# REPORT TITLE:

**Noise assessment at 13 Netherhall Gardens, London, NW3 5RN PHASE 3.**

# CLIENT DETAILS:

**Re-creo**

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**Document Status and Revision Schedule**

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| - | Checked & Authorised | 24/02/22 | JCB | MJ |
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# 1 Executive Summary

The prevalent noise levels at 13 Netherhall Gardens, London, NW3 5RN have been measured over a working day period to assess the impact of the existing noise sources on the proposed residential development. The potential impacts of the proposed development on surrounding areas are also considered.

The site is affected mainly by noise from sporadic road traffic from Netherhall Gardens, and nearby Southbank International School Hampstead to the eastern boundary.

It is considered that using guidelines from the World Health Organisation alongside levels provided in BS8233 for noise conditions within dwellings will ensure that 'significant adverse impacts on health and quality of life' are avoided as required by the Noise Policy Statement for England.

Consequently, an adequate level of noise mitigation measures will be required to ensure that future residents of the site are protected from the existing ambient noise.

If mitigation measures are included to achieve the specified internal noise levels, future residents of the proposed development will be protected from the dominant noise sources. Mitigation measures should include the use of appropriate glazing coupled with trickle ventilation.

# 2 Introduction

Pace Consult was commissioned by Re-creo to undertake an assessment of the noise impact associated with the proposed development at 13 Netherhall Gardens, London, NW3 5RN (Phase 3)

There is a potential for road traffic noise to have an impact on the proposal. Therefore, the impact of the existing noise levels has been considered in assessing the site's suitability for residential use.

The assessment was undertaken in accordance with national standards and guidelines for residential dwellings.

# 3 The Site

### 3.1 Location and Description

The site is bounded by Netherhall Gardens to the Eastern boundary, and residential properties to the Northern, Southern and Western boundaries respectively. The site lies in a quiet residential area.

Figure 1 below shows the location of the site relative to the surrounding area with survey locations indicated.

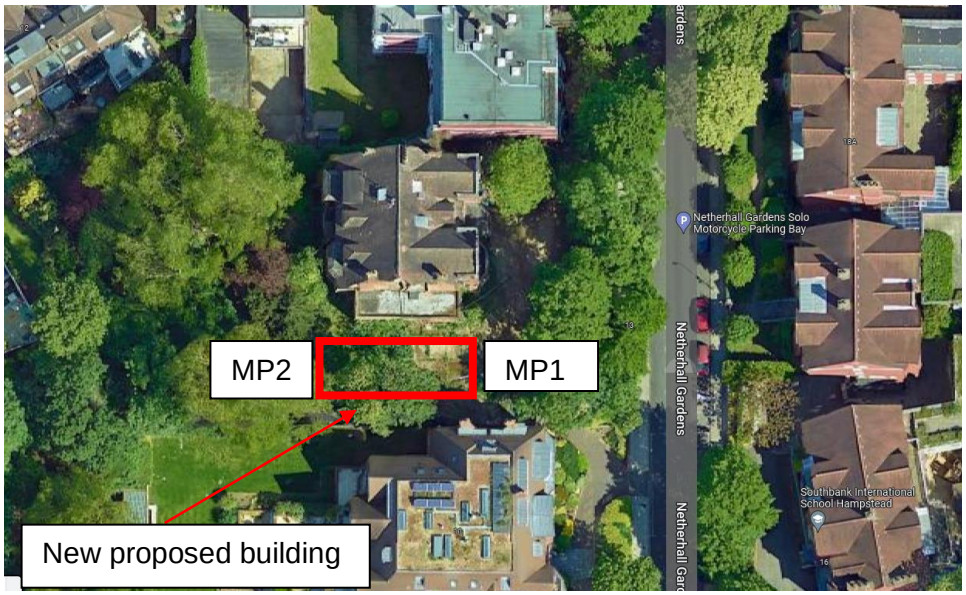



*Figure 1. Measurement positions*

### 3.2 Proposed Development PHASE 3

The proposed Phase 3 consist of the construction of a new three storey building located adjacent to the existing building 13 Netherhall Gardens. The figure below includes the proposed building location.

