BS8233 ENVIRONMENTAL NOISE ASSESSMENT
JACKS LANE, TAKELEY, ESSEX

Project Reference:
ENV01-TAKE-068b Jacks Lane, Takeley

Site Address:
Jacks Lane
Takeley
Essex
CM22 6NT

Version Number:
Version 1.0

Report Date:
7th September 2022

Customer:
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The Stansted Centre
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PROFESSIONAL CREDENTIALS

Stansted Environmental Services Limited (SES) is a standalone company within the Weston Group. SES provides a range of Health, Safety and Environmental Consultancy Services, specifically for the construction industry, working with developers, architects, planners and designers.

The consultants at Stansted Environmental Services specialise specifically in:-

Site Investigation and Contaminated Land
Acoustics and Noise Control
Construction Safety
Energy and Sustainability

Silvio Petrasso is the Managing Director for Stansted Environmental Services Limited and has experience in dealing with acoustic assessments at Senior Management and Director Level, overseeing a number of large projects, to ensure that the end product is suitable for its intended use.

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Nick holds a Master's degree qualification in Applied Acoustics and is a Corporate Member of the Institute of Acoustics (IOA). Additionally, Nick is an Incorporated Engineer (IEng) of the Engineering Council.

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1. Introduction

Stansted Environmental Services (SES) Ltd has been commissioned by Weston Homes Plc to prepare an Environmental Noise Assessment for the proposed development at Jacks Lane, Takeley, CM22 6NT.

The purposes of this report are:

- To determine and assess prevailing ambient and maximum noise levels affecting the development due to nearby noise sources (e.g. road traffic, commercial premises operations, aircraft etc.);
- Based on the above, to present the internal noise levels to be achieved within the residential premises in accordance with relevant planning conditions, and
- To identify and recommend appropriate sound insulation requirements for the purposes of mitigating noise caused by prevailing noise sources such that internal noise levels are achieved
- To demonstrate that internal noise levels, with mitigation measures, comply with the planning conditions

The noise assessment has been undertaken in accordance with the most up-to-date planning guidance – in particular:

- The National Planning Policy Framework (NPPF),
- The WHO Guidelines for Community Noise and
- BS8233:2014 Guidance on sound insulation and noise reduction for buildings
- ProPG: Planning and Noise – Professional Practice Guidance on Planning & Noise – New Residential Development, May 2017
- Aviation Policy Framework.

This report provides details of the noise survey, including measurement results, and provides recommendations.

2. Site Description

An aerial view of the site in its current use is shown in Figure 1.

