Transformation of the Ugly Brown Building

Noise Assessment Report

March 2021

Waterman Infrastructure & Environment Ltd
Pickfords Wharf, Clink Street, London SE1 9DG, United Kingdom
www.watermangroup.com

Client Name: Reef Estates Limited
Document Reference: WIE11701-102-R-9.1.3
Project Number: WIE11701

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS EN ISO 45001:2018)

Issue	Date	Prepared by	Checked by	Approved by
001	9 March 2021	Innes Urbanski Associate (original author Jerry Rees Consultant)	Mark Maclagan Technical Director	Mark Maclagan Technical Director

Comments: Legislation updated of report WIE11707-100-R-3.4.2 Dated 17th August 2017. Plot A only.

Disclaimer

This report has been prepared by Waterman Infrastructure & Environment Limited, with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporation of our General Terms and Condition of Business and taking account of the resources devoted to us by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at its own risk.

Contents

Figures

Tables

Appendices

1. Introduction

1.1 The Brief

This Noise Assessment has been prepared on behalf of Reef Estates Limited (the "Applicant") as part of an application to the London Borough of Camden Council ("LBC or the "Council") for the redevelopment of The Ugly Brown Building, 2-6 St Pancras Way, London NW1 0TB (the "Site") in relation to:

'Minor material amendments to Plot A within planning permission 2017/5497/P, namely alterations to external paving, development of accessible roof terrace, additional secondary entrance, setting back of north facade, enlargement of plant enclosure, lowering of balustrades, and other ancillary works' (the "Proposed Development';

Please note that this application is specifically concerned with amendments to Plot A only, however it should be noted that this Noise Assessment has also accounted for forthcoming amendments to the 2017/5497/P application across the wider Site (which will be subject to separate planning applications and will be submitted at a later date.)

This Noise Assessment has been based on the scenario that the aforementioned amendments to the wider Site will be implemented. The proposed changes to Plot A within this application are included within the proposed amendments to the wider Site, therefore this document is considered sufficient to examine the impacts on Noise from the Plot A changes in isolation.

This report updates the previous noise assessment submitted with the planning application (report reference: WIE11701-100-R-3.4.2-Noise)).

This report considers the Site's suitability for the nature of proposed uses through measurement of existing noise affecting the Site, which have been used to carry out the following works:

- Preliminary façade sound insulation assessment to provide early indication of the necessary façade airborne sound insulation required to achieve appropriate internal noise levels (*with reference to BS 8233;2014 and WHO,1999*), whilst protect against noise break out from the retail units;
- Assessment of road traffic noise; and
- The setting of appropriate noise emission limits for new fixed building services plant associated with the Development (*in accordance with the plant noise policy of LBC*).

A glossary of the acoustic terminology used in this report is presented in **Appendix A**.

2. The Site, Site Setting and Proposed Development

2.1 Site Description

The application Site is located at 2-6 St Pancras Way, London, NW1 0TB and is approximately 1.14 hectares in size. It is 500m to the north west of London Kings Cross and St Pancras International Station. The Site is currently occupied by the Ugly Brown Building which is used for office and data centre use.

The Site is bound by St Pancras Way (the A5202) to the west, a busy thoroughfare which experiences high vehicular flows and to the south by Granary Road. The eastern Site boundary is adjoined by the Regent's Canal.

The surrounding area close to the site is urban and characterised by a mix of uses comprising commercial, retail, office and residential.

2.2 The Noise Climate

The noise climate of the area is dominated by noise from local road traffic along St Pancras Way (A5202) and more distant traffic on the surrounding road network. The main line railway network serving London Kings Cross and St Pancras International stations are situated 130m to the east and train movements are audible around the Site. Distant construction noise is also audible along with human activities in the area and these also influence the noise climate, to some extent.

A Site location plan is provided as **Figure 1**, showing the location of the Site and orientation with respect to other existing developments and the road network for the area.

2.3 Noise Sensitive Premises

Existing properties within the vicinity of the proposed Development are predominantly commercial in nature; however, residential properties have been identified in proximity to the Site. The closest noise sensitive receptors (NSRs) are detailed in **Table 1** and illustrated as **Figure 1**. Consideration of those sensitive receptors introduced as part of the Development is also required.

Table 1: Noise Sensitive Receptors

Receptor Location (Figure 1)	Type of Receptor	Description / Name	Approximate Distance to Site Boundary
NSR A	The Royal Veterinary College	St Pancras Way	26m West
NSR B	Saint Pancras Hospital	Granary Street	18m South
NSR C	Residential	4-28 Reapers Close	35m East

2.4 Proposed Development

Development would comprise the demolition of the existing building and erection of 6 new buildings ranging from 2 storeys to 12 storeys in height above ground and 2 basement levels comprising a mixed business floorspace (E(g)), residential (C3), gym (E(d)), flexible retail (E (a/b/c) and Sui Generis and storage space (B8) development with associated landscaping work. The Development would be divided into three plots, hereafter referred to as Plots A, B and C, which would comprise the following mix of uses:

- Plot A would comprise one building of business floorspace and retail;
- Plot B would comprise one building with two basement levels for flexible Class E and Sui Generis Use, a three-storey Pavilion for flexible Class E and Sui Generis Use; and
- Plot C would comprise three buildings of business floorspace, gym, retail and residential uses (73 units, including affordable homes).

It is currently proposed that the basement would comprise car and cycle parking, refuse areas and plant rooms as well as space for a Gym and Use Class B8 floor space. A total of 808 long stay and approximately 104 short stay cycle parking spaces would be provided.

It is currently proposed that the Development would provide 32 car parking spaces including 2 for disabled residents, which will be provided in Plots B and C.

The surrounding area closer to the site is urban and characterised by a mix of uses comprising commercial, retail, and residential.

In addition, public realm space would be provided across the Site to allow access to the canal-side.

3. Planning Policy and Guidance

This section presents the key planning policy and guidance documents pertaining to noise within England relevant to the proposed development. These documents set out the aims, many of which are comparable, without providing details on specific noise levels, the latter of which are transposed into British Standards or sector specific guidance which are presented within Section 4 of this report.

3.1 National Planning Policy

3.1.1 National Planning Policy Framework, 2019

The National Planning Policy Framework[1] (NPPF) was revised and published on 19th February 2019. With regard to noise, the NPPF promotes '*good design*' as part of '*sustainable development*' and advocates '*preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of …….noise pollution…*'

Paragraph 180 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;

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;'

Paragraph 182 of the NPPF introduces the '*Agent of change principle*'. '*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.*'

Planning Practice Guidance Noise[2] (PPGN), provides web-based government advice on how planning can manage potential noise impacts in new development, therefore providing support to the noise elements of the NPPF.

3.2 Noise Policy Statement For England

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development, the Noise Policy Statement For England[3] (NPSE) aims to:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.

[1] Ministry of housing, Communities and Local Government. (February 2019) National Planning Policy Framework. HMSO.
[2] https://www.gov.uk/guidance/noise--2 (accessed 16 December 2020).
[3] Defra. (2010) Noise Policy Statement For England (NPSE).

It introduces the concept of noise "*effect levels*" although it does not equate these to a specific level of noise as this is likely to be different for different noise sources, receptors and time of day. The effect levels are as follows:

- NOEL – Noise Observed Effect Level: Level below which no effect on health and quality of life due to noise can be detected;
- LOAEL – Lowest Observed Adverse Effect Level: Level above which adverse effects on health and quality of life can be detected;
- SOAEL – Significant Observed Adverse Effect Level: Level above which significant adverse effects on health and quality of life occur.