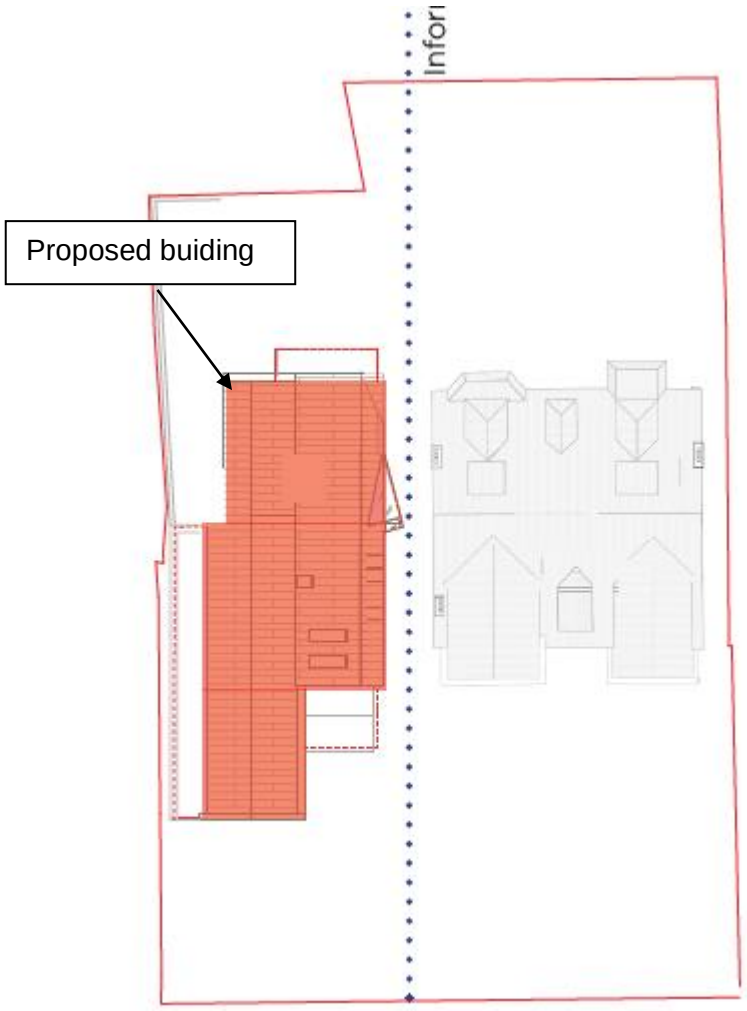



*Figure 2. Proposed building location.*

# 4 Assessment Methodology

## 4.1 National Planning Policy Framework and the Noise Policy Statement for England

National Planning Policy Framework and the Noise Policy Statement for England

The National Planning Policy Framework (NPPF) sets out the general requirements for gaining planning permission. Comments regarding noise found within the document are as follows.

S15. Para 174

*Planning policies and decisions should contribute to and enhance the natural and local environment by:*
*e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.*

Para 185

*185. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
*a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
*b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

The NPPF references the Noise Policy Statement for England (NPSE) which intern references two concepts used by the World Health Organisation (WHO) which can be used to ascertain relevant noise levels for individual sites. The concepts are LOAEL (Lowest Observed Adverse Effect Level) and SOAEL (Significant Observed Adverse Effect Level).

The NPPF then gives three aims to adhere to:

*Aim 1 – Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*
*Aim 2 – Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy of sustainable development.*
*Aim 3 – Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*

To avoid 'significant adverse impacts on health and quality of life', by creating a situation where the impact of noise lies below the SOAEL we will refer to both BS8233: 2014 – *Sound Insulation and noise Reduction for buildings,* and the World Health Organisation (WHO) *'Guidelines for Community Noise'* which both provide good criteria for internal noise levels for residential buildings.

In the context of assessing noise impact from the site, acceptable amenity levels for gardens are discussed within WHO Guidelines for Community noise, these criteria are also taken up by BS 8233: 2014 '*Guidance on sound insulation and noise reduction for buildings'.*

### 4.2 British Standard BS8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings

The scope of BS8233 is the provision of recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the external noise climate.

BS8233 suggests suitable internal noise levels within different types of buildings, including residential dwellings. It suggests an internal noise level of 35 dB $L_{Aeq,T}$ during day time, and 30 dB $L_{Aeq,T}$ during night time within bedrooms. In the daytime, the standard recommends 35 dB $L_{Aeq,T}$ in living rooms and in 40 dB $L_{Aeq,T}$ dining rooms. Table 4 below is extracted from this document.

Table 4 **Indoor ambient noise levels for dwellings**

| Activity | Location | 07:00 to 23:00 | 23:00 to 07:00 |
|---|---|---|---|
| Resting | Living room | 35 dB $L_{Aeq,16hour}$ | — |
| Dining | Dining room/area | 40 dB $L_{Aeq,16hour}$ | — |
| Sleeping (daytime resting) | Bedroom | 35 dB $L_{Aeq,16hour}$ | 30 dB $L_{Aeq,8hour}$ |

### 4.3 World Health Organisation (WHO) 'Guidelines for Community Noise'

This document states that, in dwellings, the critical effects of noise are on sleep, annoyance and speech interference. According to this document, to protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB $L_{Aeq}$ for a steady, continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB $L_{Aeq}$. To avoid any possibility of

sleep disturbance, indoor guideline values for bedrooms are 30 dB $L_{Aeq}$ for continuous noise and 45 dB $L_{Amax}$ for single sound events. These indoor noise levels correspond to sound pressure levels at the outside façades of the living spaces of 45 dB $L_{Aeq}$ and 60 dB $L_{Amax}$. These values have been obtained by assuming that the noise reduction from outside to inside with the window partly open is 15 dB.