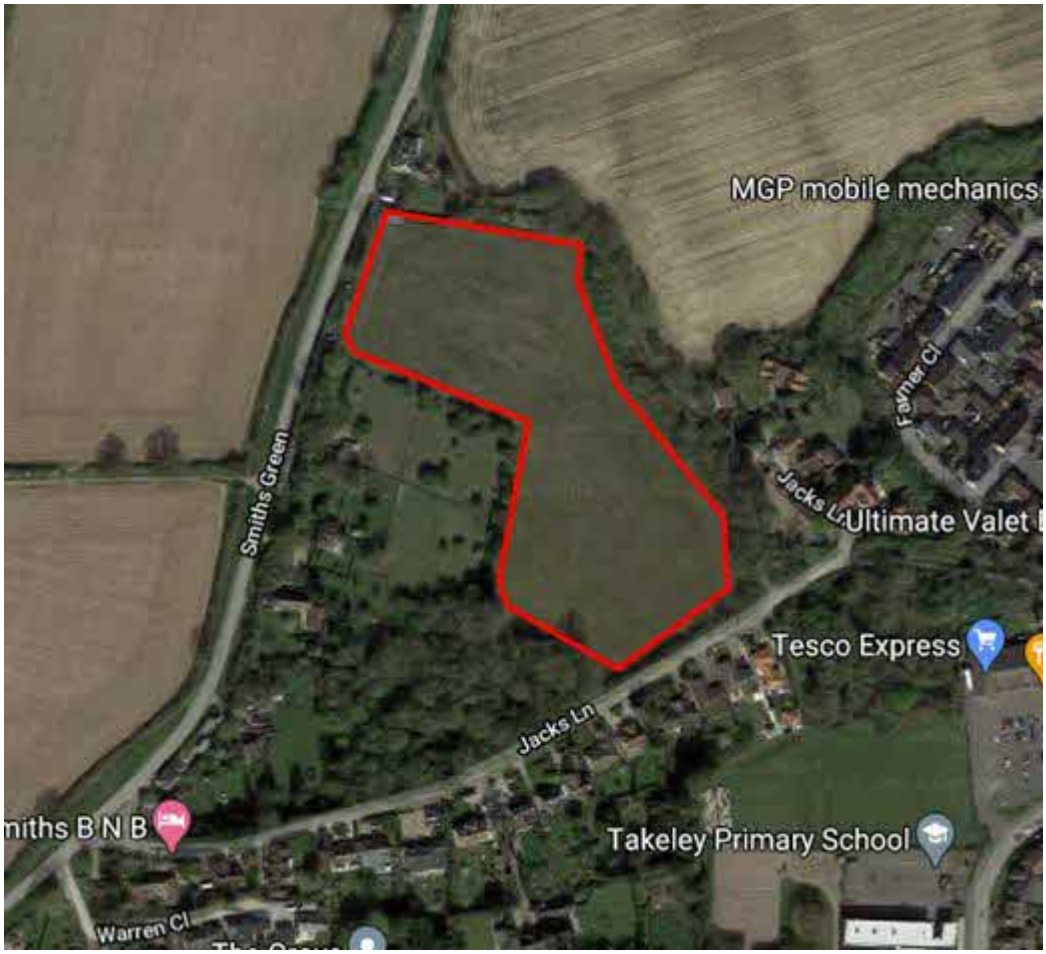

Figure 1 Aerial view of the site –Jacks Lane, Takeley, CM22 6NT

Jacks Lane, Takeley (hereafter referred to as 'the site') will consist of 22 residential dwellings. The site is surrounded by existing residential premises on Jacks Lane and private farm land to the north and south. The dominant noise sources present at the two measurement positions were noted to be road traffic noise from Smiths Green which forms the sites western boundary and the A120 situated north of the site.

3. Standard Guidance

The noise assessment has been undertaken in accordance with the most up-to-date planning guidance – in particular:

- The National Planning Policy Framework (NPPF),
- Noise Policy Statement for England (NSPE)
- BS8233:2014 Guidance on sound insulation and noise reduction for buildings
- The WHO Guidelines for Community Noise and
- ProPG: Planning and Noise – Professional Practice Guidance on Planning & Noise – New Residential Development, May 2017

3.1 The National Planning Policy Framework (NPPF), 2019

The National Planning Policy Framework was published in March 2012 and revised in July 2018 and February 2019. In respect of noise, the document states, in section 15, paragraph 170 that:

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

It goes on to advise in section 15, paragraph 180 that:

"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[60];

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; and

c) Limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

Paragraph 182 states "Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

The NPPF revokes Planning Policy Guidance 24 (PPG 24) which was previously used to assess noise impacts of planning applications. PPG 24:

- Outlined the considerations to be taken into account in determining planning applications both for noise-sensitive developments and for those activities that will generate noise
- Introduced the concept of "Noise Exposure Categories" for residential development, encouraged their use and recommended appropriate levels for exposure to different sources of noise and
- Advised on the use of planning conditions to minimise the impact of noise

The NPPF indicates that the Noise Policy Statement for England (NPSE) should be used to define "significant adverse impacts". A summary of the NPSE is provided below, and it is understood that the UK government is currently undertaking research to quantify the significant observed adverse effect levels for noise.

3.2 Noise Policy Statement for England (NPSE)

The NPSE was published in March 2010. The document seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. It also sets out, in paragraph 1.6, the long term vision of Government noise policy:

*"*Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*"*.

The NPSE clarifies that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and noise effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

The explanatory note of NPSE defines the terms used in the NPPF:

*"*There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation.

They are:

NOEL – No Observed Effect Level: This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

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

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

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

The NPSE does not provide a numerical value for the SOAEL, stating at paragraph 2.22:

*"*It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the

NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

The NPPF does not quote figures for action, however BS8233:2014 is the most appropriate guidance document in relation to identifying target noise level criteria. Achieving the LOAEL requires "all reasonable steps" to be taken in terms of mitigation.

3.3 Possible Options for the identification of SOAEL and LOAEL in support of the NPSE

In the absence of any specific guidance in the NPSE relating the absolute levels of noise from different sources to the various defined effect levels, DEFRA commissioned AECOM to carry out research to identify the potential threshold levels for LOAEL and SOAEL to assist implementation of the NPSE. The resultant document 'Possible Options for the identification of SOAEL and LOAEL in support of the NPSE' aims to contribute to the further understanding of what may constitute a significant adverse impact of noise on health and quality of life.

