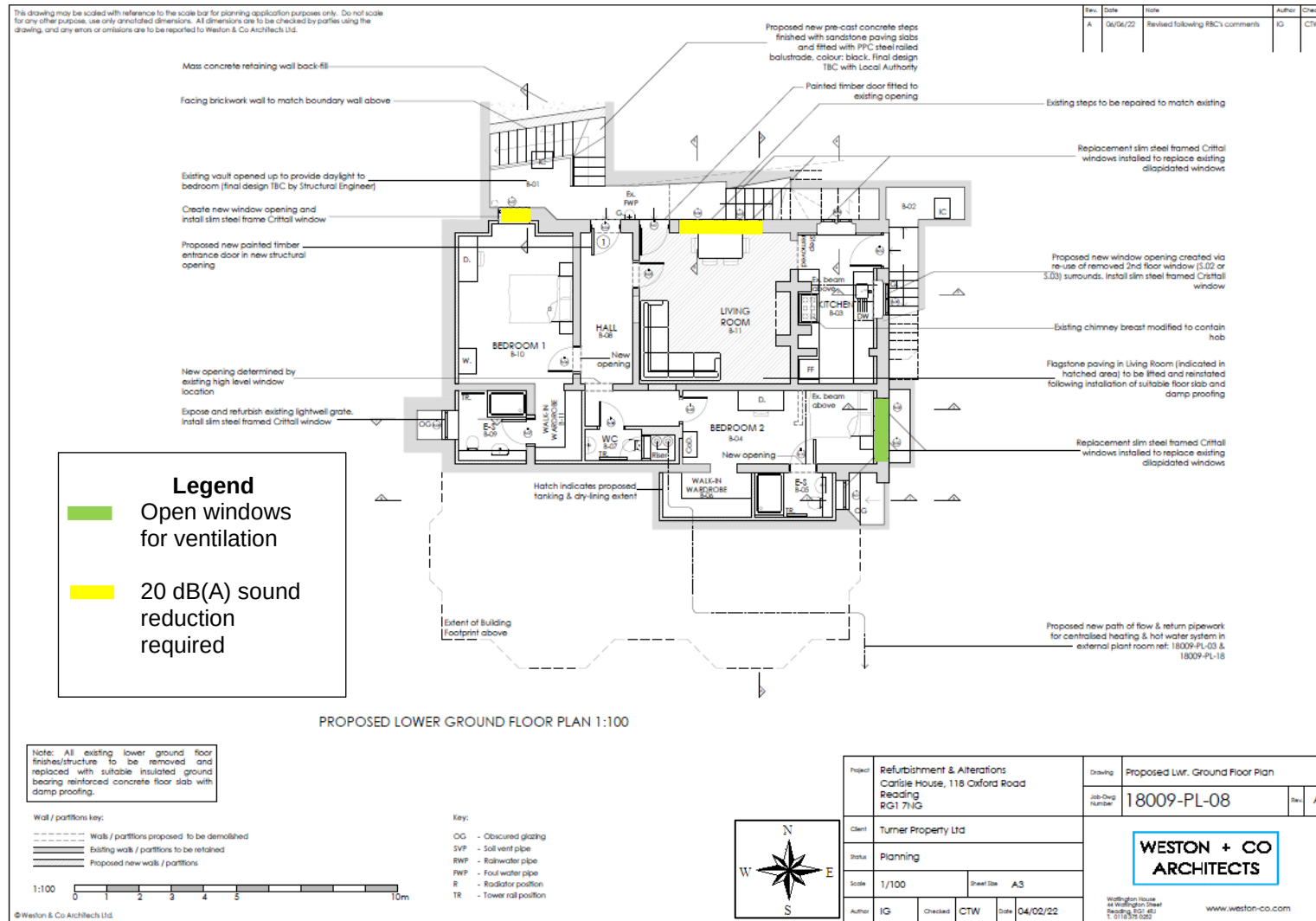
It has been identified that the existing windows to habitable rooms should achieve a minimum sound reduction of 20 dB(A). It should be noted that there are no windows to habitable rooms above the lower ground floor level of the east façade which overlook the Face Bar.

### **7.4. Recommendations to the Decision Maker**

On the basis of the above, it is recommended that there should be no objection to granting planning consent for the proposed development on noise grounds.