### 4.4 ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise.

This document encourages improvements in the consistency and quality of planmaking and decision-taking in relation to acoustic matters. The context is primarily development control, although some of the content is relevant to strategic planning. The preparation of this ProPG acknowledges and reflects the Government's overarching Noise Policy Statement for England (NPSE), the National Planning Policy Framework (NPPF) and Planning Practice Guidance (including PPG-Noise), as well as other authoritative sources of guidance. This ProPG provides advice for Local Planning Authorities (LPAs) and developers, and their respective professional advisers.

The primary goal of this ProPG is to assist the delivery of sustainable development by promoting good health and wellbeing through the effective management of noise. It seeks to do that through encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise.

The recommended approach is also considered suitable where some industrial or commercial noise contributes to the acoustic environment provided that it is "not dominant".

This ProPG advocates a systematic, proportionate, risk based, 2-stage, approach.

*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 Area Noise Assessment"; and*
- *Element 4 – consideration of "Other Relevant Issues".*

The two stages are described below:

## Stage 1:

This section illustrates how an initial noise risk assessment is linked with an increasing risk of adverse effect from noise and how this in turn is broadly associated with indicative noise levels derived from current guidance and experience. The indicative noise levels are intended to provide a sense of the noise challenge at a potential residential development site and should be interpreted flexibly having regard to the locality, the project and the wider context. The figure 1 is included below.

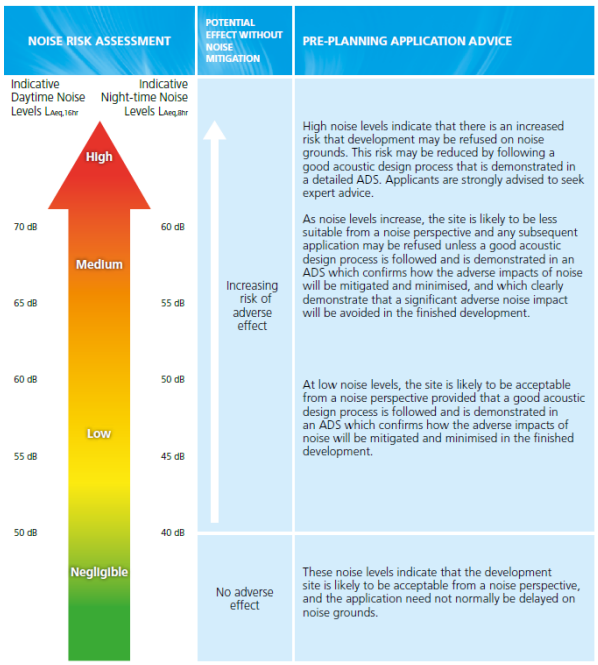



Figure notes.

a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise *mitigation measures.*
*b. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".*
*c. LAeq,16hr is for daytime 0700 – 2300, LAeq,8hr is for night-time 2300 – 0700.*
*d. An indication that there may be more than 10 noise events at night (2300 – 0700) with LAmax,F > 60 dB means the site should not be regarded as negligible risk.*

## Stage 2: The four key elements.

## Stage 2: Element 1 – Good Acoustic design Process.

Good acoustic design should provide an integrated solution whereby the optimum acoustic outcome is achieved, without design compromises that will adversely affect living conditions and the quality of life of the inhabitants or other sustainable design objectives and requirements.

## Stage 2: Element 2 – Internal Noise Levels Guidelines.

The recommended ProPG internal noise level guidelines are included below.

| ACTIVITY | LOCATION | 07:00 – 23:00 HRS | 23:00 – 07:00 HRS |
|---|---|---|---|
| Resting | Living room | 35 dB $L_{Aeq,16\ hr}$ | - |
| Dining | Dining room/area | 40 dB $L_{Aeq,16\ hr}$ | - |
| Sleeping (daytime resting) | Bedroom | 35 dB $L_{Aeq,16\ hr}$ | 30 dB $L_{Aeq,8\ hr}$<br>**45 dB $L_{AmaxF}$** (Note 4) |

*NOTE 1 The Table provides recommended internal LAeq target levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources.*
*NOTE 2 The internal LAeq target levels shown in the Table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise.*
*NOTE 3 These internal LAeq 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.*
*NOTE 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 LAmax,F, 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 LAmax,F more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A).*
*NOTE 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 LAeq target levels should not normally be exceeded, subject to the further advice in Note 7.*
*NOTE 6 Attention is drawn to the requirements of the Building Regulations.*
*NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal LAeq target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal LAeq levels start to exceed the internal LAeq 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 LAeq 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).*

## Stage 2. Element 3 – External Amenity Area Noise Assessment.

The ProPG external amenity area noise assessment reflects and extends the advice contained in BS8233:2014 and the current Government guidance in PPGNoise as detailed in the Element 3 box below.

*3(i) "If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended".*
*3(ii) "The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB LAeq,16hr."*
*3(iii) "These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces."*
*3(iv) Whether or not external amenity spaces are an intrinsic part of the overall design, consideration of the need to provide access to a quiet or relatively quiet external amenity space forms part of a good acoustic design process.*

*3(v) Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:*

- *a relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or*
- *a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden orlarge open balcony in a different, protected, location); and/or*
- *a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- *a relatively quiet, protected, publically accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations.*

**Stage 2: Element 4 – Assessment of Other Relevant Issues.**

This element seeks to build upon relevant national and local planning and noise policies (item 4(i)) to provide a systematic list of recommendations for the issues that should be considered before making a judgement about the noise aspects of a particular planning proposal for new residential development. The recommended relevant issues are included below.

