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Noise Impact Assessment…

Everest House Development, Sopers Road, Potters Bar, Cuffley. EN6 4SG.

Town and Country Planning Act (Permitted Development)(Amendment) Order 2016

KR06604

version 1.0 – 3rd February 2020

Report Conclusion…

The proposed permitted development from the existing offices (Class B1A use) to 45 No residential dwellings (Class C3 Use) will result in acceptable noise levels for future residents without putting unreasonable stress on nearby commercial premises and therefore under the Town and Country Planning Act (Permitted Development) (Amendment) Order 2016 the class O permitted development should be allowed without prior approval.

Version History…

Reference	Version	Date	Author	Position	Document Status
KR06604	V1.0	03/02/20	R Scrivener	Consultant	Current document for issue
Details	Current Issue – Submission to Local Authority				

Report Limitations…

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1. Executive Summary…

1.1. Introduction

1.1.1 Instruction

KR Associates have been instructed by Cuffley Properties Ltd to undertake a noise impact assessment to determine if the existing noise climate from existing commercial properties will result in acceptable living conditions in terms of noise for the future residents at Everest House in Sopers Road, Potters Bar, Cuffley.

1.1.2 Permitted Development

The site currently has an established B1(a) Office use and therefore under the Town and Country Planning Act (General Permitted Development) (Amendment) Order 2016 a Class O permitted development is allowed to convert to residential (Use Class C3). A prior approval applications is required to the Local Authority to consider the *"impacts of noise from commercial premises on the intended occupiers of the development".*

Section W paragraph 10.b of the Town and Country Planning Act (General Permitted Development) (Amendment) Order 2016 requires the Local Authority to consider the following when determining a prior approval application for permitted development:

> *"(b) have regard to the National Planning Policy Framework….so far as the relevant subject matter of the prior approval, as if the application were a planning application…"*

1.1.3 Scope of Report

This report will consider only the impact from existing commercial premises surrounding the site. The specific noise levels at the façade of Everest House will be calculated in accordance with British Standard 4142: 2014 (amended 2019). The calculations procedure within British Standard 12354-Part 3: 2017 will be used to determine the internal noise levels. The suitability of the internal noise levels with and without the windows open for future residents will established using the guidance within British Standard 8233: 2014 entitled "*Guidance on sound insulation and noise reduction for buildings".*

1.1.4 Ventilation and Over-Heating

An assessment of the internal noise levels will be undertaken in accordance with the Association of Noise Consultants document entitled *"Acoustics Ventilation and Overheating – Residential Design Guide"* version 1.1 published in January 2020.

1.2. Non-Technical Summary of Report (Replicated in Section 8)

The following provides a non-technical summary of the report detailing the overall approach taken to establish the impact of current commercial noise sources on the future residential occupiers of Everest House.

1.2.1 Site Criterion (Section 3)

The following is the proposed criterion internally within the proposed dwellings, Everest House.

Location	Day Time	Night Time	Commentary
Bedroom	$L_{Aeq,16h\ inside}$ 35 dB	$L_{Aeq,\ 8h,inside}$ 30 dB	Based on BS 8233: 2014 Criterion

1.2.2 Specific Noise Levels (Section 4)

The following noise levels are calculated assuming all the commercial noise sources operate continuously at the maximum allowable levels within the currently approved Use Classes 24-hours per day.

Results	Day Time	Night Time	Commentary
Calculated	$L_{Aeq,\ 16\ hour}$ 73 dB	$L_{Aeq,\ 16\ hour}$ 73 dB	All Commercial Sources

1.2.3 Internal Noise Levels

The following internal noise levels are calculated in accordance with *BS EN ISO 12354 – Part 3: 2017* assuming the windows are closed and ventilation provided by the MVHR system or the windows are opened at the occupier discretion.

Time Period	Day Time (07:00 to 23:00)		Night Time (23:00 to 07:00)	
Window Position	Closed	Open	Closed	Open
Windows, $L_{eq,2}$	$L_{Max,16\ hour}$ 26 dB	$L_{Aeq,16\ hour}$ 49 dB	$L_{Max,8\ hour}$ 26 dB	$L_{Aeq,8\ hour}$ 49 dB

1.2.4 Conclusions

The proposed permitted development from the existing offices (Class B1A use) to 45 No residential dwellings (Class C3 Use) will result in acceptable noise levels for future residents without putting unreasonable stress on nearby commercial premises.

2. Site Description…

2.1. Site Location

Everest House is a three-storey detached building constructed in the 1950's consisting of a traditional brick façade under a pitched roof. The site is located off Sopers Road within a small industrial estate with a mainline railway line to the west of the site and the M25 generally to the south of the site.

Latitude:	52.291775°	Longitude:	-1.529656°	Elevation:	5.2m

2.2. Photographs of Site

2.2.1 General Pictures of Site

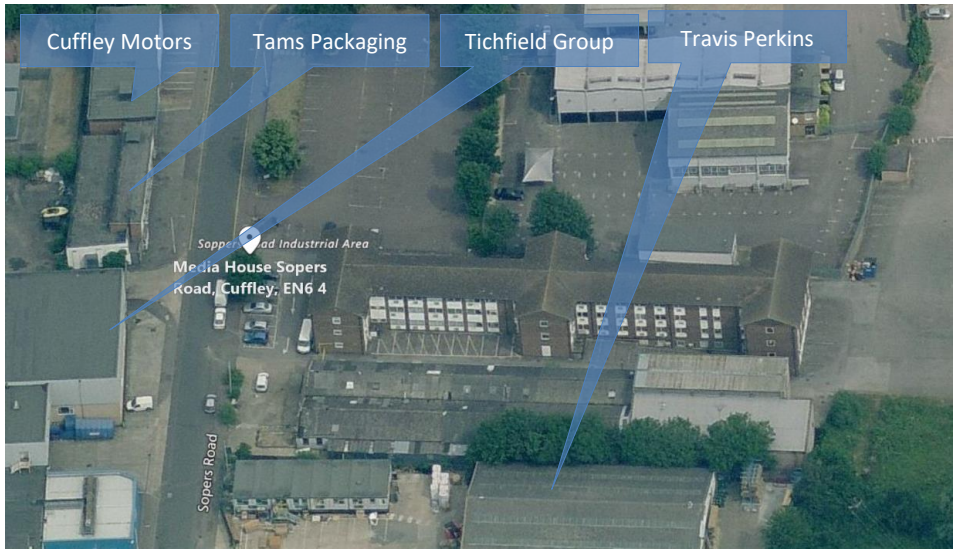
Front of the Site from Sopers Road

Front of the Site from Sopers Road

2.2.2 Existing Commercial Properties

There are four existing commercial properties that are in close proximity to Everest House.

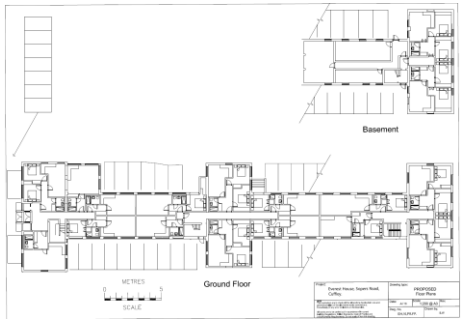
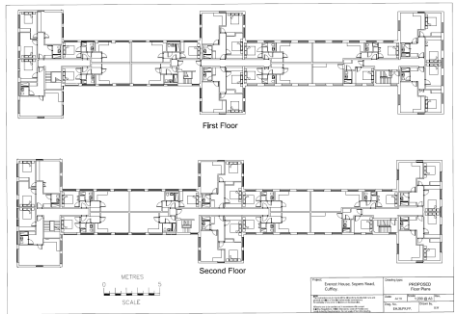
- Cuffley Motor Company is a small car repairs and serving facility.
- Tams Packaging Company provides packaging materials.
- Titchfield Group has a manufacturing facility.
- Travis Perkins is a general builders merchants and wholesalers.