Guidance has been determined for different noise sources, receptors and at different periods of the day and night. The noise sources analysed include transportation (air, road and rail), neighbour, entertainment and industrial noise. The effects considered were: annoyance; stress; sleep; cardiovascular disease; cognitive mental health; quality of life and wellbeing; impacts on performance; and cognitive mental health.

The approach adopted for deriving possible LOAEL and SOAEL values for transportation noise sources is based on exposure – response relationships which are discussed in the report as having sufficient evidence to provide identifiable link between the level of noise and a given effect. The report caveats that these relationships refer to community responses over the long term and might not be relevant for assessing either noise impacts on individuals or the short term responses where there is an abrupt change in noise exposure.

A summary of the recommendations of the report are contained within Table 1.1 of the report, of which the sections relevant to this assessment are reproduced in Table 1.

Table 1 Summary outcomes of AECOM report

Source/Effect	Annoyance/Stress, dB $L_{Aeq,16hr}$		Sleep disturbance, dB L_{night}		Cardiovascular disease, dB $L_{Aeq,16hr}$	
	LOAEL	SOAEL	LOAEL	SOAEL	LOAEL	SOAEL
Road	53-59 (56)	64-68(66)	43-52(46)	51-64(56)	58	67
Air	50-54 (52)	58-62(60)	40-49(41)	47-60(53)	NA	NA

Note: numbers shown in parentheses indicate mid points of the range, 'NA' indicates that no evidence is available for this effect.

3.4 British Standard BS8233:2014: Sound Insulation and Noise Reduction for Buildings – Code of Practice

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

The Standard suggests suitable internal noise levels within different types of buildings, including dwellings, and these are repeated in Table 2.

Table 2 Recommended internal noise levels $L_{Aeq,T}$ dB

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35dB L_{Aeq}, 16 hour	---
Dining	Dining room area	40dB L_{Aeq}, 16 hour	---
Sleeping	Bedroom	35dB L_{Aeq}, 16 hour	30dB L_{Aeq}, 8 hour

These internal levels are based on annual average data and do not have to be achieved in all circumstances. It is normal to exclude occasional events, such as fireworks night or New Year's Eve.

The standard states that where development is considered necessary or desirable, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

For external amenity areas, such as gardens and patios, the standard states:

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

3.5 World Health Organisation (WHO)1999; Guidelines for Community Noise

WHO 2009: Guidelines for Community Noise has established guideline values for community noise in specific environments, which are summarised below:

- Outdoor Living Area – Serious Annoyance 55 dB(A), 16 hours between 07:00 and 23:00
- Outdoor Living Area – Moderate Annoyance 50 dB(A), 16 hours between 07:00 and 23:00
- Indoor Speech Intelligibility – Moderate Annoyance 35 dB(A), 16 hours between 07:00 and 23:00
- Inside bedrooms night time sleep disturbance 30dB(A), 8 hours between 23:00 and 07:00
- Outside bedrooms, window open (outdoor values), sleep disturbance 45dB(A) L_{Amax}

The WHO has issued a further document. "Night Noise Guidelines for Europe (2009)" and the following table details the effects of different levels of night noise on health.

Table 3 WHO Exposure –Effects Relationship

Average night noise levels over a year $L_{night,outside}$	Health Effects Observed in the Population
Up to 30dB	Although individual sensitivities exist, circumstances may differ, it appears that up to this level no substantial biological effects are observed. $L_{night,outside}$ of 30dB is equivalent to the no observed effect level (NOEL) for night noise.
30 to 40dB	A number of effects on sleep are observed from this range: body movements, awakening, self-reported sleep disturbances, arousals. The intensity of the effect depends on the nature of the source and the number of events. Vulnerable groups (for example, children, the chronically ill and the elderly) are more susceptible. However, even in the worst cases the effects seem modest. $L_{night,outside}$ of 40dB is equivalent to the lowest observed adverse effect level (LOAEL) for night noise.
40 to 55dB	Adverse health effects are observed among the exposed population. Many people have to adapt to the their lives to cope with noise at night. Vulnerable groups are more severely affected.
Above 55dB	The situation is considered increasingly dangerous for public health. Adverse health effects occur frequently, a sizeable proportion of the population is highly annoyed and sleep-disturbed. There is evidence that the risk of cardiovascular disease increases.

Based on the exposure-effects relationship summarised in Table 3, the night noise guideline values are recommended for the protection of public health from night noise as follows:

- Night Noise guideline – $L_{night,outside}$ = 40dB
- Interim Target – $L_{night,outside}$ = 55dB

For the primary prevention of health effects related to night noise, the WHO (2009) recommends people should not be exposed to night time noise levels greater than 40dB of $L_{night,outside}$ during the part of the night when most people are in bed. The LOAEL of night noise, 40dB $L_{night,outside}$, should be considered a health based limit value to protect the public.