*4(i) compliance with relevant national and local policy*
*4(ii) magnitude and extent of compliance with ProPG*
*4(iii) likely occupants of the development*
*4(iv) acoustic design v unintended adverse consequences*
*4(v) acoustic design v wider planning objectives*

### 4.5 BS4142:2014+ A1:2019 Methods for rating and assessing industrial and commercial sound

BS 4142: 2014 + A1:2019 provides a numerical means of assessing the significance of building plant noise. A key aspect of the BS 4142 assessment procedure is a comparison between the background noise level in the vicinity of noise sensitive receptors and the rating level of the noise source under consideration. The relevant parameters in this instance are as follows:

Background Sound Level, $L_{A90,T}$, defined in the Standard as the 'A-weighted sound pressure level that is exceeded by the residual sound for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels';

Specific Sound Level, $L_{Aeq,T}$ , the 'equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T (being 1 hour for assessments between 07:00-23:00hrs and 15 minutes for night time assessments 23:00-07:00hrs) ; and

Rating Level, $L_{Ar,Tr}$ , the specific sound level plus any adjustment made for the characteristic features of the sound'.

BS 4142 allows for, as an absolute worst case, a cumulative +15 dB correction to be applied to the specific sound level based upon the presence or expected presence of the following 'Acoustic Feature Corrections':

*Tonality – up to +6 dB penalty;*
*Impulsivity – up to +9 dB penalty (this can be summed with tonality penalty)*
*Intermittency – up to +3 dB penalty*
*Other sound characteristics (neither tonal nor impulsive but still distinctive) – +3 dB penalty.*

BS 4142 provides guidance as to the likely response from sensitive residential receptors to new fixed noise sources (e.g. building plant or services) through comparison of the rating level of the new noise source with the existing background level. The higher the rating noise level in comparison to the background noise level, the greater the likelihood of complaints arising. BS 4142 requires separate analysis for day and night time periods.

The criteria for determining the significance of changes in noise levels from building services plant, based on guidance within BS 4142, and the potential effect on noise sensitive receptors are presented in below.

*Rating level is 10 dB(A) below background Very Low (LOAEL)*
*Rating level is equal to background Low*
*Rating level is +5 dB(A) above background Medium (SOEAL)*
*Rating level is +10 dB(A) or more above background High*

The Rating Level is the noise level attributable to the new source(s), plus penalties if the new source has tonal or intermittent characteristics.

The Background Level is taken as the $L_{A90}$; this is the ambient noise level in the absence of the source which is exceeded for 90% of the time.

LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.

A cumulative BS 4142: 2014 +A1: 2019 rating level for all new items of mechanical plant – equivalent to the prevailing Background Noise Level ($L_{A90}$ dB) at all sensitive receptors would be expected to have a Low Impact of nearby receptors.

# 5 Survey Method and Equipment

### 5.1 Survey

The noise survey was carried out between Tuesday 22nd and Wednesday 23rd February 2022 to measure representative noise levels at the site of the proposed development during a typical weekday period.

The noise survey comprised of two unattended monitoring locations on site which are described in detail below;

- Eastern Boundary (MP1): Unattended continuous monitoring position recorded the noise levels from the Netherhall Gardens. The sound level meter was positioned at a height of 1.5 m above ground level, and 3 metres from any reflective surface. The microphone had direct line of view with Netherhall Gardens.

- Western Boundary (MP2): Unattended continuous monitoring position recorded the noise levels affecting the back area of the proposed development. The sound level meter was positioned at a height of 1.5 m above ground level and 3 m from any reflective surface.

Noise measurements were made with a calibrated precision grade sound level meter which achieves the requirements of BS EN 61672:2003. The survey was carried out in accordance with the principles of BS 7445:1997 Parts 1-3, 'Description and Measurement of Environmental Noise', and British Standard BS4142: 2014: Methods for rating and assessing industrial and commercial sound.

### 5.2 Equipment

- Svantek 971 precision grade sound level meter. Serial number 34931, 34937.
- Norsonic Sound Calibrator 1251. Serial number 32199.
- Environmental wind shields

The sound level meters were calibrated before and after the survey. No significant drift was noted between the two reference checks.

### 5.3 Weather

In order to evaluate the weather conditions two weather check measurements were undertaken on site. During the weather checks, it was noted that the climatic conditions were stable during the whole measurement period. During the visits the sky was covered.

Table 1. Weather condition.

| | $^{o}$C | Wind speed m/s | Wind direction | Relative Humidity % |
|---|---|---|---|---|
| 1st visit (12:00 PM) Tuesday | 10.2 | 1.0 | N | 89.4 |
| 2nd visit (10:00 AM) Wednesday | 13.2 | 0.9 | NE | 67.8 |

The weather condition was taken using a Pocket weather tracker KESTREL 4500.