	
Cuffley Motor Company	Tams Packaging Company
	
Titchfield Group	Travis Perkins Builders Merchants

2.3. Proposed Development

The following drawings provide an indicative layout of the 45 individual dwellings formed by changing the internal structure of the existing building and no alterations to the external fabric of the building.

Architect:	Barratts	Drawing No.	EH10.PR.FP	Date:	July 2018

2.4. Survey Preparation (Section 4 – BS4142: 2014)

Before the survey was undertaken consideration was given to the following five areas to fully understand the context of the site to ensure the final assessment of the noise is appropriate.

2.4.1 Identification of Sound Source (Section 4a – BS4142: 2014)

The report will only consider the impact of the noise generated 24-hours a day from the surrounding commercial properties.

2.4.2 Measurement Method and Equipment (Section 4b – BS4142: 2014)

It was considered appropriate to measure background noise levels over a 24-hour period using unattended measurements and a precision noise meter complying with the requirements of BS EN 61672 – Part 1 for free field measurements.

2.4.3 Measurement Location (Section 4c – BS4142: 2014)

The measurement position was considered representative.

2.4.4 Measurement Timing and Durations (Section 4d – BS4142: 2014)

It was considered appropriate to measure the existing noise climate over a 24-hour period to establish the underlying background noise levels as some of the mechanical equipment will operate for the entire 24-hour period.

2.4.5 Agent of Change (Section 4e – BS4142: 2014)

The proposal is to introduce residential dwellings adjacent to existing commercial premises by applying for prior approval under the allowable permitted development rights. The wide area already includes a residential dwelling on the other side of Everest House.

3. Site Criterion…

3.1. Planning Policy

3.1.1 National Planning Policy Framework 2019

The revised *National Planning Policy Framework* (1) ("NPPF") published in 2019 provides an assumption in favour of sustainable development that meets the three overarching objectives: economic, social and environmental. Paragraph 11 provides guidance for decision makers:

> *"For decision-taking this means:…*
> *c) approving development proposals that accord with an up-to-date development plan without delay; or*
> *d) …granting planning permission…*
> *i) the application of policies in this Framework… provides a clear reason for refusing development proposed; or*
> *ii) any adverse impacts of doing so would significantly and demonstrably outweigh the benefits.*

Paragraph 170 of the NPPF provides the following guidance on conserving and enhancing the natural environment in terms of noise:

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

Paragraph 180 of the NPPF requires the development to be appropriate for its location:

> *"Planning… decisions should also ensure that new development is appropriate for its location…*
> *a) mitigate and reduce to a minimum potential adverse impact resulting from noise from new development and avoid noise giving rise to significant adverse impacts on health and quality of life* [60]
> *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for the recreational and amenity value…*
>
> *60 See Explanatory Note to the Noise Policy Statement for England: 2010"*

3.1.2 Noise Policy Statement for England: 2010

The *Noise Policy Statement for England* (2) ("NPSE") was published in 2010 defines three aims:

> *"**Avoid** significant adverse impact on health and the quality of life;*
> ***Mitigate** and minimise adverse impacts on health and quality of life; and*
> ***Contribute** to the improvement of health and the quality of life."*

The NPSE defines significant adverse and adverse impact in terms of noise:

> *"**NOEL – No Observed Effect Level** – This is the level of noise below which no effect can be detected.*
> ***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."*

3.1.3 Planning Practice Guidance: 2014

The *Planning Practice Guidance – Noise* (3) ("PPG") last updated in July 2019 is an online resource published by the Ministry of Housing, Communities and Local Government and provides specific advice on the NPPF and NPSE.

The PPG expands the concept of effect levels and provides a useful table on the link between the effect, perception and typical outcomes.

Effect	Perception	Typical Outcomes
NOEL	Not Noticeable	No effect
	Noticeable & Not Intrusive	Audible, small behaviour change
LOAEL	Noticeable & Intrusive	Audible, behaviour change, quality of life change
SOAEL	Noticeable & Disruptive	Dominant, sleep disturbance
	Noticeable & Very Disruptive	Extensive, harmful impact on health

3.1.4 Night Noise Guidelines: 2009

The aim of the *Night Noise Guidelines* (4) published in 2009 was to update the *WHO – Guidelines for Community Noise* (5) published in 1999 and provides health-based guidelines for acceptable night time noise levels following the work previously undertaken for the *European Union Directive 2002/49/EC* (6) known as the Environmental Noise Directive.

The report goes on to recommend the following thresholds based on the relationship between the night time noise levels and the effect on the person sleeping.

Effect	Health Effects Observed in the Population	$L_{night,\ outside}$
NOEL	Up to this level no biological effects are observed	30 dB
LOAEL	Effects on sleep, body movements, awakening	40 dB
SOAEL	Significant adverse health effects	> 55 dB

3.1.5 British Standard 4142: 2014…

British Standard 4142: 2014 provides a method for assessing the likely effects of sound from industrial or commercial nature on *"people who might be inside or outside a dwelling used for residential purposes"*. The standard may be used to establish the following:

> *"This standard is applicable to the determination of the following levels at outdoor locations:*
>
> *a) rating levels for sources of sound of a ….. commercial nature;*
>
> *b) ambient, background and residual noise levels.*
>
> *For the purposes of:*
>
> *2) assessing sound from proposed,,.. new….source(s) of sound of a …. Commercial nature."*

3.1.6 British Standard 8233: 2014…

British Standard 8233: 2014 entitled *Guidance on sound insulation and noise reduction for buildings* (7) provides general guidance on the control of noise in and around buildings. The standard relates to the design of new buildings or refurbished buildings undergoing a change of use and the impact of existing external noise levels.

Results	Day Time	Night Time	Commentary
Sleeping	35 dB $L_{Aeq,16\ hour}$	30 dB $L_{Aeq,16\ hour}$	7.7.2 of BS 8233:2014 (Internal Levels)
Amenity	55 dB $L_{Aeq,16\ hour}$	--	7.7.3.2. of BS 8233:2014 (External Levels)

3.1.7 Approved Document F: 2010 (Amended 2015)

Approved Document F1 Means of Ventilation: 2010 (Amended 2015) (9) provides details of how to comply with requirements F1 of the *Building Regulations 2010* (10) .

> *"Means of Ventilation*
>
> *F1(1). There shall be adequate ventilation provided for people in the building."*

The ventilation strategy must provide the following:

Ventilation Type	Description
Extract	Removal of high concentration of water vapour e.g. Bathrooms, kitchens
Whole Building	Provide fresh air and remove pollutants e.g. water vapour CO_2 build up etc.
Purge	Removal of high concentrations of pollutants and water vapour e.g. painting, burnt toast etc.

The ventilation requirements are designed solely to provide fresh air to the building and remove pollutants such as moisture and CO_2.

> *"4.8 Ventilation may also provide a means to control thermal comfort but this is not controlled under the Building Regulations. Part L addresses minimising energy due to the effects of solar gain in summer"*

Approved Document F requires selection of one of the following four ventilation systems.

System	System Type	Requirements
1	Background Ventilation	5,000mm^2 area in each room
	Extract Ventilation	60 ls^{-1} Kitchen, 15 ls^{-1} Bathrooms
2	Passive Stack Ventilation	12,000mm^2 area in each room
3	Continuous Mechanical Extract (MEV)	4 air changes per hour
4	Continuous Mechanical Supply and Extract with Heat Recovery (MVHR)	60 ls^{-1} Kitchen, 15 ls^{-1} Bathrooms 0.3 ls^{-1} per m^2 of floor area

3.1.8 NANR116 Open / Closed Window Research

The Building Performance Centre produced a document entitled *NANR116: Open / Closed Window Research – Sound Insulation through Ventilated Domestic Windows: 2007* (11) for Napier University which details the results of the sound insulation through partially open windows. Table 5.6 provides the statistically derived sound insulation of the opening within the windows where the opening has an equivalent area of 0.2m^2

Octave Band Centre Frequency (Hz)							$D_{n,e,W}$
63	125	250	500	1000	2000	4000	
20	14	14	16	14	17	19	16

Statistically derived Sound Insulation of Window Opening (dB)

3.1.9 Permitted Development

The Town and Country Planning Act (General Permitted Development) (Amendment) Order 2016 came into effect on 6th April 2016 and provides details of permitted development under Schedule 2 - Class O *"Offices to dwellinghouses"*.