Predominantly, guidance is drawn from the World Health Organisation (WHO) when setting specific noise levels to the above effect levels, which essentially have been transposed into various British Standards, Policy and Guidance. Further explanation on the effect levels is provided in PPGN,

3.3 The London Plan 2021

The London Plan 2021[4] is the Spatial Development Strategy for Greater London. It sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth.

Policies D13 'Agent of Change' and D14 'Noise' of the London Plan 2021, are relevant to the proposed development.

Policy D13 'Agent of Change' reflects Para 182 of the NPPF, in that "*it places the responsibility for mitigating impacts from existing noise and other nuisance-generating activities or uses on the proposed new noise-sensitive development*". Further to this the "*development should be designed to ensure that established noise and other nuisance-generating uses remain viable and can continue or grow without unreasonable restrictions being placed on them*". The development proposal should mitigate and manage noise and other potential nuisances by:

1. ensuring good design mitigates and minimises existing and potential nuisances generated by existing uses and activities located in the area;
2. exploring mitigation measures early in the design stage, with necessary and appropriate provision including ongoing and future management of mitigation measures secured through planning obligations;
3. separating new noise-sensitive development where possible from existing noise-generating businesses and uses through distance, screening, internal layout, sound-proofing, insulation and other acoustic design measures.

The development needs to clearly demonstrate how noise and other nuisance will be mitigated and managed.

Policy D14 'Noise' states that the development (residential and non-aviation) should manage noise by:

1. avoiding significant adverse noise impacts on health and quality of life;
2. reflecting the Agent of Change principle as set out in Policy D13 Agent of Change;

[4] the_london_plan_2021.pdf [accessed 4/3/21]. GLA (March 2021) Mayor of London. The London Plan. The Spatial Development Strategy for Greater London. GLA.

3. mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on existing noise-generating uses;
4. improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity);
5. separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening, layout, orientation, uses and materials – in preference to sole reliance on sound insulation;
6. where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles;
7. promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver.

Paragraph 3.14.3 of the London Plan states:

"The management of noise also includes promoting good acoustic design of the inside of buildings. Section 5 of BS8233:2014 provides guidance on how best to achieve this. The Institute of Acoustics has produced advice ProPG Planning and Noise (May 2017), that may assist with the implementation of residential developments." BS4142 is also referred to.

3.4 Local Planning Policy

3.4.1 Camden Local Plan, 2017

LBC has certain legal responsibilities to prepare documents that control and regulate the use of land. This is done with the Camden Local Plan[5] policy sets out detailed planning criteria that LBC use to determine applications for planning permission in the borough in contributing towards delivering the Council's Strategic Objectives. The Camden Local Plan contains Policy A4 – Noise and Vibration.

Policy A4 states that:

"*The Council will seek to ensure that noise and vibration is controlled and managed.*

Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:

a) development likely to generate unacceptable noise and vibration impacts; or

b) development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.

We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development."

Appendix 3 of the Local Plan presents threshold values for noise sensitive residential development with regard to prevailing noise levels and plant and machinery. The threshold levels are themselves based on the 'effect levels' as detailed in NPSE and NPPG and are divided into three basic design criteria; green,

[5] London Borough of Camden (2017); '*Camden Local Plan 2017*', London Borough of Camden.

amber and red. The aim is to guide applicants as to the degrees of detailed consideration needed to be given to noise in any planning application.

- Green: where noise is considered to be at an acceptable level.
- Amber: where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.
- Red: where noise is observed to have a significant adverse effect.

Residential Development

Table 2 presents LBC's noise levels applicable to noise sensitive residential development proposed in areas of existing noise. These have been reproduced from Table B of Appendix 4 to the Camden Local Plan.

The guidance states that "*special consideration will need to be given to noise sensitive developments that are proposed in areas which are, or expected to become, subject to levels of noise likely to have an adverse effect. The threshold of acceptability of the noise will primarily depend on two factors: the intended use of the noise sensitive development and the source of the noise experienced, or likely to be experienced."*

Table 2: Noise Levels Applicable to Residential Development

Dominant Noise Source	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOEL (Amber)	SOAEL (Red)
Anonymous noise such as general environmental noise, road traffic and rail traffic	Noise at 1m from noise sensitive façade/free field	Day	<50dB $L_{Aeq,16hr}$[1]	50dB to 72dB $L_{Aeq,16hr}$[1]	>72dB $L_{Aeq,16hr}$[1]
		Night	<45dB $L_{Aeq,8hr}$[1] <40dB L_{night}[2]	45dB to 62dB $L_{Aeq,8h}$[1] >40dB L_{night}[2]	>62dB $L_{Aeq,8hr}$[1]
	Inside a bedroom	Day	<35dB $L_{Aeq,16hr}$	35dB to 45dB $L_{Aeq,16hr}$	>45dB $L_{Aeq,8hr}$
		Night	<30dB $L_{Aeq,8hr}$ 42dB $L_{Amax,fast}$	30dB to 40dB $L_{Aeq,16hr}$ 40dB to 73dB $L_{Amax,fast}$	>40dB $L_{Aeq,8hr}$ >73dB $L_{Amax,fast}$
	Outdoor living space (free field)	Day	<50dB $L_{Aeq,16hr}$	50dB to 55dB $L_{Aeq,16hr}$	>55dB $L_{Aeq,16hr}$
Non-anonymous noise	See guidance note on non-anonymous noise				

Note: [1]$L_{Aeq,T}$ values specified for outside a bedroom window are façade noise levels, [2]L_{night} values specified for outside a bedroom window are free field levels.

With regard to non-anonymous sources it states:

"*A relevant standard or guidance document should be reference when determining values for LOAEL and SOAEL for non-anonymous noise*. *"Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).*"

Table 3 presents LBC's noise levels applicable to proposed industrial and commercial developments (including plant and machinery). These have been reproduced from Table C of Appendix 4 to the Camden Local Plan.

Table 3: Noise Levels Applicable to Proposed Industrial and Commercial Development (including plant and machinery)

Existing Noise Sensitive Receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAEL (Red)
Dwellings[2]	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	Rating level 10dB[1] below background (≤L_{A90}-10dB)	Rating level between 9dB below and 5dB above background (L_{A90}-9dB – L_{A90}≤+5dB)	Rating level greater than 5dB above background (>L_{A90}+5dB)
Dwellings[2]	Outside bedroom window (façade)	Night	Rating level 10dB[1] below background (≤L_{A90}-10dB) and no events exceeding 57dB L_{Amax}	Rating level between 9dB below and 5dB above background (L_{A90}-9dB – L_{A90}≤+5dB) or noise events between 57dB and 88dB L_{Amax}	Rating level greater than 5dB above background (>L_{A90}+5dB) and/or events exceeding 88dB L_{Amax}.

Note: [1] 10dB should be increase to 15dB if the noise contains audible tonal elements (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required. [2] Levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The periods in Table 3 correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night.