Note. Short period of light rain was detected on Tuesday morning; however, this period did not affect negatively the survey result. It is therefore considered that the weather condition was considered suitable to undertake the noise survey.

# 6 Survey Results

The measurement survey at all monitoring locations comprised of consecutive measurement periods in terms of the most relevant standards and guidelines.

The Tables below show the period noise levels measured at all monitoring locations. These have subsequently been used as the basis for establishing the dominant noise levels across the site. The full set of survey data is included within the Annex.

Table 2. Measured continuous noise level

| **Time** | **Period** $L_{Aeq,\,T}$ **dB** (Log Average) | $L_{Amax(fast),\,T}$ **dB** **95th Percentile** | $L_{A90,T}$ **dB** Typical background |
|---|---|---|---|
| MP1 | | | |
| Day (07:00 – 23:00) | 51 | N/A | 42 |
| Night (23:00 – 07:00) | 46 | 95th Percentile 67<br>Average 56<br>Max 70 | 38 |
| MP2 | | | |
| Day (07:00 – 23:00) | 50 | N/A | 39 |
| Night (23:00 – 07:00) | 43 | 95th Percentile 67<br>Average 57<br>Max 74 | 35 |

# 7 Site Suitability for Residential Development

### 7.1 Noise Assessment

External noise levels have been predicted for the sensitive façades of the proposed development that will be exposed to the highest levels of noise. All calculations are based on the results of the noise monitoring exercise.

It will be important to construct the envelope of the building using materials with adequate sound insulating properties as to provide good internal noise conditions. If the envelope is built to a high enough standard, it will be possible to achieve appropriate internal noise levels recommended for noise-sensitive developments.

The octave spectrums used in the building envelope assessment are shown below; these have been adjusted to assess the facade requirements at different locations. The night-time maximum noise levels are based on the 95$^{th}$ percentile of the levels measured during the survey for a robust assessment.

| Table 3 Example noise level octave spectrums used for building envelope calculation (MP1) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Freq. Hz | 63 | 125 | 250 | 500 | 1 k | 2 k | 4 k | Average dBA |
| Day-time $L_{eq}$ | 57 | 52 | 50 | 47 | 47 | 42 | 40 | 51 |
| Night-time $L_{eq}$ | 53 | 47 | 43 | 42 | 41 | 35 | 37 | 46 |
| Night-time $L_{max(fast)}$ | 74 | 68 | 64 | 63 | 62 | 56 | 58 | 67 |

| Table 4 Example noise level octave spectrums used for building envelope calculation (MP2) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Freq. Hz | 63 | 125 | 250 | 500 | 1 k | 2 k | 4 k | Average dBA |
| Day-time $L_{eq}$ | 56 | 49 | 45 | 45 | 45 | 41 | 44 | 50 |
| Night-time $L_{eq}$ | 52 | 44 | 39 | 39 | 38 | 31 | 36 | 43 |
| Night-time $L_{max(fast)}$ | 76 | 68 | 63 | 63 | 62 | 55 | 60 | 67 |

### 7.2 Building Envelope Sound Insulation

The measured noise levels affecting the proposed development is considered low, and therefore the envelope construction could achieve the internal noise levels through a combination of measures such as those presented below:

Table 6 – Specification for the building envelope.

| Freq. Hz | 63 | 125 | 250 | 500 | 1 k | 2 k | 4 k | **Average** |
|---|---|---|---|---|---|---|---|---|
| Glazing – Bedrooms | 15 | 21 | 17 | 25 | 35 | 37 | 31 | **29 dB $R_w$** |
| Trickle vent Bedroom | 29 | 36 | 38 | 36 | 32 | 37 | 39 | **35 Dn,w** |
| Glazing – Living Rooms | 15 | 21 | 17 | 25 | 35 | 37 | 31 | **29 dB $R_w$** |
| Trickle vent Living Rooms | 29 | 36 | 38 | 36 | 32 | 37 | 39 | **35 Dn,w** |
| External wall | 43 | 46 | 44 | 46 | 54 | 62 | 68 | **52 dB $R_w$** |
| Roof | 22 | 35 | 48 | 56 | 60 | 56 | 60 | **56 dB $R_w$** |

The example wall and roof specification was a typical cavity brick construction and Dryliner (12.5 mm soundbloc plasterboard). The roof specification is typical roof sheeting, rafters, insulation 150 mm and 2 x layers of sound bloc on resilient layers. Various other construction types may be acceptable however these should be calculated if necessary.

By employing the above attenuating measures, it will be possible to attain the internal noise levels within dwellings recommended in British Standard BS 8233:2014 Guidance on sound insulation and noise reduction for buildings. Nighttime noise levels resulting from single sound events are not expected to regularly exceed the recommended level of 45 dB $L_{Amax(fast)}$ by the relevant acoustic guidelines in bedrooms and $L_{Aeq}$ 35 dB in living rooms during day time.

An example of the noise intrusion calculations into the habitable spaces are included overleaf. The calculations are based on the BS8233:2014 recommended methodology.