> *"O. development consisting of a change of use of a building and any land within its curtilage from a use falling within Class B1(a) (Offices) of the Schedule to the Use Classes Order, to a use falling within Class C3 (dwellinghouses) of the Schedule."*

> *"0.2. – (1) Development under Class I is permitted subject to the condition that before the beginning of the development, the developer must apply to the local planning authority for a determination as to whether the prior approval of the authority will be required as to –*
>
> *Transport and highways impact of the development.*
> *Contamination risks on the site,*
> *Flooding risks on the site, and*
> *Impacts of noise from commercial premises on the intended occupiers of the development."*

3.2. Local Plan

As this report is dealing with a permitted development as detailed above there is no need to reference the Local Plan. However, the Local Authority have provided an unofficial policy relating to permitted development applications. The Welwyn Hatfield Local Plan District-Wide Policies was fully adopted in 2005 including policy R19 entitled *"Noise and Vibration Pollution."*

> *"Proposals will be refused if the development is likely:*
>
> *(i) To generate unacceptable noise or vibration for other land uses; or*
>
> *(ii) To be affected by unacceptable noise or vibration from other land uses. Planning permission will be granted where appropriate conditions may be imposed to ensure either:*
>
> *(iii) An adequate level of protection against noise or vibration; or*
>
> *(iv) That the level of noise emitted can be controlled."*

The Welwyn Hatfield emerging Local Plan which is expected to be adopted late 2020 includes the policy SADM 18 entitled *"Environmental Pollution"* and details a section entitled *''Noise and Vibration.''*

> *''A Noise and Vibration Impact Assessment will be required for proposals with the potential to cause disturbance to people or the natural environment due to noise and/or vibration and for proposals that are considered to be sensitive to noise and/or vibration.*
> *Proposals that would result in or be subject to noise pollution and/or vibration that is:*

i. Very disruptive and would have an unacceptable adverse effect on human health or the natural environment will not be permitted.

ii. Disruptive and would have a significant adverse effect on human health or the natural environment will be refused unless the need for, and benefits of, the development significantly outweigh the harm and all feasible solutions to avoid and mitigate that harm have been fully implemented.

iii. Intrusive and would have an adverse effect on human health or the natural environment will be resisted unless the need for, and benefits of, the development outweigh the harm and all feasible solutions to avoid and mitigate that harm have been fully implemented. ''

3.3. Local Authority Planning Requirements

3.3.1 Advice Received from Local Authority

The following was advice was received from Environmental Health Technical Officer of Welwyn Hatfield Borough Council on Monday 27th January 2020.

"Public health and protection planning requirements:

Noise:
Where new developments could be subjected to noise or indeed when new developments could create noise we will expect a noise impact assessment to be submitted with the planning application."

The Local Authority confirms the standards to be used.

"The standards that are expected for residential properties are those indicated in BS8233:2014. It should be noted that we will also make[s] reference to standards set out in the World Health Organisation guidance documents."

The Local Authority then provides clarification that any acoustic assessment must be made in accordance with the *"Noise Insulation Regulations 1975"* when considering the assessment of internal noise levels with the windows closed and open:

"If opening windows will negate the acoustic insulation provided by windows leading to noise levels higher than those within BS8233:2014 then extra measures will be required. A suitable mechanical ventilation system will need to be incorporated into the building which must comply with the ventilation requirements as stipulated in The Noise Insulation Regulations 1975. We must stress that the use of mechanical ventilation is a last resort. Attenuation should be sought by good acoustic design in the first instance."

The Local Authority then go on to provide details of the planning requirements for *"Commercial/Industrial Noise"* when considering the impact of existing commercial noise sources and new residential dwellings:

"The impact of existing and new commercial noise sources should be assessed in accordance with BS4142:2014. We require the noise level to be 10dB below the background noise level at the nearest receptor location. LAMax levels should not exceed 40dB internally and internal noise levels (from commercial/industrial) should be 10dB below the noise levels in BS8233."

3.4. Approach to the Calculations

3.4.1 Reason for Calculations

The purpose of this assessment is to determine if the *"impacts of noise from commercial premises on the intended occupiers of the development"* can be adequately controlled through normal mitigation measures. The requirements for a Class O permitted development from an established B1(a) Office use to residential C3 within the Town and Country Planning Act (General Permitted Development) (Amendment) Order 2016 is to ensure that by permitting residential dwellings does not result in commercial properties being subjected to stricter noise criterion to ensure they don't disturb the new residents.

The proposed assessment considers the *"planning requirements"* detailed in the information provided on 27th January 2020 though does not make reference to the Noise Insulation Regulations 1975 as the ventilation requirements are covered by the current Association of Noise Consultants Guidelines.

3.4.2 Commercial Sources

The report will establish the current commercial premises that surround Everest House and determine the likely noise levels that could be generated by all the current approved uses if they all operated at the same time. The noise levels from vehicles on the public highway associated with the commercial units are not considered by this assessment.

3.4.3 Calculated Noise Levels

The sound power levels are established from published data for the various commercial operations and used to calculate the maximum noise levels that will exist at the nearest part of the Everest building façade. The sound power levels are then used within the CadnaA noise map to calculate the cumulative noise levels impacting the façade of Everest house on a 250mm x 250mm grid (around 1.5 million points across the façade).

3.4.4 Internal Noise Levels

The internal noise levels are calculated using BS EN ISO 12354: 2007 entitled *"BS EN ISO 12354-3:2017. Building acoustics. Estimation of acoustic performance of buildings from the performance of elements. Airborne sound insulation against outdoor sound*". For ease of reference this is the same calculation methodology mirrored in British Standard 8223: 2014 entitled "Guidance on sound insulation and noise reduction for buildings." It should be noted that the calculation method can be applied to all types of sources, even commercial sources, though BS8233: 2014 specifically references only transport sources.

3.5. Test Procedure (Section 6 – BS4142: 2014)

3.5.1 Field Calibration Check

The field calibration check before and after the measurements indicated an overall calibration drift of less than 0.1 dB(A) for the entire measurement system and was considered appropriate and reasonable for unattended measurements. The measurement chain was considered to be valid and a reasonable reliance can be placed on the results but with consideration within the uncertainty calculations from the original laboratory calibration and recorded drift between calibrations.

Period	Calibrator Level		Meter Reading	
	Broadband	1000 Hz	Broadband	1000 Hz
Before	94.1 dB	94.1 dB	94.1 dB	94.1 dB
After	94.1 dB	94.1 dB	94.1 dB	94.1 dB

3.5.2 Measurement Location Selection

Section 6.2 of British Standard 4142: 2014 recommends that where practical background noise measurements are undertaken at a height of between 1.2m and 1.5m above ground level and at least 3.5m from any reflective surface other than the ground. Where this is not possible the following corrections have been applied to the background noise levels.