Appendix 3 also states:

"*There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.*"

For commercial entertainment noise Appendix 3 states:

"*Assessments for noise from entertainment and leisure premises must include consideration to amplified and unamplified music, human voices, footfall and vehicle movements and other general activity. Appropriate metrics must be used to measure and assess the noise impact including L_{Aeq} and L_{Amax} metrics and appropriate frequency spectrum. Planning permission will not be granted in instances where it is not possible to achieve suitable and sufficient internal noise levels with reference to the most up to*

date and appropriate guidance within proposed noise sensitive receptors despite appropriate mitigation proposals due to the totality of noise from existing entertainment venues."

Table D within Appendix 3 sets out noise levels applicable to proposed entertainment premises (customer noise).

3.4.2 Camden Planning Guidance - Amenity, 2018

Camden Planning Guidance (CPG) provides advice and information on how they apply their planning policies. The Council has reviewed its Camden Planning Guidance documents to support the delivery of the Camden Local Plan. This is following its adoption in 2017. The adopted CPG documents can be 'material considerations' in planning decisions. However, they have less weight than the Local Plan or other development plan documents.

CPG Amenity[6], dated March 2018, replaces the Noise and Vibration section of CPG 6[7] (adopted 2011). Chapter 6 on Noise and Vibration states:

- The Council will assess the impact of noise and vibration through the consideration of acoustic reports submitted by applicants.
- Noise mitigation (where appropriate) is expected to be incorporated into developments at the design stage.
- The Council will secure mitigation measures through planning condition or legal agreement where necessary.
- The Council will adopt the 'agent of change' principle.

The CPG provides guidance regarding the application of Local Plan Policies A4 Noise and Vibration and A1 Managing the impact of development. When assessing acoustic reports, the Council will consider the reported measurements against the noise thresholds set out in Appendix 3 of the Local Plan.

The CPG provides a number of examples of mitigation that could be used to minimise the impact of noise and vibration and states that it "*should be considered at the beginning of the design process*". It further states that "*Developers should also seek guidance from the Council's Noise team prior to any acoustic work being carried out in order so they can advise on the best methodology for the proposed development*."

The CPG details the minimum information that is expected to be submitted as part of an acoustic report and is presented below:

- description of the proposal;
- description of the site and surroundings, a site map showing noise and vibration sources and measurement locations;
- background noise levels measured over a minimum of 24 hours;
- details of instruments and methodology used for noise measurements (including reasons for settings and descriptors used, calibration details);

[6] LBC (2018), Camden Planning Guidance – Amenity. LBC.
[7] LBC (2011), Camden Planning Guidance 6 - Amenity. LBC.

- details of the plant or other source of noise and vibration both on plan and elevations and manufacturers specifications;
- noise or vibration output from proposed plant or other source of noise and vibration, including: o noise or vibration levels; o frequency of the output; and o length of time of the output.
- features of the noise or vibration e.g. impulses, distinguishable continuous tone, irregular bursts;
- specification of the plant, supporting structure, fixtures and finishes; • location of noise sensitive uses and neighbouring windows;
- details of measures to mitigate noise and vibration;
- details of any associated work including acoustic enclosures and/or screening;
- cumulative noise levels; and;
- hours/days of operation.

To demonstrate the above the Council require submission of an acoustic report 'checklist' to be submitted along with the report.

The CPG provides advice on:

- **Internal Noise Levels** – which is aligned with the Building Regulations but may require enhanced sound insulation where "*a new commercial use likely to generate noise adjoins an existing residential building (and vice versa); and/or a change of use will result in a residential development being sited in a noisy environment.*"
- **Vibration** - when assessing the impact of vibration, the Council expects vibration thresholds within Camden Local Plan Appendix 3 not be exceeded and consider guidance from B6472-1:2008 'Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting'.
- **Plant and other noise generating equipment** – *"Developments proposing plant, ventilation, air extraction or conditioning equipment and flues will need to provide the system's technical specifications to the Council accompanying any acoustic report. There are however likely to be instances where the Council will consider that a BS4142 assessment alone is not sufficient to provide all the information necessary"* e.g. electrical substations low frequency noise also needs to be considered.
- **Food, drink, entertainment and leisure noise** – "*can pose particular difficulties in terms of noise and disturbance, as their peak operating time is usually in the evening and late at night*". Advice is provided on how to mitigate the potential impact from this source and what noise from entertainment and leisure premises must include. It details that principally it is controlled through planning conditions covering; opening times, amplified music and restrictions on times where outdoor standing/seating areas can be used.
- **Delivery management** – Regard should be given to the following when developing Delivery Servicing Management plans.

4. Noise Assessment Criteria

Compliance with the noise assessment criteria presented within Section 4 of this report allows the Planning Policy requirements discussed within Section 3 to be satisfied.

4.1 Residential Amenity

When considering the amenity of future occupants of the Development, the most relevant and credited guidance covering desirable levels of environmental noise for indoor and outdoor environments is the World Health Organisation (WHO), 1999 '*Guidelines for Community Noise*'[8] and BS 8233:2014 'Guidance on sound insulation and Noise Reduction for Buildings'[9] and ProPG 2017[10]. These documents set out guideline internal and external noise limits which should be met by all residential elements of the development to ensure the critical effects of noise on sleep, annoyance and speech interference are guarded against. A summary of the guideline advice relevant to this Development is outlined below.

WHO, BS8233:2014 and ProPG documents set out guideline internal and external noise limits which should be met by all residential developments to ensure the critical effects of noise on sleep, annoyance and speech interference are guarded against. Further to this, ProPG advocates a holistic approach with good acoustic design being a key consideration which is not just reliant on achieving the required guideline noise limits. It should be noted that ProPG is only considered applicable where the dominant noise source is transportation. Both BS8233 and ProPG make reference to BS4142 where industrial/commercial noise is dominant.

A summary of the guideline advice presented within these documents and relevant to the proposed development is provided in **Table 4**.

Table 4: Noise Criteria for Assessment of Residential Amenity

Activity	Location	Noise Level dB	
		Day time	Night-time
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedrooms	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$ 45 dB $L_{Amax,F}$
Enjoyment	Private Garden	50-55dB $L_{Aeq,16h}$	

4.2 Building Services Plant Noise

The primary source of guidance in relation to noise which is industrial in nature, such as fixed building services plant, industrial and commercial operations, is provided in BS 4142:2014+A1:2019[11]. BS 4142 states that the potential impact from industrial/commercial sound is based on the level difference between the source, known as the 'specific sound level' ($L_{Aeq,Tr}$), compared with the 'background sound level'

[8] World Health Organisation (WHO) (1999); '*Guidelines for Community Noise'*, WHO, Geneva.
[9] British Standards Institution (BSI) (2014); British Standard (BS) 8233 '*Sound insulation and noise reduction for buildings*', BSI.
[10] ANC, IoA, CiEH (May 2017); Professional Practice Guidance on Planning & Noise. New Residential Development.
[11] British Standard Institute (BSI) (2019) BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. BSI.

($L_{A90,T}$) that exists in the absence of the source in question. Where the sound contains any acoustic characteristics such as tonality, impulsiveness and intermittency then the specific noise level is adjusted in-line with BS 4142 advice to determine the 'rating level' ($L_{Ar,Tr}$).

Typically, the greater the difference between the rating level and the background sound level the greater the potential of an adverse impact. BS 4142 states:

- A difference of +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of +5dB or more is likely to be an indication of an adverse impact, depending on the context; and
- Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

BS4142 further states; "*Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact*."

Context is an important consideration of a BS4142 assessment, and the impact may require modification due to context, which may include:

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound; and
- Design measures that secure good internal and/or outdoor acoustic conditions, such as; façade insulation treatment, ventilation and/or cooling that will reduce the need to have windows open, and acoustic screening.