The table below includes the noise intrusion in bedrooms exposed to the highest noise levels ($L_{Amax, fast}$ dB). The calculation assumes a bedroom of 34 $m^3$.

**BS8233:2014 Calculation of Sound transmission into a building**

| | | | |
|---|---|---|---|
| **Project:** | | **Date:** | |
| **Client:** | | **Consultant:** | |

| **Building elements & Areas** | **Total $M^2$** |
|---|---|
| $S_{ew}$ - External Wall Area | 11.50 |
| $S_{wi}$ - Area of Windows within Room | 3.50 |
| $S_{rr}$ - Area of Ceiling within Room | 18.30 |
| **Total Façade Area:** | **15.00** |
| **Total Area of transmitting elements:** | **33.30** |

| **Constants** | |
|---|---|
| A0 | 10 |
| A (0.16√T) | 10.752 |
| No. Vents | 1 |

| | W | L | H | V | Rt (s) |
|---|---|---|---|---|---|
| Room Data | 4 | 3 | 2.8 | 33.6 | 0.5 |

**Constructions & Performance Data:**

| Construction | *63* | *125* | *250* | *500* | *1K* | *2K* | *4K* |
|---|---|---|---|---|---|---|---|
| **Window** | 15 | 21 | 17 | 25 | 35 | 37 | 31 |
| **Vent:** | 29 | 36 | 38 | 36 | 32 | 37 | 39 |
| Wall | 43 | 46 | 44 | 46 | 54 | 62 | 68 |
| Ceiling | 22 | 35 | 48 | 56 | 60 | 56 | 60 |

**Source Noise & Element Contributions**

| | *63* | *125* | *250* | *500* | *1K* | *2K* | *4K* |
|---|---|---|---|---|---|---|---|
| **Source Lp** | 74 | 68 | 64 | 63 | 62 | 56 | 58 |
| Window | -24.8 | -30.8 | -26.8 | -34.8 | -44.8 | -46.8 | -40.8 |
| Vent | -34.2 | -41.2 | -43.2 | -41.2 | -37.2 | -42.2 | -44.2 |
| Wall | -47.6 | -50.6 | -48.6 | -50.6 | -58.6 | -66.6 | -72.6 |
| Ceiling | -24.6 | -37.6 | -50.6 | -58.6 | -62.6 | -58.6 | -62.6 |
| **Cumulative SRI** | **-21.4** | **-29.6** | **-26.6** | **-33.8** | **-36.5** | **-40.8** | **-39.1** |
| Plus 10log S/A | 4.9 | 4.9 | 4.9 | 4.9 | 4.9 | 4.9 | 4.9 |
| Façade Effect | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| RESULT | 60.5 | 46.3 | 45.3 | 37.1 | 33.4 | 23.1 | 26.8 |

| A weighted Internal Level | 41.7 |
|---|---|

As can be seen from the above table, the calculated internal noise intrusion is 42 dBA, which is significantly below the levels recommended by the WHO acoustic guidelines, and ProPG. ≤ 45dB $L_{Amax}$.

The table below includes the noise intrusion in living rooms based on the measured $L_{Aeq}$ dB during day time. The calculation assumes a living room of 56 $m^3$.

**BS8233:2014 Calculation of Sound transmission into a building**

| | | | |
|---|---|---|---|
| **Project:** | | **Date:** | |
| **Client:** | | **Consultant:** | |

| **Building elements & Areas** | **Total $M^2$** |
|---|---|
| $S_{ew}$ - External Wall Area | 14.50 |
| $S_{wi}$ - Area of Windows within Room | 3.50 |
| $S_{rr}$ - Area of Ceiling within Room | 27.90 |
| **Total Façade Area:** | **18.00** |
| **Total Area of transmitting elements:** | **45.90** |

| **Constants** | |
|---|---|
| A0 | 10 |
| A (0.16v/T) | 17.92 |
| No. Vents | 2 |

| | W | L | H | V | Rt (s) |
|---|---|---|---|---|---|
| Room Data | 5 | 4 | 2.8 | 56 | 0.5 |

| | **Constructions & Performance Data:** | | | | | | |
|---|---|---|---|---|---|---|---|
| Construction | *63* | *125* | *250* | *500* | *1K* | *2K* | *4K* |
| **Window** | 18 | 21 | 17 | 25 | 35 | 37 | 31 |
| **Vent:** | 32 | 37 | 41 | 43 | 39 | 42 | 45 |
| Wall | 43 | 46 | 44 | 46 | 54 | 62 | 68 |
| Ceiling | 22 | 35 | 48 | 56 | 60 | 56 | 60 |