Correction	Correction – Section 6.2 of British Standard 4142: 2014	Applied
-3 dB	Measurement 1m from façade – Far Field Sources	-0 dB
-1 to -2 dB	Measurement 1m from façade – Near Field Sources	-0 dB

3.5.3 Precautions Against Interference

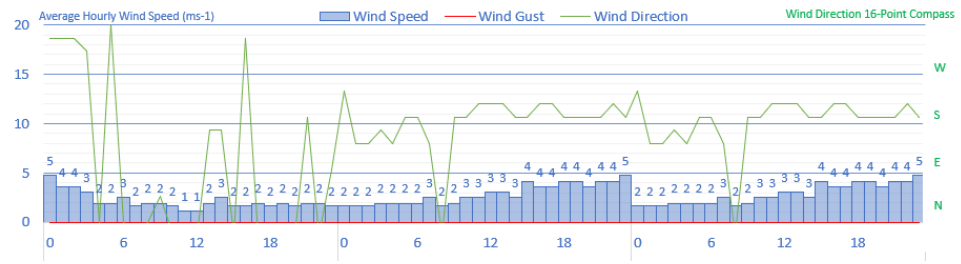
The weather conditions were established during the measurement period and it was concluded that the following did not interfere with the background measurements:

a) Wind passing over the microphone inducing vibration in the diaphragm.
b) Rain falling on the microphone windshield or nearby surfaces.
c) Electrical or electromagnetic interference.
d) Variation in temperature outside the calibrated range of the meter.

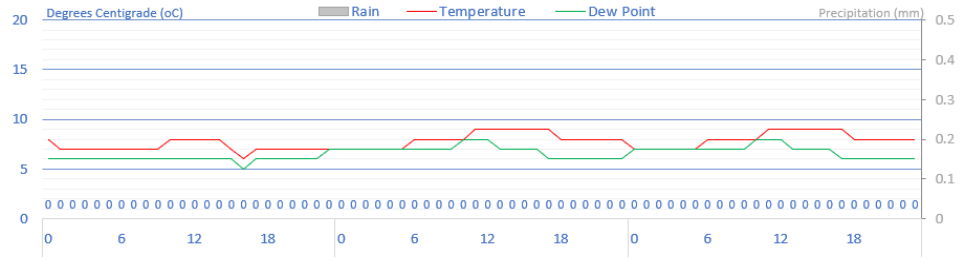
3.5.4 Weather Conditions

The following data is taken from the Weather Underground site using a website API at the nearby 24-hour weather station.

3.5.5 Wind Speed and Direction



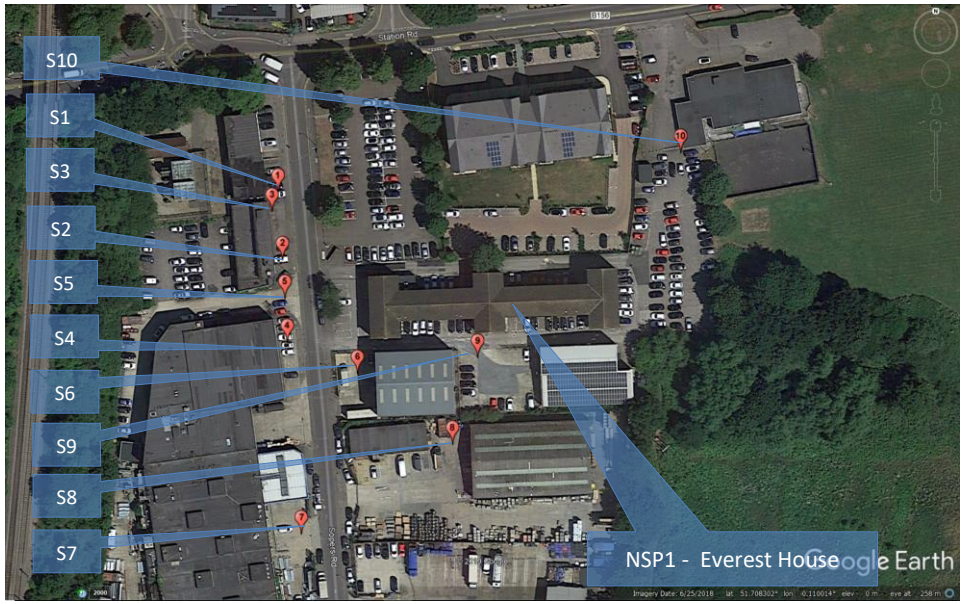
3.5.6 Temperature, Dew Point and Rainfall



4. Specific Sound (Section 7 – BS4142: 2014)…

4.1. Location of Sources and Noise Sensitive Properties

4.1.1 Location Plan of Commercial Sources



Ref	Description of Source	Latitude	Longitude	Altitude
S1	Elis Training Centre (Parking)	51.707794°	51.707794°	59 m
S2	Cuffley Motor Co (Parking)	51.707605°	-0.108766°	60 m
S3	Cuffley Motor Co (Open Workshop)	51.707740°	-0.108813°	59 m
S4	Tams Packaging (Parking, Forklift & Delivery)	51.707375°	-0.108744°	59 m
S5	Entrance to Car Park (50 Spaces)	51.707498°	-0.108755°	59 m
S6	Trax Storage Front (Parking, Forklift & Delivery)	51.707288°	-0.108428°	58 m
S7	Titchfield (Parking, Forklift & Delivery)	51.706841°	-0.108681°	57 m
S8	Travis Perkins (Parking, Forklift & Delivery)	51.707091°	-0.108000°	56 m
S9	Trax Storage Rear (Parking, Forklift & Delivery)	51.707333°	-0.107887°	57 m
S10	Cuffley Community Centre (Music Noise)	51.707904°	-0.106972°	56 m

4.1.2 Relative Distances

The following table shows the relative distances between the identified commercial sources and the nearest façade of the Everest building to the nearest meter.

Ref	Source	Ref	Receiver	Distance
S1	Elis Training Centre (Parking)	NSP1	Everest House	38m
S2	Cuffley Motor Co (Parking)			27m
S3	Cuffley Motor Co (Open Workshop)			36m
S4	Tams Packaging (Parking, Forklift & Delivery)			25m
S5	Entrance to Car Park (50 Spaces)			25m
S6	Trax Storage Front (Parking, Forklift & Delivery)			11m
S7	Titchfield (Parking, Forklift & Delivery)			64m
S8	Travis Perkins (Parking, Forklift & Delivery)			35m
S9	Trax Storage Rear (Parking, Forklift & Delivery)			8m
S10	Cuffley Community Centre (Music Noise)			41m

The above distances are only for reference purposes and the final noise levels from all the combined noise sources will be calculated using CadnaA noise mapping software.

4.2. Sound Power Levels

It was not practical or reasonable to arrange access to all the commercial premises surrounding Everest House. It is assumed that the commercial premises will operate within their currently established Use Classes 24-hours per day.

The noise of any delivery lorries or activities on the public highway associated with the commercial properties are not included within the noise calculations as it is outside the scope of this report.

4.2.1 Car Parking

The Journal of Environmental Engineering and Landscape Management published an article in October 2010 entitled *"Testing on noise level prevailing at motor vehicle parking lots and numerical simulation of its dispersion"* and concludes the following:

> *"The equivalent noise level at the spots of measuring differs only be 2 – 3 dB(A) and on the average is 47 dB(A)."*

The measurement technique provides the average noise level based on one measurement in the centre of the car park and four measurements 1m from the edge of the car parking facility.

Bayerisches Landesamtfür Umwelt published the document entitled *"Parking Area Noise - Recommendations for the Calculation of Sound Emissions of Parking Areas, Motorcar Centres and Bus Stations as well as of Multi-Storey Car Parks and Underground Car Parks"* which includes Tab 18 entitled *"sound power Levels"* provides the sound power level from 1 car parking space using the standard approach, timing, and departure.

> *"Motorcar Averaged over 84 movements L_{WTeq} 70 dB(A) Measurements by Mohler and Partner 1999"*

Correction to Octave Bands	Octave Band Centre Frequency (Hz)							
	A	63	125	250	500	1K	2K	4K
Sound Level Difference	70	-17	-17	-13	-9	-5	-5	-9

Using the above two references the following is considered an appropriate sound power level for the parking spaces.