Table 5 presents the criteria for assessing the significance of impacts from plant noise which are taken from BS 4142:2014+A1:2019 and LBC's requirements (refer to Table 3)

Table 5 Noise Impact Criteria for Plant Noise

Plant Noise dB $L_{Aeq,r}$ [1]	**Impact**
≤LA90-10dB	Negligible
≤LA90	Low impact, depending on the context (small)
≤LA90+5	Adverse impact, depending on the context (medium)
≥LA90+5dB	Significant adverse impact, depending on the context (large)

Note: [1] Where the noise has an acoustic character at the receptor the plant noise limit is lowered by 5dB; e.g. ≤LA90-15dB

At this stage specific detail on fixed external plant and building services is not known, therefore plant noise limits are recommended based on the environmental noise survey data detailed in the following section (**Section 5**), maximum plant emission levels have been set in controlling fixed building services plant to an acceptable level and are detailed in **Section 6** of this report. Noise limits apply at a position 1m from the façade of the nearest noise sensitive properties and include the total contribution of noise from all plant items associated with the proposed plant scheme that may run during any particular period.

4.3 Road Traffic Noise

The calculation methodology of Calculation of Road Traffic Noise[12] (CRTN), based on 18-hour AAWT, percentage HGVs and speed in kph, is used to predict the basic noise level (dB $L_{A10,18\ hour}$), which is the noise level 10m from the road edge. Significance of change in noise level is derived from information in the Design Manual for Road and Bridges (DMRB) LA 111 'Noise and Vibration'[13] as presented in **Table 6**.

Table 6 Noise Impact Criteria for Changes in Road Traffic Noise

Short-term change in dB $L_{A10,18hr}$ noise level	Impact
<1.0	Negligible
1.0 – 2.9	Small
3.0 – 4.9	Medium
≥5.0	Major

For a 1dB increase in road traffic noise a 25% increase in the 18-hour AAWT is required (*assuming no change in speed, %HGVs or other factors affecting generation and propagation of noise affecting generation and propagation of noise as in this instance*. Therefore, only changes in traffic volumes of 25% or greater are considered significant.

Existing sensitive receptors are currently exposed to a certain level of road traffic noise. In assessment terms, it is therefore the difference in noise level as a result of the Development that is important.

For noise which is very similar in all respects except magnitude, a change or difference of 1dB is only just perceptible under controlled or laboratory conditions, whilst a change or difference of 3dB is the minimum perceptible under most normal environmental conditions. A 10dB change in noise corresponding roughly to a doubling or halving in the loudness of a sound.

4.4 Noise Breakout from the Class E (formerly A3) Premises (only relevant to Plot B)

The significance of noise impacts associated with the Class E (restaurants/cafes) uses depends upon the type of tenant and the nature of noise sources, and will dictate the required sound insulation performance of the primary building fabric to control noise break-out. Particular regard will need to be given to tenants whose use may be unusually noisy or noise sensitive to minimise conflict of use between adjacent occupants and wider off site receptors. This is to ensure that tenanted activities are controlled to an unobtrusive level to safeguard the acoustic acceptability of the Development.

4.5 Consultation

The Environmental Health Officers (EHO) at CC were consulted in December 2016 regarding the noise issues which need to be considered in the planning application, the appropriate standards, and the scope of the baseline monitoring exercise.

[12] DoT (1988) Calculation of Road Traffic Noise. HMSO.
[13] Highways England. (2020) Design Manual for Roads and Bridges. Sustainability & Environment Appraisal. LA 111 Noise and Vibration. Rev 2. Highways England.

No formal response was received from CC so the appraisal has been carried out based on experience of similar developments in London using robust cautionary assumptions and sound methodology to ensure a well-balanced and considered appraisal was undertaken.

5. Baseline Conditions

5.1 Baseline Noise Monitoring

In support of the planning application for the proposed Development, short-term attended noise monitoring was carried out over a seven-day period from Friday 9th December 2016 to Friday 16th December at three key locations described in **Table 7** and illustrated in **Figure 1**, in order to establish and quantify the existing noise climate at and within the vicinity of the Development.

Table 7 Noise Monitoring Locations

Monitoring Location (Figure 1)	**Description**	**Observations and Predominant Noise Sources**
LT1	Façade measurement at roof level on the south-eastern Site boundary overlooking Granary Street. Microphone located 12m AGL.	Noise climate dominated by vehicle traffic on Granary Street and St Pancras Way (A5202) along with Kings Cross construction works. Contributory noise from human activities, distant road noise, distant railway noise, HVAC services and distant aircraft also influence the noise climate to some extent.
LT2	Façade measurement at roof level on the eastern site boundary overlooking Regents Canal. Microphone located 12m AGL.	Noise climate dominated by Kings Cross construction works along with distant railway and road traffic noise. Contributory noise from human activities, distant aircraft and HVAC services also influence the noise climate to some extent.
LT3	Façade measurement at roof level on western Site boundary overlooking St Pancras Way (A5202). Microphone located 12m AGL.	Noise climate dominated by vehicle traffic on St Pancras Way (A5202) and HVAC services. Contributory noise from human activities and distant aircraft also influence the noise climate to some extent.

Notes: LT (long-term); * Comparative free-field measurement at ground level.

All noise measurements were taken with calibrated precision grade (Class 1) frequency (*one-octave band*) sound level meters in order to provide a detailed description of the prevailing environmental noise characteristics. The sound level meters were set-up to record over consecutive 5-minute periods the L_{eq}, L_{90}, L_{10}, and L_{max} noise indices in the A-weighting network over a 125ms^{-1} fast response time constant interval for the duration of each survey. The indices are described in **Appendix A** of this report, but roughly translated they describe in turn the average, background, road traffic, and maximum noise level.

Full details of the instrumentation used for the noise measurements, including calibration certificates are available on request.

Weather conditions, whilst not actively measured during the survey period, were monitored remotely throughout. Overall, weather conditions were ideal for the measurement of noise, it being fine and dry, with just a light north-westerly to north-easterly wind (<5ms^{-1}) prevailing.

A summary of the measured daytime (07:00 to 19:00), evening (19:00 to 23:00) and night-time (23:00 to 07:00) noise levels are presented in **Table 8**, with full results displayed graphically in time-history format in **Annex B**. A summary of attended short-term daytime measurement results are presented in **Table 9** out of completeness.

Table 8 Summary of Attended Baseline Noise Monitoring Results (*Façade Measurement*)

Monitoring Location (Figure 1)	Period	Duration	$L_{Aeq,T}$ dB		$L_{A10,T}$ dB		$L_{A90,T}$ dB		$L_{AFmax,5min}$ dB	
			Range	Ave[1]	Range	Ave[2]	Range	Ave[2]	Range	90th Percentile[3]
LT1	Day	12hr	55 - 71	62	55 - 73	64	52 – 68	57	57 – 92	78
	Evening	4hr	55 – 70	60	56 - 68	61	52 – 57	55	61 – 90	74
	Night	8hr	51 - 64	57	53 - 69	58	49 – 57	53	55 – 86	73
LT2	Day	12hr	49 - 71	55	50 - 76	55	47 – 57	51	53 - 84	72
	Evening	4hr	48 - 58	51	49 - 62	52	46 – 56	49	51 - 77	66
	Night	8hr	46 - 57	49	46 - 60	50	44 – 56	47	49 - 81	61
LT3	Day	12hr	61 - 80	68	66 - 78	70	50 – 68	60	72 - 105	85
	Evening	4hr	59 - 77	67	64 - 81	70	50 - 67	56	71 - 100	83
	Night	8hr	50 - 83	65	51 - 84	67	48 - 82	52	61 - 100	81

Notes: [1] Logarithmic average over the daytime survey periods; [2] Arithmetic average over the daytime survey periods; [3] The 90th percentile L_{AFmax} value is presented and considered representative of typical L_{AFmax} levels experienced. All figures rounded to nearest whole decibel.