## ADDITIONAL FIGURES

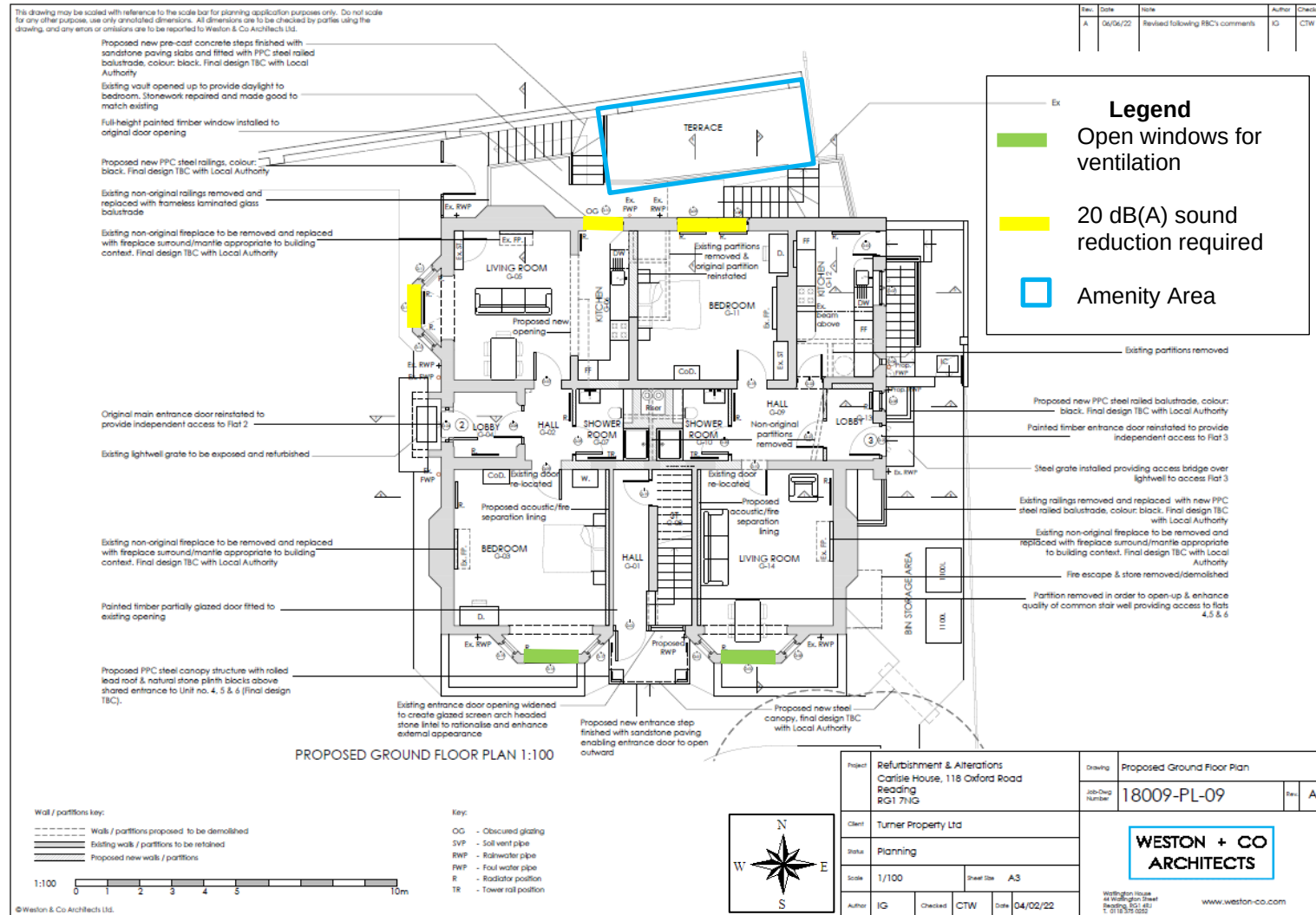
**Figure F.7.1: Proposed Lower Ground Floor Plan**