Ref	Source Location	A_{bar} – Octave Band Centre Frequency (Hz)							
		A	63	125	250	500	1K	2K	4K
a	Commercial Car Parking	70	53	53	57	61	65	65	61
Sound Power Levels (dB) reference 1 x 10^{-12} watts									

4.2.2 Open Workshop

The site inspection indicated that the existing car servicing facility had an open workshop door and therefore it was considered appropriate to assume the noisiest activity would be the operation of a compressor.

British Standard 5228 – Part 1: 2009 entitled *"Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise"* includes standard data for the large loaders or forklifts unloading goods from a vehicle in table C.5.5. A correction is made for the operation within the workshop and the noise emission through the open door.

Ref	Source Location	A_{bar} – Octave Band Centre Frequency (Hz)							
		A	63	125	250	500	1K	2K	4K
b	Open Garage Workshop	85	102	91	88	77	75	73	76

4.2.3 Forklift Truck

Federation Europeennee De La Manutention published the document entitled "Information of the application of the EC Regulations on the noise of forklifts" which describes how to measure the noise emissions from forklift trucks. It states the average sound power level is around $L_{W(A)}$ 100 – 104 dB(A).

British Standard 5228 – Part 1: 2009 entitled *"Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise"* includes standard data for the large loaders or forklifts unloading goods from a vehicle in table C.2.28.

Ref	Source Location	A_{bar} – Octave Band Centre Frequency (Hz)							
		A	63	125	250	500	1K	2K	4K
c	Forklift Trucking Loading	104	114	110	105	102	98	94	90
Sound Power Levels (dB) reference 1 x 10^{-12} watts									

4.2.4 Delivery Vehicle

The Defra funded project entitled *"An investigation into the effect of historic noise policy interventions – Final Report Annex 3 Road Traffic Noise"* dated May 2012 provides some useful sound data for HGV in terms of noise emissions at low speeds. Furthermore, LGV's have maximum noise levels limited by the EU Directive 1992 / 97 entitled *"Amendment directive 70/157/EEV on the approximation of the laws of Member States relating to the permissible sound levels and the exhaust system of motor vehicles."*

British Standard 5228 – Part 1: 2009 entitled *"Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise"* includes standard data for the large loaders or forklifts unloading goods from a vehicle in table C.11.4.

Ref	Source Location	A_{bar} – Octave Band Centre Frequency (Hz)							
		A	63	125	250	500	1K	2K	4K
d	39T Lorry	101	100	98	96	93	94	96	93
Sound Power Levels (dB) reference 1 x 10^{-12} watts									

4.2.5 Music Noise

The Cuffley Community Centre is located around 20m from the existing residential dwellings on Station Road. Therefore, to comply with their legal obligation within the Environmental Protection Act 1990 amended by the Noise and Statutory Nuisance Act 1993 the existing operation can't cause a statutory noise nuisance to the residents. On that basis the following are likely to be the maximum music noise levels generated on the façade of the building.

Ref	Source Location	A_{bar} – Octave Band Centre Frequency (Hz)							
		A	63	125	250	500	1K	2K	4K
e	Music Noise Breakout	64	65	68	65	61	58	55	55
Sound Power Levels (dB) reference 1 x 10^{-12} watts									

4.3. Calculation Methodology

4.3.1 Scope of Methodology

The International Standards Organisation ("ISO") published ISO 9613 – Part 2: 1996 entitled *"Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculations"* details the method for calculating the noise levels at a specific position. It was considered appropriate within the context of the site to use this calculation method to determine the sound pressure level at the various noise sensitive positions (NSP's) from the supplied manufacturers data.

The Cadna A 3D-Noise map is not used for the calculation of the specific noise levels at each Noise Sensitive Property (NSP) but is used to provide a check and verification of the overall calculation methodology.

4.3.2 Source Directivity (D_c)

A correction is made to account for the location of the individual sources and the effect of reflective surfaces excluding the ground and is contained within section 6 of ISO 9613 - Part 2:1996.

Number of Surfaces	Correction in dB (D_c)
1 Reflective Surface	+3 dB
2 Reflective Surfaces	+6 dB
3 Reflective Surfaces	+9 dB

4.3.3 Geometric Divergence (A_{div})

A correction is made for the distance between the source and assessment position using the following formula defined in section 7.1 of ISO 9613-Part 2:1996.

Formula	Symbols
$A_{div} = 20 . \text{Log}_{10} (d/d_0) +11$	A_{div} = Reduction due to Geometric Divergence (dB) d = Distance from source to receiver (m) d_0 = reference distance (1m)

4.3.4 Atmospheric Absorption (A_{atm})

As the source was less than 100m from the receiver position (assessment position) no correction was made for atmospheric absorption.

4.3.5 Ground Absorption (A_{gr})

A correction is made for the effect of the ground between the source and receiver depending on whether it is considered hard or soft ground.

Type of ground	Correction in dB (A_{gr})
Hard Ground	+ 3 dB
Soft Ground	+ 0 dB

4.3.6 Barrier Effect (A_{bar})

A correction is made for any barrier in the direct line of site between the source and the assessment position and is detailed in section 7.4 of ISO 9613-Part 2:1996. For clarity the K_{met} meteorological correction has been ignored and C_2 equals 40 and C_3 equals 1.

Formula	Symbols
$A_{bar} = 10 . \text{Log}_{10} [3 + (40 . \delta / \lambda) - A_g]$ *Note 1 where $\delta = a + b – r$ and $\lambda = c / f$	A_{bar} = Effective barrier attenuation (dB) A_{gr} = Total Ground Absorption (dB) *Note 1: Only apply the A_{gr} correction if $A_{gr} > 0$ δ = Path difference (m) a = Distance from source to barrier head (m) b = Distance from barrier head to assessment position (m) r = Distance from source to assessment position (m) λ = Wavelength of sound (m) c = Speed of sound – Assumed to be 342 ms^{-1} f = Octave band centre frequency (Hz)

4.3.7 A-Weighted and Octave Band Data

It should be noted that the calculations have been undertaken in octave bands. The corrections for source directivity (D_c), geometric divergence (A_{div}) and ground absorption (A_{gr}) are not frequency dependent and therefore the same correction is applied to all octave bands.

However, the correction for barrier effect (A_{bar}) is frequency dependent and therefore the correction is different at each octave band. The calculations are undertaken in each octave band with the overall impact for barrier attenuation to the A-weighted level report in the summary calculations. Details of the barrier correction are provided in section 4.4. onwards to demonstrate the correct barrier attenuation has been applied to the calculations.

4.4. Specific Noise Levels at Everest House (Individual Sources)

4.4.1 Calculation Corrections

The following corrections are applied to the sound power levels to calculate the individual noise levels at the nearest points on the Everest House façade. The on-time corrections are based on a typical 15 minute period during the night time and it is assumed that the 1 hour period during the day time will just be 4-No 15-minutes periods back to back.

NSP1		D_c	A_{div}	A_{gr}	OT	A_{bar} – Octave Band Centre Frequency (Hz)							
Ref	r					δ	63	125	250	500	1K	2K	4K
S1a	38	+0	-43	+3	0.1	--	-0	-0	-0	-0	-0	-0	-0
S2a	27	+0	-40	+3	0.1	--	-0	-0	-0	-0	-0	-0	-0
S3b	36	+0	-42	+3	1.0	--	-0	-0	-0	-0	-0	-0	-0
S4acd	25	+0	-39	+3	1.0	--	-0	-0	-0	-0	-0	-0	-0
S5a	25	+0	-39	+3	0.1	--	-0	-0	-0	-0	-0	-0	-0
S6acd	11	+0	-32	+3	1.0	--	-0	-0	-0	-0	-0	-0	-0
S7acd	64	+0	-47	+3	1.0	--	-0	-0	-0	-0	-0	-0	-0
S8acd	35	+0	-42	+3	1.0	--	-0	-0	-0	-0	-0	-0	-0
S9acd	8	+0	-29	+3	1.0	--	-0	-0	-0	-0	-0	-0	-0
S10e	41	+0	-43	+3	1.0	--	-0	-0	-0	-0	-0	-0	-0

The references above are in two parts. The first part (e.g. S4) relates to the source location as a defined above in section 4.1. The second part (e.g. acd) relates to the sources operating at the specific location as defined in section 4.2.