Table 9 Summary of Short Term Baseline Noise Monitoring Results (*Free-Field Measurement*)

Monitoring Location (Figure 1)	Period	Duration	$L_{Aeq,T}$ dB	$L_{A10,T}$ dB	$L_{A90,T}$ dB	$L_{AFmax,5min}$ dB
			Ave[1]	Ave[2]	Ave[2]	90th Percentile[3]
ST1	Day	20mins	69	73	58	85
ST2	Day	20mins	67	69	59	86
ST3	Day	20mins	67	71	54	85
ST4	Day	20mins	53	55	50	67

Notes: [1] Logarithmic average over the daytime survey periods; [2] Arithmetic average over the daytime survey periods; [3] The 90th percentile L_{AFmax} value is presented and considered representative of typical L_{AFmax} levels experienced. All figures rounded to nearest whole decibel.

5.2 Covid-19

Covid-19 tier restrictions is directly affecting the current noise climate due to changes in transport, commercial, industrial and human activity. On this basis, conducting further surveys to check the December 2016 monitored levels to determine if they are applicable to inform this assessment is not possible. Given the site is dominated by road traffic noise, with contribution from HVAC services, this is unlikely to have changed significantly since 2016. With regard to road traffic noise, the volume of traffic would have to double to result in a 3dB increase, which is normally regarded as just perceptible. It is considered that this is unlikely to have occurred between December 2016 and December 2020. On this basis the summary of measured noise levels presented within Tables 5.2 and 5.3 are considered a suitable basis on which to undertake the assessment of residential amenity.

6. Assessment of Existing Noise Levels

6.1 Assessment of Existing Noise Levels upon Future Residential Use

The degree of external environmental noise intrusion into internal areas depends on the acoustic performance of all elements of the façade, but it is generally determined by the components providing the least airborne sound resistance, in this case the glazing; especially when residents open windows to provide natural background or rapid ventilation.

The glazing performance requirements are dependent on the use type, the percentage of the façade that is glazed, the frequency composition of noise incident on the façade and the ventilation strategy. Preliminary calculations have been undertaken to provide an early indication of the sound insulation performance requirements the glazing in the worst affected façades would be required to provide to achieve the internal criteria set out in **Section 3** of this report (*with windows closed or fixed*) and are presented in **Table 10** The calculations adopt the detailed methodology set out in BS 8233:2014, and are based on the following assumptions considered to present an accurate if not slightly cautionary scenario:

- To ensure favourable acoustic conditions are provided for, assessment has been based on determined daytime ambient ($L_{Aeq,16hr}$) and night-time ambient ($L_{Aeq,8hr}$) and maximum (L_{AFmax}) values. The 90th percentile measured L_{AFmax} level has been used in the night-time assessment in residential bedrooms and is considered to fairly represent typical L_{AFmax} levels being experienced on the most noise exposed façade of the proposed Development.
- The internal finishes of the room will affect the reverberant component of the overall noise level, with a degree of soft furnishing (*carpet and curtains*) considered in our calculations. All walls and ceilings are assumed to be plastered and painted.
- It has been assumed that the external walls forming a part of the Development achieve an acoustic performance of not less than 50dB R_w.
- The calculated noise levels are based on a 80% glazed area for different user elements of the Development. Should glazed areas change by +/-10% of the façade area then the performance of the proposed glazing units would need to be adjusted accordingly.

Table 10 Minimum Indicative Glazing Performance Specification

Façade	Floor Levels / Room Spaces	Period / Parameter	Target Criterion	Incident Façade Noise Level	Sound Reduction Index (dB) in Octave Band Centre Frequency (Hz)								Minimum Sound Insulation of Glazing dB (R_w+C_{tr})[1]	Example Glazing Configuration (*or equal and approved*)
					63	125	250	500	1k	2k	4k	8k		
LT1 – Southern Façade	Business Floorspace	Daytime $L_{Aeq,16hr}$	45	61	12	18	22	25	26	25	21	19	≥24	Standard double glazing (e.g. 4/12/4mm) + Acoustic Passive Ventilation
	Residential Bedrooms		35		21	27	32	36	37	36	33	29	≥35	Thick double glazing (e.g. 4:12:6.4 mm Stadip Silence) + mechanically ventilation
		Night-time $L_{Aeq,8hr}$	30	57	20	28	33	37	38	36	33	28	≥36	
		Night-time L_{AFmax}[1]	45	73	25	28	32	36	39	37	33	32		
LT2 – Northern & Eastern Façade	Business Floorspace	Daytime $L_{Aeq,16hr}$	45	54	7	12	16	18	19	18	14	11	≥18	Standard double glazing (e.g. 4/12/4mm) + Acoustic Passive Ventilation
	Residential Bedrooms		35		16	21	26	29	30	29	26	21	≥27	
		Night-time $L_{Aeq,8hr}$	30	49	13	21	26	30	30	28	22	12	≥28	
		Night-time L_{AFmax}[1]	45	62	14	17	23	25	26	25	22	19		
LT3 – Western Façade	Business Floorspace	Daytime $L_{Aeq,16hr}$	45	68	12	18	22	26	35	27	33	27	≥26	Standard double glazing (e.g. 4/12/4mm) + Acoustic Passive Ventilation

Notes: [1] The sound insulation performance of the window is for the glazing system as a whole (*including framing, seals, opening lights etc.)* as opposed to the glass panels alone. Preliminary assessment has been based on 80% of the façade area being glazed, with results dependent on but not limited to the final area of glazing.

On the basis of the measured external noise climate and preliminary break-in calculations, providing the glazing system as a whole (*including framing, seals openable lights etc.*) meet or exceed the stipulated performance specified in **Tables 10** on the most noise exposed building façades then sufficient resistance to external environmental noise should be provided to achieve the target internal design criteria levels (*windows closed*). This could be secured though a suitably worded planning condition.

During the detailed design phase of the project, a complete assessment will be undertaken and used to identify the detailed zoning of window types and attendant acoustic performance specifications in one octave band detail to ensure appropriate control of the frequency content of sound incident upon all the different façades of the Development.

6.2 Ventilation

The sound insulation performance of the glazing system assumes that windows are fixed and or remain closed. Should windows be partially opened for ventilation (*assuming 10-15dB typical noise attenuation*) then the internal design criteria levels within the different room spaces (**Tables 4 & 5**) would not be met.

The Building Regulations on ventilation (*Approved Document F; ADF*)[14] require that habitable rooms have background ventilation by natural or mechanical means. As such, an alternative source of passive (*e.g. trickle vent*) or mechanical ventilation will need to be made available that meets the minimum requirements for background ventilation in habitable rooms as set out in ADF. It is important to ensure that the alternative source of ventilation does not compromise the overall performance of the façade system or the internal ambient noise level criteria to be met within habitable room spaces.