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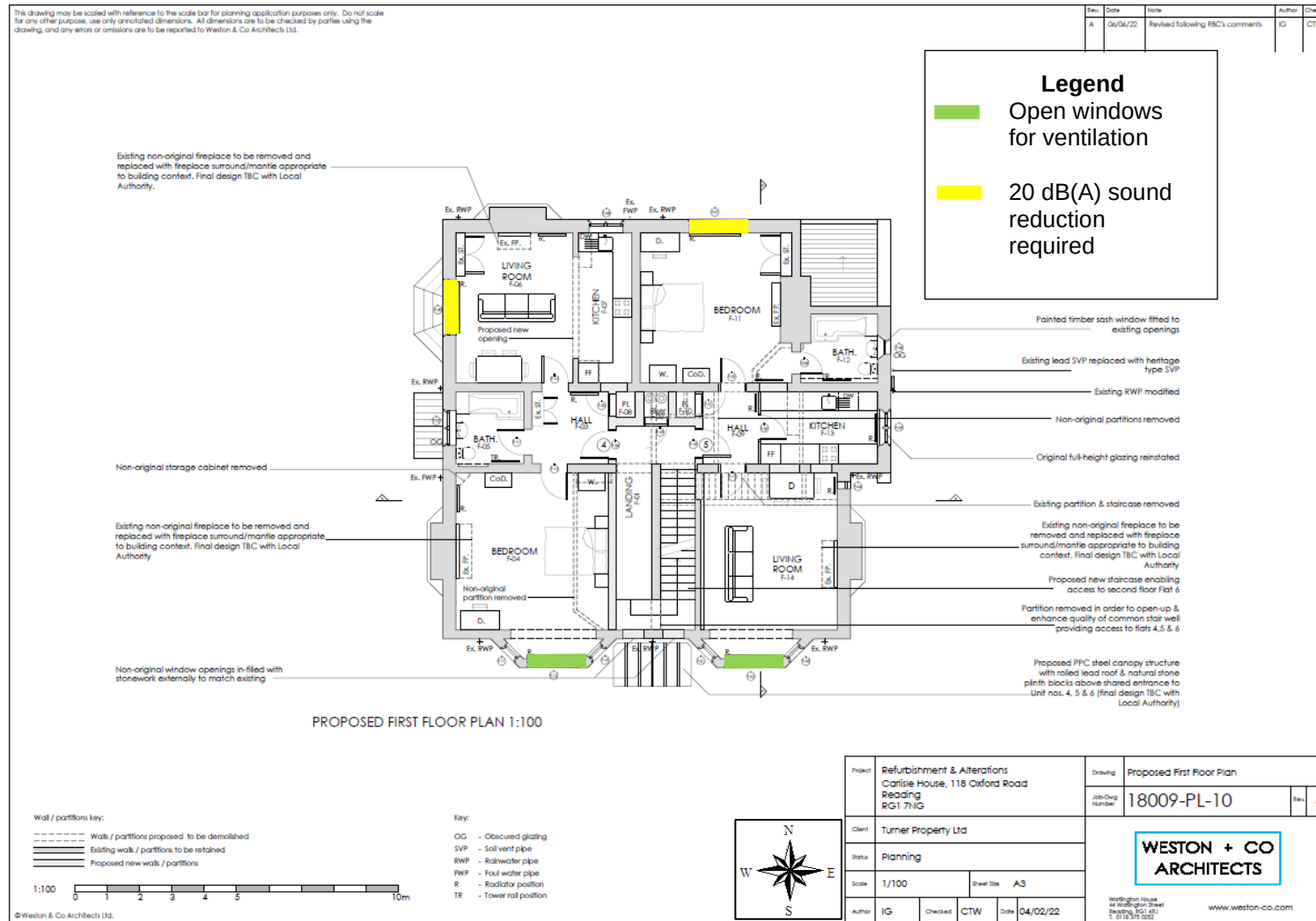
**Figure F.1.2: Proposed Ground Floor Plan**