The On-Time Correction ("OT") details the period within each 15-minute period when the specific operation is likely to occur.

4.4.2 Resultant Noise Levels

Ref	Receiver Position	A_{bar} – Octave Band Centre Frequency (Hz)							
		A	63	125	250	500	1K	2K	4K
S1	Nearest Point to Source Everest House	20	4	4	8	12	16	16	12
S2		23	7	7	11	15	19	19	15
S3		36	53	42	39	28	26	24	27
S4		60	68	65	60	57	54	52	49
S5		24	7	7	11	15	19	19	15
S6		67	76	72	67	64	61	60	56
S7		52	60	56	52	49	46	44	41
S8		57	66	62	57	54	51	49	46
S9		34	17	17	21	25	29	29	25
S10		14	15	18	15	11	8	5	5

Sound Pressure Levels (dB) Reference 2 x 10^{-5} Nm^{-2}

The above noise levels are the equivalent continuous noise levels that will be impacting the façade as a result of the individual noise sources at the nearest point on the façade. No account has been made of the combined noise levels on the façade as it is too time consuming to calculate the impact from multiple noise sources.

4.4.3 CadnaA Noise Map

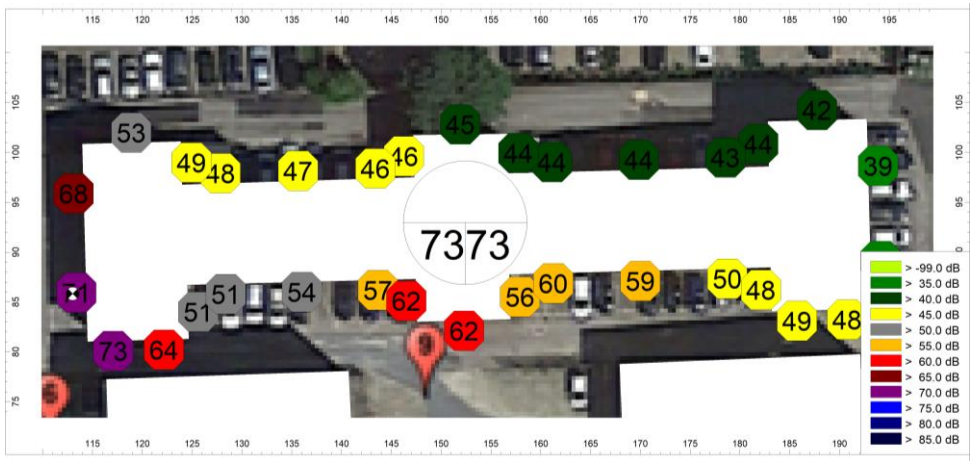
The following sound power levels have been entered into a CadnaA Noise map of Everest House and the surrounding area so that the combined noise levels can be calculated every 250mm along the Everest House Façade.

For a point of reference there are approximately 30,000 measurement points across the façade and with 10 noise sources that means the above table would need to include just under 300,000 individual calculations. Furthermore, the CadnaA noise map is setup to include the first 5 reflections so that would increase the total number of individual measurements to around 1.5 million individual transmission paths.

4.5. 3D Noise Map Verification

4.5.1 3D Noise Map against 35°C Ambient

The following noise map shows the impact of the commercial noise sources on the façade of Everest House.



The noise map has been calculated at a height of 1.5m but the façade noise levels are calculated across the whole façade.

4.5.2 Highest Noise Levels on Façade

The highest noise level on the façade of the building is in the south west corner facing the access road. The following table provides a breakdown of how the various sources impact the highest noise levels.

Ref	Receiver Position	A_{bar} – Octave Band Centre Frequency (Hz)							
		A	63	125	250	500	1K	2K	4K
S1	South West Corner to Source Everest House	23	-16	-11	-4.1	4	17	20	15
S2		27	-12	-7	1	9.4	21	24	19
S3		38	34	28	28	21	28	29	31
S4		65	52	54	55	56	59	60	56
S5		29	-10	-4	4.2	13	23	26	21
S6		72	58	61	63	65	66	67	63
S7		56	44	45	43	44	49	52	47
S8		39	31	32	31	31	31	31	26
S9		2.6	-29	-25	-18	-9.1	-1.8	-1	-6.2
S10		-11	-23	-17	-18	-19	-18	-21	-24
TOTAL		73	59	62	63	65	66	67	64

Sound Pressure Levels (dB) Reference 2 x 10^{-5} Nm^{-2}

4.5.3 Assessment of Noise Levels

For the purposes of calculating the internal noise levels it is considered appropriate to use the combined noise level calculated from the 3D noise map i.e. $L_{Aeq,\,t}$ 73 dB(A) as detailed in the table above.

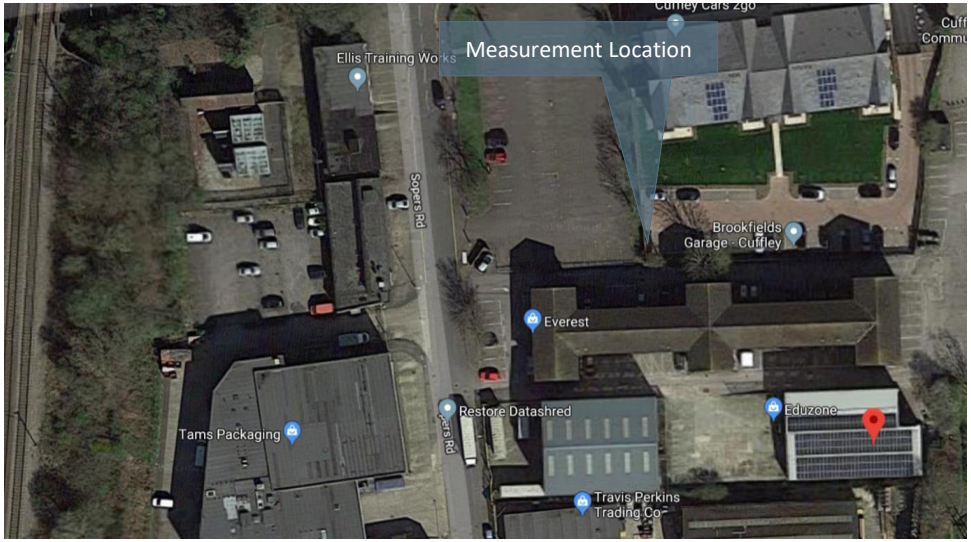
4.5.4 Existing Residential Dwellings

It should be noted that the calculated continuous noise level from all commercial sources operating at once and to the maximum allowable level within the currently permitted Use Class at the nearest existing residential dwellings is . $L_{Aeq,\,t}$ 55 dB(A).