At this stage, it is understood the ventilation strategy for the building would be an active solution comprising a whole building mechanical ventilation system. This would allow windows to remain closed for much of the time, safeguarding internal target criteria levels, with occupants and tenants free to open windows for purge ventilation and summer cooling as required at their own discretion accepting the related increase in noise.

[14] Department for Communities and Local Government (DCLG) (2010); '*The Building Regulations Approved Document F – Means of Ventilation*', HM Government.

7. Noise Impact Assessment

7.1 Road Traffic Noise Assessment

The likely change in road traffic noise resulting from operational traffic associated with the Development was determined in accordance with CRTN; the results of which are presented in **Table 11**. The 2025 baseline scenario 'without Development' includes traffic increases due to natural traffic growth and a cumulative scheme. Therefore, the scenario 'with Development' is intended to identify the likely impacts solely as a result of the Development.

Table 11 Differences in the Road Traffic Basic Noise Level (BNL), dB $L_{A10,18hr}$

Road Link	Difference in dB $L_{A10,18hr}$ BNL (Base + Development) - (Base)		
	2025 - Without Development (Base)	2025 - With Development (Base + Development)	Change
Pancras Road, south of junction with Crowndale Road	69.4	69.7	0.3
Granary Street, east of junction with St Pancras Way	62.9	63.0	0.1
St Pancras Way, north of site	62.5	62.7	0.1
Camden Road, west of St Pancras Way	71.6	71.9	0.3
Camden Road, west of Murray Street	71.0	71.2	0.2

For all road links assessed in **Table 11** the difference in operational road traffic noise (considering the 2025 baseline situation both 'with' and 'without' Development) is no greater than +0.5 dB. According to the criteria (see **Table 7**) the difference in noise levels are negligible, with Development alone would not cause any discernible impacts.

7.2 Building Services Plant Noise Limiting Criteria

Any items of fixed plant associated with the operation of the proposed Development would have the potential to generate noise. At this stage in the design of the Development, specific details of the type, number and configuration of building services plant are not developed. Consequently, suitable limits to which plant should adhere have been set.

Based on the results of the baseline noise survey (**Table 8, Section 5**), suitable noise limits to which fixed building services plant should adhere have been set and are presented in **Table 12.**

Table 12: Plant Noise Limits at Nearest Noise Sensitive Premises

Location	Period	Measured Minimum $L_{A90,15min}$	Plant Noise Emission Limit [1] ($L_{Ar,15min}$)
NSR A	Daytime	47	37
	Evening	46	36
	Night-time	44	35[1]
NSR B	Daytime	52	42
	Evening	52	42
	Night-time	49	39

Location	Period	Measured Minimum $L_{A90,15min}$	Plant Noise Emission Limit [1] ($L_{Ar,15min}$)
NSR C	Daytime	50	40
	Evening	50	40
	Night-time	48	38

Notes: [1] A limiting plant noise limit of 35 $dBL_{Aeq,T}$ is set where the prevailing background noise levels minus 10 dB(A) are below this value. Such a limiting criterion falls below credited absolute health-based guideline values to prevent harmful effects of noise (*e.g. on rest/sleep with windows open*), whilst ensuring standard abatement measures remain physically and economical viable.

The plant noise limits apply to the total contribution of noise from all new plant items associated with the proposed Development that may run during any particular period and are to be met 1m from the nearest habitable window of existing potentially sensitive receptors that may be affected by the proposed Development, together with future sensitive receptors forming a part of the Development.

Based on the above noise emission limits for new building plant being achieved (*and potentially being controlled by a standard planning condition*), noise generated from new building services plant would have a negligible impact on surrounding existing and future sensitive receptors.

8. Break-Out Noise Associated with Class E Premises

8.1 Class E (Restaurant/Café) (only relevant for Plot B)

In order to not prejudice public areas outside of the proposed Development, it is recommended that break-out noise is controlled to below NR 40 (~48dBA) 3.0m from the façade, which will ensure that noise levels at the nearest noise sensitive receptors fall to an unobtrusive (*unnoticeable*) level as not to materially affect or inconvenience user's amenity, thereby ensuring the acoustic acceptability of the Development.

At this stage in the design of the Development, the future tenant and restaurant type is not known. However, a representative sample internal ambient noise level of 75 dB $L_{Aeq,T}$ and maximum noise level of 93 dB L_{AFmax} taken within a busy themed restaurant with incidental background music and raised voice to represent a '*severe case'* scenario have been used in the appraisal. This allows break-out noise levels associated with the operation of the restaurants to be identified and controlled to a sufficient level as to ensure negligible disturbance to nearby residents. For the Development this can be achieved where the façade system provides a performance equal to or greater than that presented in **Table 13.**

Table 13 Minimum Façade Specification

Octave Band Centre Frequency (Hz)								
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**$R_w + C_{tr}$**	**Example Glazing Configuration** (or equal and approved)
Minimum Sound Reduction Index, dB								
29	29	29	38	43	49	56	36	10/12/8.8 mm Stadip Silence

For guidance only, the glazing configuration outlined in **Table 13**, which would typically be expected to be suitable in achieving the minimum SRI requirements. It should be noted, however, that this construction is for guidance/costing purposes only, and does not constitute a recommended construction.

9. Conclusions

This noise assessment has been prepared by Waterman Infrastructure & Environment Ltd on behalf of Reef Estates as part of a noise assessment for the redevelopment of the Ugly Brown Building in Camden. The following points outline the assessment findings of this report:

- A comprehensive noise assessment has been undertaken across the Site in order to assess the amenity of the proposed redevelopment for future occupants and to determine the potential impacts of the proposed Development upon nearby existing and proposed sensitive receptors.
- To facilitate this assessment, short-term attended noise monitoring was carried out at ground level on Friday 09 December 2016 at four key locations to establish and quantify the existing noise climate around the Site.
- Noise monitoring results confirm the west and south Site boundary to be exposed to high noise levels commensurate to its urban location adjoining the busy St Pancras Way (A5202). In contrast the levels on the eastern Site boundary adjoining the Regent Canal are around 12 dB lower.
- Based upon measured environmental noise levels ($L_{Aeq,T}$ and L_{AFmax}) affecting the Site, preliminary façade sound insulation calculations have been undertaken to determine the sound insulation performance requirements the glazing in the worst affected façades would be required to provide in controlling the ingress of noise to meet recommended internal design criteria noise levels (BS 8233;2014 and WHO,1999).
- This study has shown that to achieve the internal noise level design criteria within residential spaces on the most noise exposed façade (southern façade) it will be necessary to provide thick doubled glazed units (*e.g.* 4:12:6.4 mm Stadip Silence) providing in the region of 36 dB R_w+C_{tr} sound insulation. This is in combination with a mechanical ventilation system proposed as part of the design of the Development and could be secured though a suitably worded planning condition. During the detailed design phase of the project, a more detailed assessment will be undertaken.
- No significant change in noise level is predicted due to the increase in traffic flows associated with the completed Development.
- With regards to building services plant, suitable plant noise emission limits have been specified in accordance with BS4142; 2014+A1:2019 and LBC plant noise policy to which all fixed plant will need to be designed (*collectively*) to achieve. Providing careful attention is paid to plant selection, installation and noise attenuation and that the design aim is achieved then there can be high confidence that noise from the operation of plant associated with the proposed Development will have negligible impact upon the existing noise climate and amenity of nearby sensitive receptors or future occupants of the Development.