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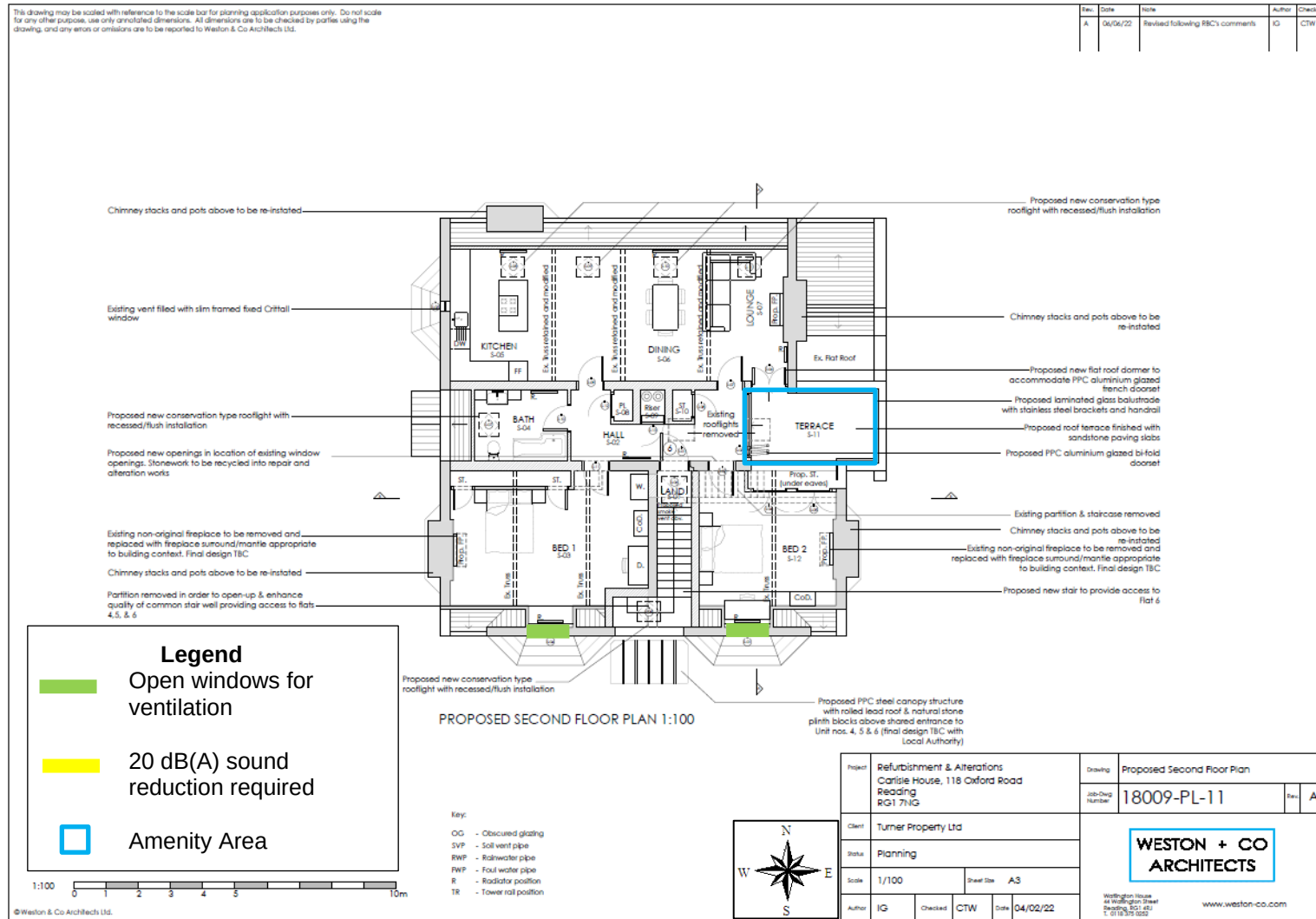
**Figure F.1.3: Proposed First Floor Plan**