5. Background Noise Levels…

5.1. Instrument Details (Section 5 – BS4142: 2014)

5.1.1 Measurement Location



Latitude:	51.750869°	Longitude:	-1.262385°	Elevation:	5.2 m

5.1.2 Calibration Details of Equipment

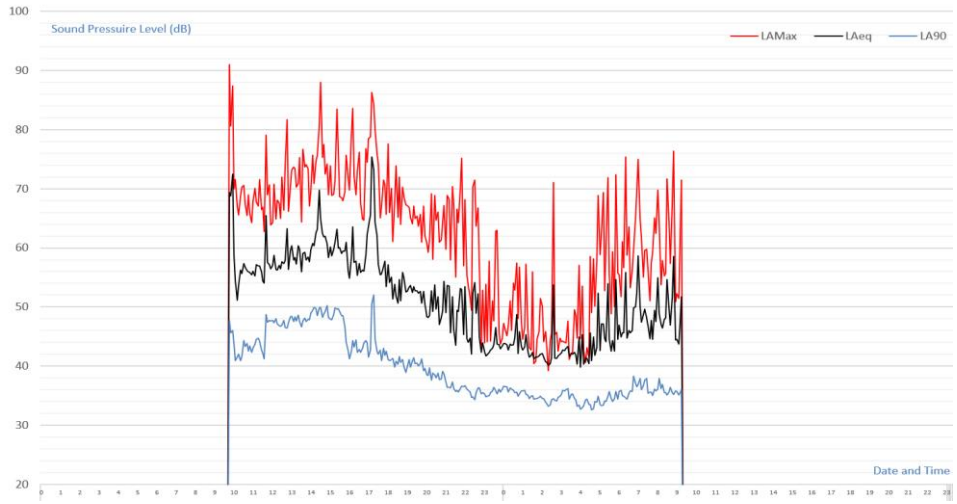
The following equipment was used to measure the background noise levels which were verified on site before and after the measurements using the associated calibrator.

Type	Sound Level Meter	Microphone	Calibrator
	633.C1	251	120/1
Manufacturer	Casella	Casella	Casella
Serial Number	2145360	00709	5231002
Certificate Number	U24420	U24419	U27852
Calibration Date	12th January 2017	12th January 2017	21st February 2018

5.2. Measurements Results (Section 8 – BS4142: 2014)

5.2.1 Measurement Results

The following table shows the underlying background noise levels which were dominated from the traffic from the M4.



Day Time (07:00 to 23:00)			Night Time (23:00 to 07:00)		
$L_{Amax,\ 1\ hour}$	$L_{Aeq,\ 1\ hour}$	$L_{A90,\ 1\ hour}$	$L_{Amax,\ 1\ hour}$	$L_{Aeq,\ 1\ hour}$	$L_{A90,\ 1\ hour}$
51 – 91	44 – 75	35 – 52	49 – 82	40 – 56	33 - 38

Sound Pressure Level (dB) – Reference 2 x 10^{-5} Nm^{-2}

5.2.2 Modal Analysis of Background Results

A modal analysis of the background noise levels established the following underlying levels:

Day Time (07:00 to 23:00) $L_{A90,\ 1\ hour}$ 46 dB
Night Time (23:00 to 07:00) $L_{A90,\ 15\ minutes}$ 35 dB

6. Assessment of Internal Noise Levels…

6.1. Internal Noise Levels Calculations

6.1.1 Calculation Methodology

The calculation methodology defined within *BS EN ISO 12354 – Part 3: 2017* (13) entitled *Building acoustics. Estimation of acoustic performance of building from the performance of elements. Airborne sound insulation against outdoor sound* provides a simplified calculation process defined by the following equation:

$$L_{eq,2} \approx L_{eq,ff} + 10.\log_{10}\left(\frac{A_0}{S}.10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S}.10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}.10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S}.10^{\frac{-R_{rr}}{10}} +\right) + 10.\log_{10}\left(\frac{S}{A}\right) + 3$$

$L_{eq,2}$ = Equivalent sound pressure level internally within the room (dB) – reference 2 x 10^{-5}Nm^{-2}
$L_{eq,ff}$ = Equivalent sound pressure level externally outside the room under consideration (dB) – reference 2 x 10^{-5}Nm^{-2}
A_0 = Reference absorption area within room of 10m^2 and independent of frequency
S_f = Total façade area of room in question (m^2)
S_{wi} = Area of windows or glazing within the room (m^2)
S_{ew} = Area of external wall within the room (m^2)
S_{rr} = Area of the ceiling within the room (m^2)
S = Total area of elements through which sound enters the room (m^2). i.e. $S = S_f + S_{rr}$
$D_{n,e}$ = Sound insulation of the trickle vent measured to British Standard 20140 – Part 10: 1992
R_{wi} = Sound reduction index of the window (dB)
R_{ew} = Sound reduction index of the external wall (dB)
R_{rr} = Sound reduction index of the ceiling (dB)
A = Equivalent absorption of the room under consideration (m) – BS EN ISO 10140 – Part 2

6.1.2 Transmission Loss of Elements

The following are the performance of the elements used within the calculations.

Element	Makeup	$R_{w\ (100-3150)}$	125	250	500	1K	2k
Trickle Vent	Whole House Ventilation	D_{ne}38 dB	35	40	41	51	51
Open Window	NANR116 (0.2m^2 Open Area)	R_{wi} 16 dB	14	14	16	14	17
Glazing	4-12-4 Existing Secondary 8mm float	R_{wi} 47 dB	28	38	43	50	52
Walls	Brick and Block Walls	R_{ew}55 dB	47	49	47	56	66
Ceilings / Roof	2 x 15mm Soundbloc	R_{rr}57 dB	42	49	55	60	56

6.1.3 Ventilation System

The following is the calculated insertion loss of the MVHR system from the external façade to the internal living or bedrooms.

Element	Makeup	$R_{w\ (100-3150)}$	125	250	500	1K	2k
Louvre	Nuaire External Ventilation Grill	--	3	4	5	6	7
Termination	End Reflection Loss of Duct	--	13	8	4	1	0
Duct	Straight Duct (4m)	--	3	1	0	0	0
90 Degree	90 Degree Bends (2 No)	--	4	5	6	6	6
Attenuator	Attenuator (PVCSIL-1500)	--	6	16	20	32	32
Correction	Diffuse to Reverberant	--	6	6	6	6	6
TOTAL	Calculated Total Transmission Loss	--	35	40	41	51	51

6.1.4 Average Internal Noise Levels – Windows Closed

Period	Day Time (07:00 to 23:00)						Night Time (23:00 to 07:00)					
Octave Frequency	**S**	125	250	500	1K	2K	**S**	125	250	500	1K	2k
Façade Level, $L_{eq,ff}$	**4.2**	47	49	47	56	66	**4.2**	47	49	47	56	66
Ventilation, D_{ne} 38 dB	**--**	35	40	41	51	51	**--**	35	40	41	51	51
Windows, R_{wi} 47 dB	**1.8**	28	38	43	50	52	**1.8**	28	38	43	50	52
Walls, R_{ew} 55 dB	**2.8**	47	49	47	56	66	**2.8**	47	49	47	56	66
Ceiling, R_{rr} 57 dB	**6.4**	42	49	55	60	56	**6.4**	42	49	55	60	56
Internal Levels, $L_{eq,2}$	**--**	33	26	26	17	18	**--**	33	26	26	17	18
	$L_{Aeq,16\ hours,\ inside}$ 26 dB						$L_{Aeq,8\ hours,\ inside}$ 26 dB					

6.1.5 Average Internal Noise Levels – Windows Open

Period	Day Time (07:00 to 23:00)						Night Time (23:00 to 07:00)					
Octave Frequency	S	125	250	500	1K	2K	S	125	250	500	1K	2k
Façade Level, $L_{eq,ff}$	**4.2**	47	49	47	56	66	**4.2**	47	49	47	56	66
Ventilation, D_{ne} 38 dB	--	35	40	41	51	51	--	35	40	41	51	51
Windows, R_{wi} 16 dB	**1.8**	14	14	16	14	17	**1.8**	14	14	16	14	17
Walls, R_{ew} 55 dB	**2.8**	47	49	47	56	66	**2.8**	47	49	47	56	66
Ceiling, R_{rr} 57 dB	**6.4**	42	49	55	60	56	**6.4**	42	49	55	60	56
Internal Levels, $L_{eq,2}$	--	43	43	43	46	44	--	43	43	43	46	44
	$L_{Aeq,16\ hours,\ inside}$ 49 dB						$L_{Aeq,8\ hours,\ inside}$ 49 dB					

6.2. Association of Noise Consultants AVO Guide

6.2.1 Level 1 Site Risk Assessment

External free-field Noise Levels		Position of Assessment	Risk Category
$L_{Aeq,T}$ 07:00 -23:00	LAeq,8h 23:00 – 07:00		
73	73	Highest Façade Level	High

6.2.2 Level 2 Assessment

An assessment is specifically required as the Level 1 Assessment resulted in a high-risk Category.