Based on assessment findings, it is considered that noise levels can be satisfactorily controlled to within recommended acoustic design standards so that a high quality acoustic environment is provided to all future occupants and that impacts associated with the operation of the completed Development can be controlled to a level of negligible significance for existing receptors.

waterman

- Site Boundary
- LT Long Term Noise Monitoring Location
- ST Short Term Noise Monitoring Location

Noise Sensitive Receptor

- A The Royal Veterinary College
- B Saint Pancras Hospital
- C Residential

N

Project Details	WIE11701-100: Ugly Brown Buildings, London
Figure Title	Figure 1: Noise Monitoring and Noise Sensitive Receptor Locations
Figure Ref	WIE11701-100_GR_NM_1C
Date	August 2017
File Location	\\s-lncs\wiel\projects\wie11701\100\graphics\nm\issued figures

www.watermangroup.com

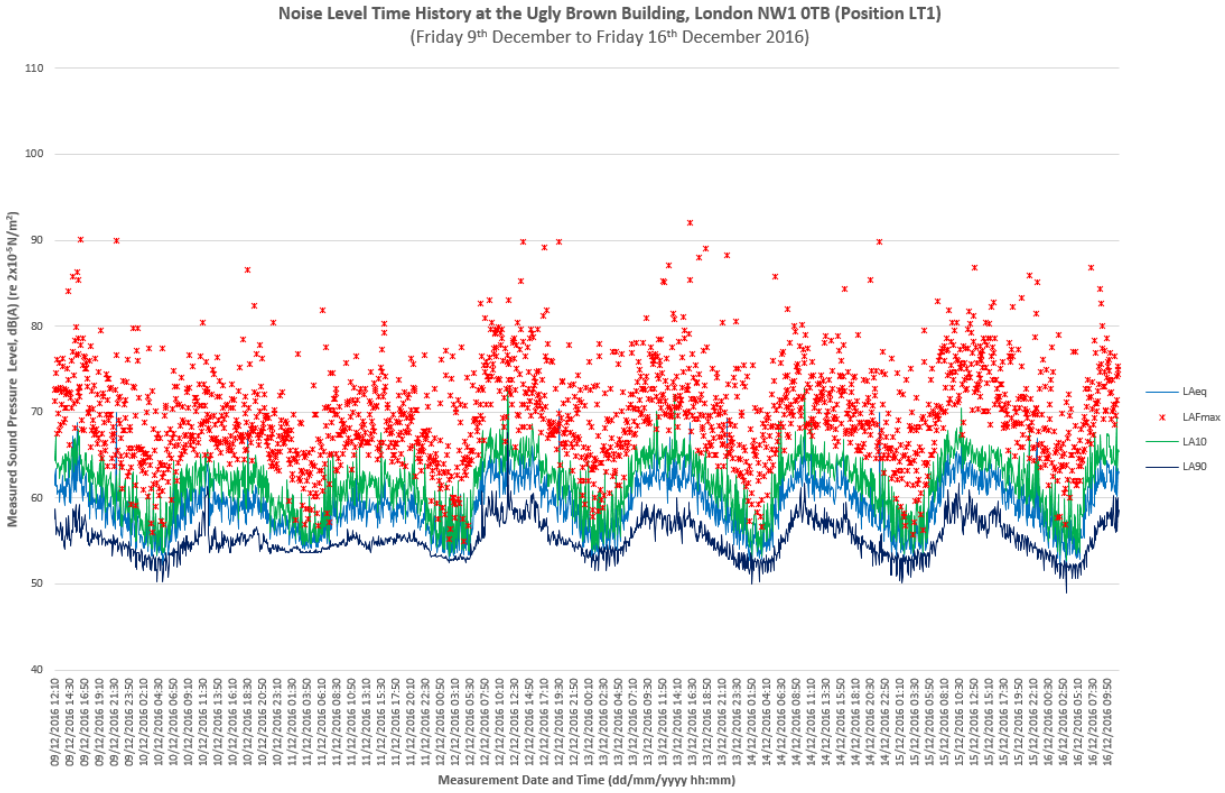
APPENDICES

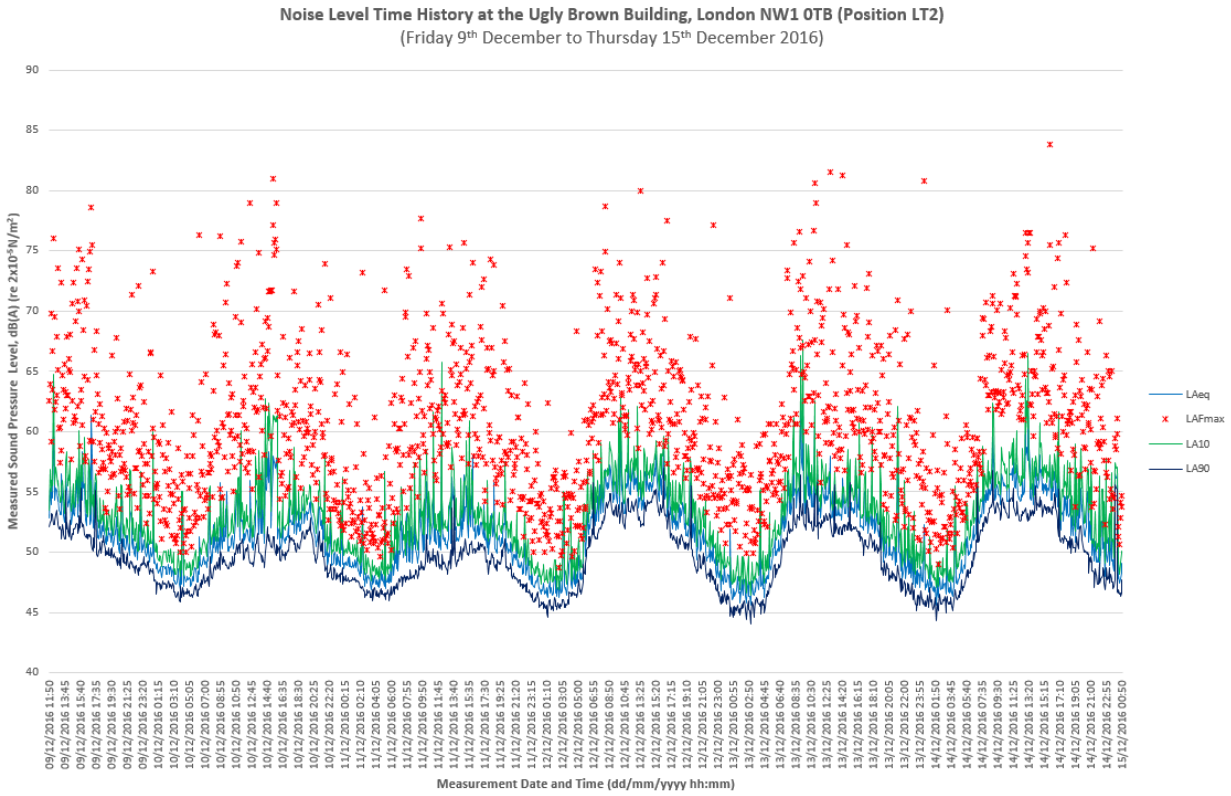
Appendix A Acoustic Terminology

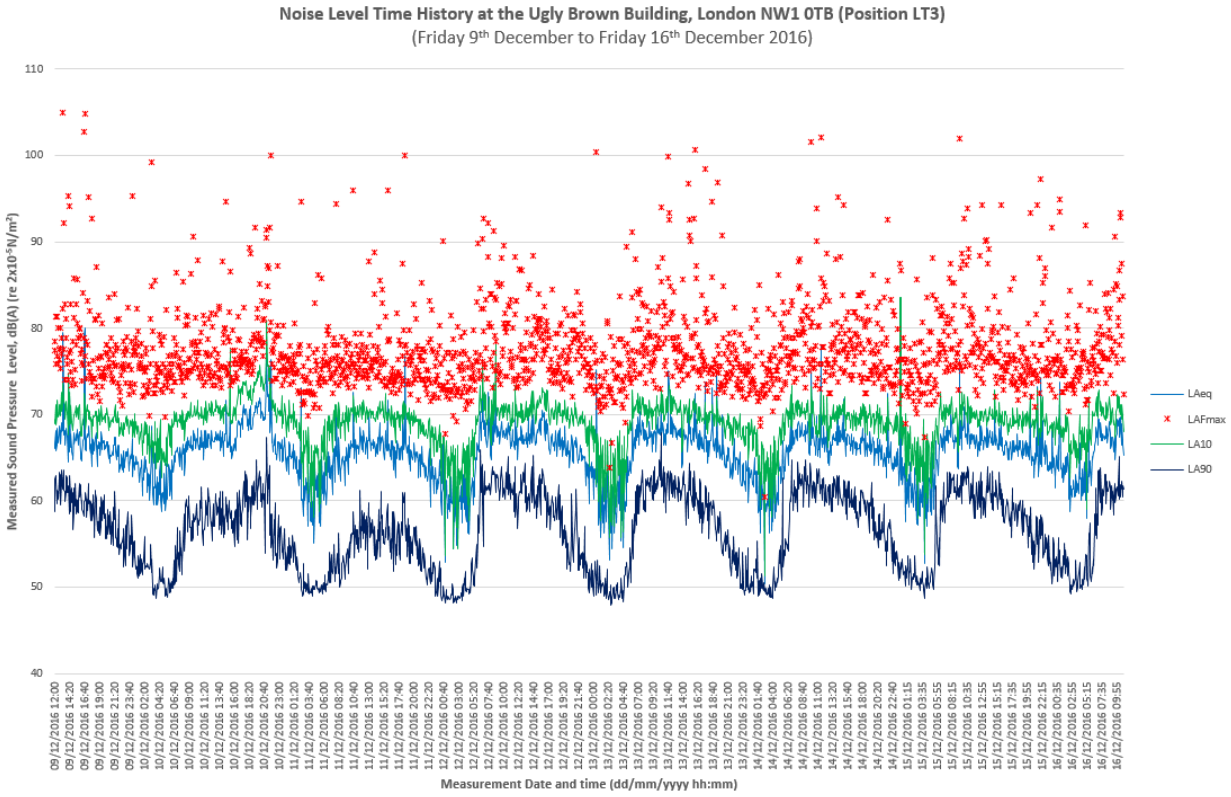
Ambient sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
A-weighting	A frequency weighting applied to measured or predicted sounds levels in order to compensate for the non-linearity of human hearing.
Background noise	Background noise is the term used to describe the noise measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L_{90} noise level (see below).
Broadband	Containing the full range of frequencies.
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. This instrument has been specifically developed to mimic the operation of the human ear. The human ear responds to minute pressure variations in the air. These pressure variations can be likened to the ripples on the surface of water but of course cannot be seen. The pressure variations in the air cause the eardrum to vibrate and this is heard as sound in the brain. The stronger the pressure variations, the louder the sound is heard. The range of pressure variations associated with everyday living may span over a range of a million to one. On the top range may be the sound of a jet engine and on the bottom of the range may be the sound of a pin dropping. Instead of expressing pressure in units ranging from a million to one, it is found convenient to condense this range to a scale 0 to 120 and give it the units of decibels. The following are examples of the decibel readings of every day sounds; Four engine jet aircraft at 100m — 120 dB Riveting of steel plate at 10m — 105 dB Pneumatic drill at 10m — 90 dB Circular wood saw at 10m — 80 dB Heavy road traffic at 10m — 75 dB Telephone bell at 10m — 65 dB Male speech, average at 10m — 50 dB Whisper at 10m — 25 dB Threshold of hearing, 1,000 Hz — 0 dB
Free Field	Free field noise levels are measured or predicted such that there is no contribution made up of reflections from sound reflecting objects (e.g. buildings),usually taken to mean at least 3.5m away.
dB(A): A-weighted decibels	The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the 'A' filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.