| | **Source Noise & Element Contributions** | | | | | | |
|---|---|---|---|---|---|---|---|
| | *63* | *125* | *250* | *500* | *1K* | *2K* | *4K* |
| **Source Lp** | 57 | 52 | 50 | 47 | 47 | 42 | 40 |
| Window | -29.2 | -32.2 | -28.2 | -36.2 | -46.2 | -48.2 | -42.2 |
| Vent | -35.6 | -40.6 | -44.6 | -46.6 | -42.6 | -45.6 | -48.6 |
| Wall | -48.0 | -51.0 | -49.0 | -51.0 | -59.0 | -67.0 | -73.0 |
| Ceiling | -24.2 | -37.2 | -50.2 | -58.2 | -62.2 | -58.2 | -62.2 |
| **Cumulative SRI** | **-22.7** | **-30.5** | **-28** | **-35.6** | **-40.9** | **-43.5** | **-41.2** |
| Plus 10log S/A | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 |
| Façade Effect | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| RESULT | 41.4 | 28.6 | 29.1 | 18.5 | 13.2 | 5.6 | 5.9 |

| | |
|---|---|
| A weighted Internal Level | 23.8 |

As can be seen from the above table, the calculated internal noise intrusion is 24 dBA, which is below the levels recommended by BS8233:2014 and ProPG (≤ 35dB $L_{Aeq}$).

Potential suppliers of construction elements must be able to satisfy the design team that the acoustic performance information supplied must relate to the products on offer for this project and should show laboratory test acoustic information measured in accordance with BS EN ISO 140-3.

Regarding the external amenities, the measured noise levels is below 55 dBA which is compliant with the external noise levels recommended by the relevant acoustic guidelines.

# 8 Noise from Fixed Installations and Mechanical Plant

Noise levels generated by mechanical plant and experienced by local receptors depends upon a number of variables, the most significant of which are considered to be as follows.

- Noise generated by plant or equipment used on site, generally expressed as sound power levels (SWL).
- Distance between the noise source and the receptor.
- Attenuation due to ground absorption, atmospheric and barrier effects.
- Periods of operation of the plant on the site, known as its “on-time”.

It is possible that the proposal will include installations of ventilation and mechanical plant. However, at this stage, no information is available with regards to the fixed installations and mechanical plants that are to be installed as part of the proposed development.

Consequently, it is not possible to present an inclusive assessment of the noise effects of such plant. However, in order to ensure that background noise levels at the nearest noise sensitive receptors do not increase significantly as a result of the development, design noise limits for electrical and mechanical plant have been provided.

The noise limits have been based on achieving the quietest background noise level recorded during the noise survey.

| Table 7: Noise Limit for Fixed Installations of Mechanical Plant, $L_{Ar,Tr}$ (dB) | |
|---|---|
| Daytime | Night-time |
| 38 | 35 |

If fixed installations and mechanical plant are designed to achieve the above-mentioned noise limits at the nearest residential receivers complaints will be minimised.

There are a number of measures that can be introduced to control noise from the mechanical and fixed plant installation associated with the proposed development. Consideration should be given to reducing noise at point of generation (e.g. by selecting quieter plant) or containment of noise generated (e.g. by insulating buildings which house machinery and/or providing purpose-built barriers around the site).

# 9 Conclusions

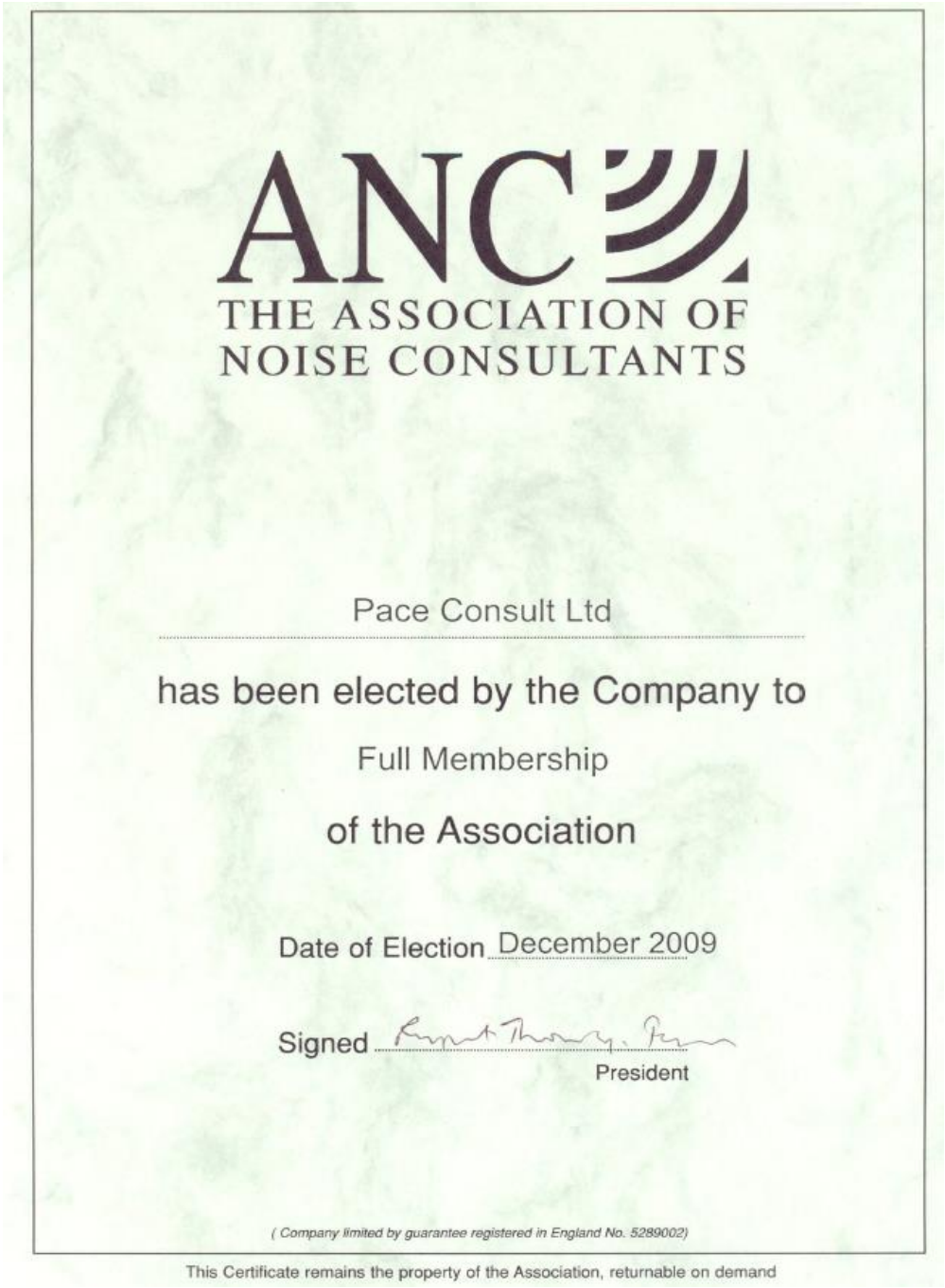
The impact of noise associated with the proposed development at 13 Netherhall Gardens, London, NW3 5RN has been assessed. Throughout, the assessment has been undertaken with reference to British Standards and national and international guidance on noise impacts.