6.2.3 Ventilation Strategy Guidelines

The ANC document suggests that in this instance an ADF type 4 ventilation system is required due to the external noise levels impacting Everest House.

6.2.4 Level 2 Assessment – Windows Open and Closed

Time Period	Day Time (07:00 to 23:00)		Night Time (23:00 to 07:00)	
Window Position	Closed	Open	Closed	Open
Windows, $L_{eq,2}$	$L_{Max,16\ hour}$ 26 dB	$L_{Aeq,16\ hour}$ 49 dB	$L_{Max,8\ hour}$ 26 dB	$L_{Aeq,8\ hour}$ 49 dB
Risk Assessment	<35 dB Green	35 – 50 dB Orange	<30 dB Green	>42 dB Red

The assessment of the resultant noise levels under the Association of Noise Consultants document entitled *"Acoustics Ventilation Overheating"* concludes the following:

> Windows closed during the day time and night time periods (green)
> *"Noise can be heard, but does not cause any change in behaviour"*
>
> Windows open during the day time (orange)
> *"As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television ; speaking a little louder; having to close windows during certain activities…"*
>
> Windows open during the night time (Red)
> *"Having to keep windows closed most of the time because of the noise."*

It should be noted that the above assessment has indicated that the internal noise levels are acceptable with the windows closed during the day and night time periods and during the day time with the windows open.

The assessment is based on continuous operation from all the commercial activities that are currently permitted within the respective Use Classes. This is a situation that is very unlikely to occur and if it did on the odd occasion it would be reasonable to assume the future residents of Everest House would just close the windows to ensure a suitable internal noise level.

7. Uncertainty (Section 10 – BS4142: 2014)…

7.1.1 Scope

Section 10 of British Standard 4142: 2014 entitled *"Uncertainty"* requires the following:

> *"Consider the level of uncertainty in the data and associated calculations. Where the level of uncertainty could affect the conclusion, take reasonably practicable steps to reduce the level of uncertainty. Report the level and potential effects of uncertainty.*

Annex B of British Standard 4142: 2014 entitled *"consideration of uncertainty and good practice for reducing uncertainty"* makes reference to the University of Salford publication entitled *"A Good Practice Guide on the Source and Magnitude of Uncertainty arising in the Practical Measurement of Environmental Noise"* edition 1a dated May 2007.

7.1.2 Uncertainty of Measured Values

Ref	Source of Uncertainty Section 10.2 British Standard 4142: 2014	Value dB(A)	Distribution (Divisor)	Uncertainty dB(A)
a	Variability and complexity of sound source	0.50	$\sqrt{2}$	0.35
b	Variability and complexity of residual sound	0.00	$\sqrt{3}$	0.00
c	Residual sound present in specific sound	0.00	$\sqrt{3}$	0.00
d	Background noise position selection	0.10	$\sqrt{3}$	0.06
e	Distance between source and receiver	0.15	$\sqrt{2}$	0.11
f	Number of measurements taken (Days)	0.10	$\sqrt{3}$	0.06
g	Measurement time interval variation	0.00	$\sqrt{2}$	0.00
h	Range of times measurements taken	0.10	$\sqrt{3}$	0.06
i	Suitable weather conditions during measurements	0.20	$\sqrt{3}$	0.12
j	Application of British Standard 4142: 2014	0.10	$\sqrt{2}$	0.07
k	Rounding of each measurement	0.05	$\sqrt{3}$	0.03
l	Instrumentation – Calibration	1.20	$\sqrt{3}$	0.69
Reported Expanded Uncertainty (95% confidence, convergence k = 2)				1.61

7.1.3 Uncertainty in Calculations

Ref	Source of Uncertainty Section 10.2 British Standard 4142: 2014	Value dB(A)	Distribution (Divisor)	Uncertainty dB(A)
a	Impact of measured sound level on calculations	0.00	$\sqrt{2}$	0.00
b	Assumption on sound power level of source	0.00	$\sqrt{3}$	0.00
c	Uncertainty of calculation method (ISO 9613)	0.20	$\sqrt{3}$	0.12
d	Model fit against real world conditions	0.10	$\sqrt{3}$	0.06
e	Error in the calculation process	0.15	$\sqrt{2}$	0.11
Reported Expanded Uncertainty (95% confidence, convergence k = 2)				0.33

7.1.4 Uncertainty from Other Factors

Ref	Source of Uncertainty Section 10.2 British Standard 4142: 2014	Value dB(A)	Distribution (Divisor)	Uncertainty dB(A)
a	Standing waves or interference patterns	0.15	$\sqrt{3}$	0.09
b	Approximation of sound source to a point source	0.10	$\sqrt{3}$	0.06
c	Maintenance and repair of source over 15 years	0.50	$\sqrt{3}$	0.29
Reported Expanded Uncertainty (95% confidence, convergence k = 2)				0.61

7.1.5 Combined Reported Expanded Uncertainty

Ref	Source of Uncertainty Section 10.2 British Standard 4142: 2014	Value dB(A)	Distribution (Divisor)	Uncertainty dB(A)
a	Section 7.1.2. Uncertainty of measured values	2.7	$\sqrt{2}$	1.14
b	Section 7.1.3. Uncertainty of calculations	2.7	$\sqrt{2}$	0.23
c	Section 7.1.4. Uncertainty from other factors	2.7	$\sqrt{2}$	0.43
Combined Reported Expanded Uncertainty (95% confidence, convergence k = 2)				2.5

It should be noted that the uncertainty calculations have assumed a Type B uncertainty.

8. Assessment and Conclusions …

8.1. Conclusions

8.1.1 Site Criterion (Section 3)

The following is the proposed criterion internally within the proposed dwellings, Everest House.

Location	Day Time	Night Time	Commentary
Bedroom	$L_{Aeq,16h\ inside}$ 35 dB	$L_{Aeq,\ 8h,inside}$ 30 dB	Based on BS 8233: 2014 Criterion

8.1.2 Specific Noise Levels (Section 4)

The following noise levels are calculated assuming all the commercial noise sources operate continuously at the maximum allowable levels within the currently approved Use Classes 24-hours per day.

Results	Day Time	Night Time	Commentary
Calculated	$L_{Aeq,\ 16\ hour}$ 73 dB	$L_{Aeq,\ 16\ hour}$ 73 dB	All Commercial Sources

8.1.3 Internal Noise Levels

The following internal noise levels are calculated in accordance with *BS EN ISO 12354 – Part 3: 2017* assuming the windows are closed and ventilation is provided by the MVHR system.

Time Period	Day Time (07:00 to 23:00)		Night Time (23:00 to 07:00)	
Window Position	Closed	Open	Closed	Open
Windows, $L_{eq,2}$	$L_{Max,16\ hour}$ 26 dB	$L_{Aeq,16\ hour}$ 49 dB	$L_{Max,8\ hour}$ 26 dB	$L_{Aeq,8\ hour}$ 49 dB

8.1.4 Conclusions

The proposed permitted development from the existing offices (Class B1A use) to 45 No residential dwellings (Class C3 Use) will result in acceptable noise levels for future residents without putting unreasonable stress on nearby commercial premises.

8.2. Discussions and Recommendations

8.2.1 Previous Prior Approval Application

A previous prior approval application for the same scheme was withdrawn on the advice of the Local Authority planning officer as an agreement was unable to be reached with the Local Authority regarding the impact of existing commercial uses surrounding the development on future residents.

8.2.2 Secondary Glazing and MVHR System

The required secondary glazing and MVHR system is unlikely to require planning permission and therefore it is considered that they could reasonably be included within the development should the prior approval application be granted by the Local Authority.

END OF REPORT

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