Façade Noise Level	A noise level measured or predicted at the façade of a building, typically at a distance of 1m, containing a contribution made up of reflections from the façade itself (+3 dB).
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
L_{eq}	A noise level index called the equivalent continuous noise level over a specified period of time, T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured. The L_{10} can be considered to be the "average maximum" noise level and is generally used to describe road traffic noise.
L_{90}	The level of noise exceeded for 90% of the measurement time interval, T. The L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
L_{max}	The maximum noise level over a specified period of time, T, and unless described otherwise, it is measured using the 'fast' sound level meter response. The L_{AFmax} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{Aeq} noise level but will still affect the noise environment.
Rating Noise Level ($L_{Ar,Tr}$)	The equivalent continuous A-weighted sound pressure level during a specified time interval, plus specified adjustments for tonal character and impulsiveness of sound.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on. That is, the sound of 85 dB is 400% times the loudness of a sound of 65 dB.
Noise	Sound which a listener does not wish to hear.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Specific Noise Level	The monitored/calculated noise level as a result of a noise source excluding the impacts of any extraneous noise sources.
Vibration Dose Value (VDV)	A cumulative measurement of the vibration level received over an 8-hour or 16-hour period.
Weighted Sound Reduction Index (R_w)	The weighted sound reduction index (R_W) is a single figure number rating used to describe the sound reduction of a material or building element. The R_W is calculated from the measured values in each one-third-octave band. A laboratory measurement and so may be used to compare building elements. As with all single figure indices the specified acoustic performance is not always achieved when applied to real noise exposure. Consequently, the R_w cannot be used directly to estimate the noise level in the room. However, where noise from road traffic, low speed railway traffic and/or aircraft traffic at large distances exists, the spectrum adaptation term, C_{tr}, can be added to the R_w to take account of the low frequency spectrum of the noise and provide a more accurate indication of the sound reduction of the building element (e.g. window) (in dB).

Appendix B Noise Level Time History Graphs




Noise Level Time History at the Ugly Brown Building, London NW1 0TB (Position LT2)
(Friday 9th December to Thursday 15th December 2016)
Measured Sound Pressure Level, dB(A) (re 2x10⁻⁵N/m²)
Measurement Date and Time (dd/mm/yyyy hh:mm)
LAeq
LAFmax
LA10
LA90


Noise Level Time History at the Ugly Brown Building, London NW1 0TB (Position LT3)
(Friday 9th December to Friday 16th December 2016)
Measured Sound Pressure Level, dB(A) (re 2x10⁻⁵N/m²)
Measurement Date and time (dd/mm/yyyy hh:mm)
LAeq
LAFmax
LA10
LA90

UK and Ireland Office Locations