The noise levels have been assessed with consideration to the National Planning Policy Framework and the Noise Policy Note for England. Following these policies, figures from the WHO's 'Guidelines for Community Noise', ProPG: Planning & Noise, and BS8233 '*Sound Insulation and Noise Reduction for Buildings'* have been used to assure that 'significant adverse impacts on health and quality of life' are avoided. To achieve these internal noise levels envelope constructions have been suggested.

# 10 References


1. National Planning Policy Framework
2. Noise Policy Statement for England
3. World Health Organisation Criteria – Environmental criteria
4. BS8233:2014 "Guidance on sound insulation and noise reduction for buildings"
5. British Standard BS4142: 2014, Method for Rating and assessing industrial and commercial sound.
6. ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise.

# Appendix 1 ANC Membership.



ANC

THE ASSOCIATION OF NOISE CONSULTANTS

Pace Consult Ltd

has been elected by the Company to

Full Membership

of the Association

Date of Election December 2009

Signed

President

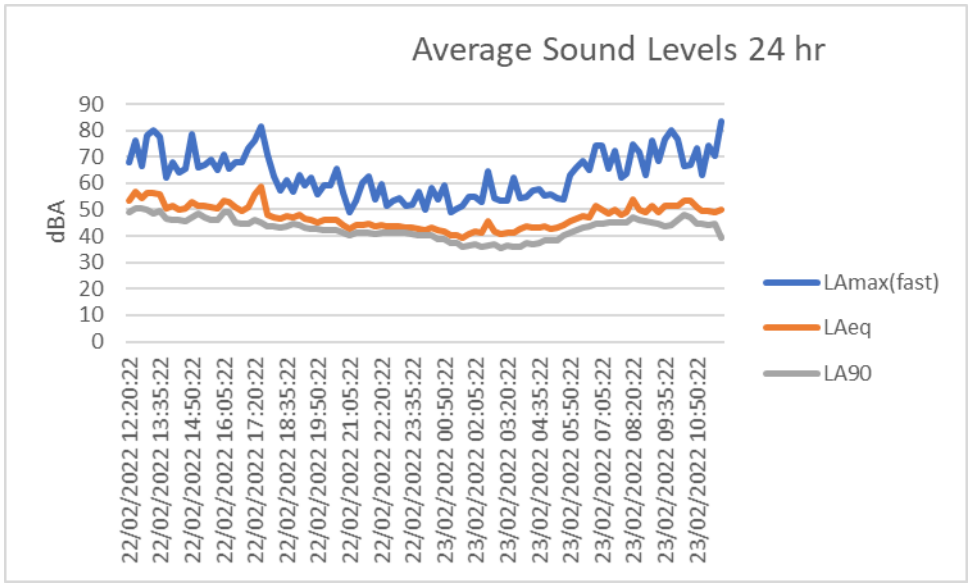
( Company limited by guarantee registered in England No. 5289002)

This Certificate remains the property of the Association, returnable on demand

# Appendix 2 Noise measurements.

The figures included below shows the sound levels at intervals of 15 minutes during the 24 hr noise survey.

Position MP1




Position MP2