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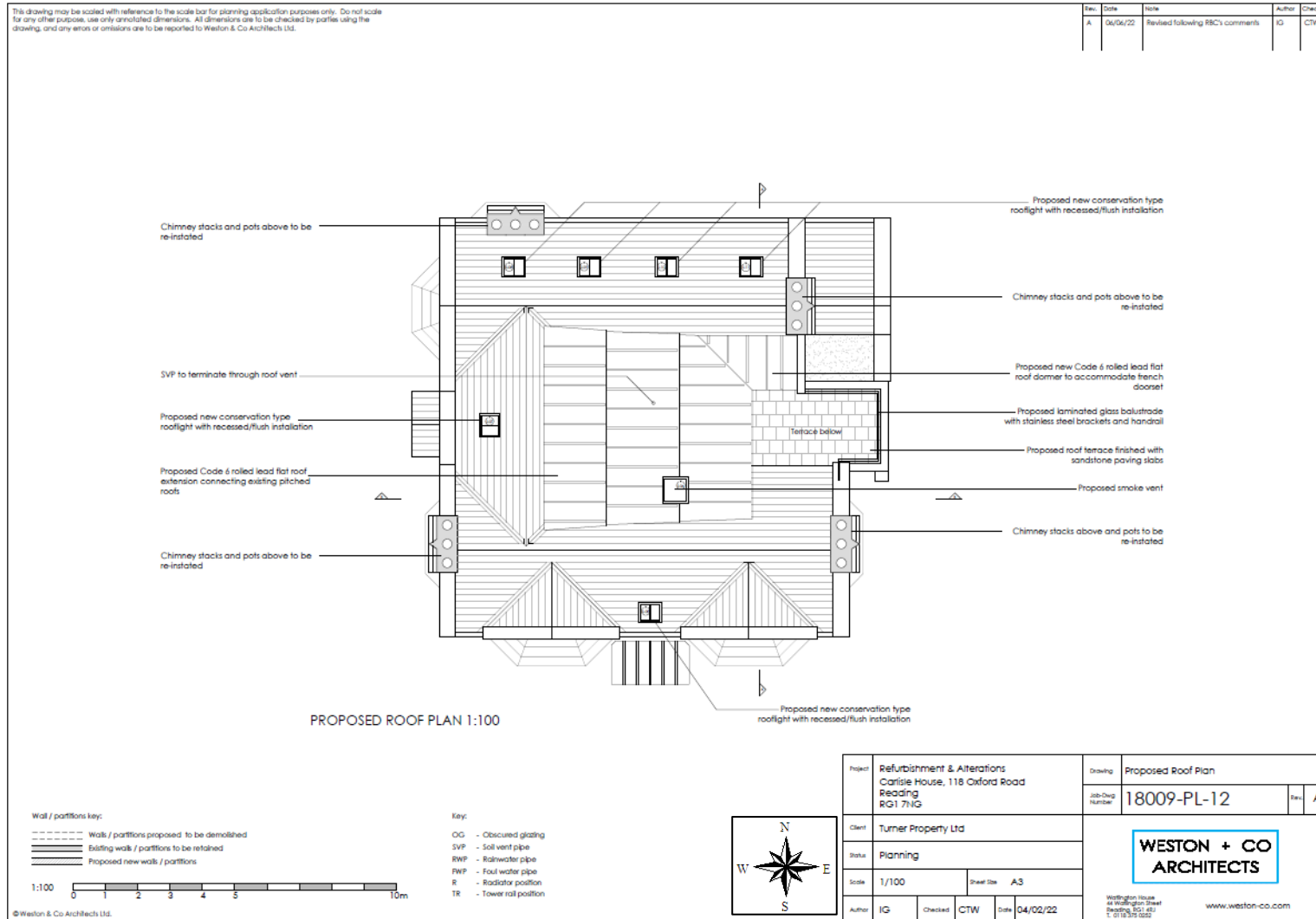
**Figure F.1.4: Proposed Second Floor Plan**



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**Figure F.1.5: Proposed Roof Floor Plan**



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## APPENDICES

## Appendix 1

### Glossary of Acoustic Terminology

| Term                                     | Description                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 'A'-Weighting                            | <i>This is the main way of adjusting measured sound pressure levels to take into account human hearing, and our uneven frequency response.</i>                                                                                                                                                                                                                                                        |
| Decibel (dB)                             | <i>This is a tenth (deci) of a bel. Decibel can be a measure of the magnitude of sound, changes in sound level and a measure of sound insulation. Decibels are not an absolute unit of measurement but are an expression of ratio between two quantities expressed in logarithmic form.</i>                                                                                                           |
| $L_{Aeq,T}$ (Ambient/Period Sound Level) | <i>The equivalent steady sound level in dB containing the same acoustic energy as the actual fluctuating sound level over the given period, T. T may be as short as 1 second when used to describe a single event, or as long as 24 hours when used to describe the noise climate at a specified location. <math>L_{Aeq,T}</math> can be measured directly with an integrating sound level meter.</i> |
| $L_{A90,T}$ (Background Sound Level)     | <i>The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 90 per cent of a given time. The <math>L_{A90,T}</math> is used to describe the background noise levels at a particular location.</i>                                                                                                                                                                         |
| $L_{Amax}$                               | <i>The 'A'-weighted maximum sound pressure level measured over a measurement period. Typically measured with 'fast' weighting (125 ms) or 'slow' weighting (1 s).</i>                                                                                                                                                                                                                                 |
| Rating Level, $L_{Ar,Tr}$                | <i>The specific sound level plus any adjustment for the characteristic features of the sound.</i>                                                                                                                                                                                                                                                                                                     |
| Residual Sound Level, $L_r = L_{Aeq,T}$  | <i>Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.</i>                                                                                                                                                                                                                             |
| Specific Sound Level, $L_s = L_{Aeq,Tr}$ | <i>The equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, <math>Tr</math>.</i>                                                                                                                                                                                                              |



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