3.6 ProPG: Planning and Noise – Professional Practice Guidance on Planning & Noise – New Residential Development, May 2017

Ever since PPG 24 Planning and Noise was repealed in 2012 with the introduction of the National Planning Policy Framework (NPPF), there has been no objective policy guidance provided by the English government on noise aspects of new residential planning applications.

Noise is still clearly a material issue to be considered in planning, as highlighted by the requirements of paragraph 170 of the NPPF. However, no objective policy guidance on assessing potential noise impact at residential developments is provided in the NPPF or subsequent policy documents.

Guidance on acceptable noise levels within residential properties is provided within British Standard 8233:2014 as previously noted.

The ProPG has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England. The IOA, the Chartered Institute of Environmental Health and the Association of Noise Consultants worked together to produce the guidance which encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise.

The guidance emphasises the importance of good acoustic design in the planning process and describes what this may mean.

- Good acoustic design describes the process of considering the environmental noise impacts on the proposed residential development from the early stages in a project.
- Site layout, building massing, orientation and internal layouts can all be important to demonstrating good acoustic design.
- Noise needs to be considered in the context of the internal environmental quality (IEQ), to avoid trade-offs with other aspects of the internal environment such as day-lighting, sunlight, ventilation and thermal comfort.

3.7 Aviation Policy Framework

The Aviation Policy Framework (APF) sets out the Government's high-level strategy and overall objectives for aviation and the policies to achieve those objectives. The policies of the APF are of relevance to this given the adjacency of the proposed development to Stansted Airport.

The APF recognises that noise is the primary concern of local communities near airports and aims to strike a fair balance between the negative impacts of noise on health and quality of life and the positive economic impacts of flights. In this context, it sets the Governments' overall policy on aviation noise as follows:

"...to limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise".

Much of the noise policy contained in the APF concerns noise from aircraft arriving and departing an airport including helicopter noise, and the levels at which noise insulation measures and compensation should be considered. In this regard the APF reference the policy threshold marking the 'approximate onset of significant community annoyance' at a daytime noise level of 57dB $L_{Aeq,16hr}$ and an upper threshold level of 63dB $L_{Aeq,16hr}$ at which airport operators would be expected to offer financial support towards acoustic insulation to both residential properties and community buildings, including schools.

3.8 Stansted Airport noise contours

Noise exposure contours have been produced by the Civil Aviation Authority for Stansted Airport in 2018 and 2019. These are reproduced in Appendix 3.

The lowest daytime contour shown in Figure 3 is 54dB $L_{Aeq,16\,hr.}$ This is below the threshold for SOAEL shown in Table 1 and equal to the APF 'approximate onset of community annoyance'. The proposed developed site is considerably further away from the airport than this contour line. Therefore, it is likely that daytime noise levels are well below the APF onset values and threshold for SOAL.

Similarly, the lowest night-time contour shown in Figure 4 is 48dB L_{night}. This is only 1dB above the threshold for SOAEL shown in Table 1. The proposed development site is considerably further away from the airport than this contour line. Therefore, it is likely that night-time noise levels are well below the threshold for SOAEL.

The level of aircraft noise across the site, which is perpendicular to the runway, is much lower than adjacent areas of land at similar distance that falls within the directions of the runway and therefore is under the flight-path. This is to be expected for all airports. As a worst-case, aircraft noise has been considered to be above the threshold of LOAEL, but below the level of SOAEL.

3. Environmental Noise Survey Methodology

An unmanned environmental noise survey was undertaken at the site. The unattended measurements were taken over 1 minute period between 16:09 on 6th April 2021 and 23:55 on 10th April 2021. The equipment was installed and collected by Jeeva Srilal. Monitoring was conducted over 5 days to determine prevailing ambient and maximum noise levels affecting the development. The measurement position was approximately 1.5m above ground level and under free-field conditions.

The monitoring locations are indicatively highlighted in orange (unattended) and blue (attended) in Figure 2. These measurement locations were chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises. The survey represents typical day, evening and night-time periods at the site.

Attended measurements were taken over 15 minute period on Tuesday 6th April 2021. This was carried out by Jeeva Srilal and Hugo Evans. The microphone was mounted on a tripod approximately 1.5m above the ground level and under free-field conditions. Ambient, background and maximum sound pressure levels (L_{Aeq}, L_{A90} and $L_{Amax,\,f}$ respectively) throughout the measurement period.

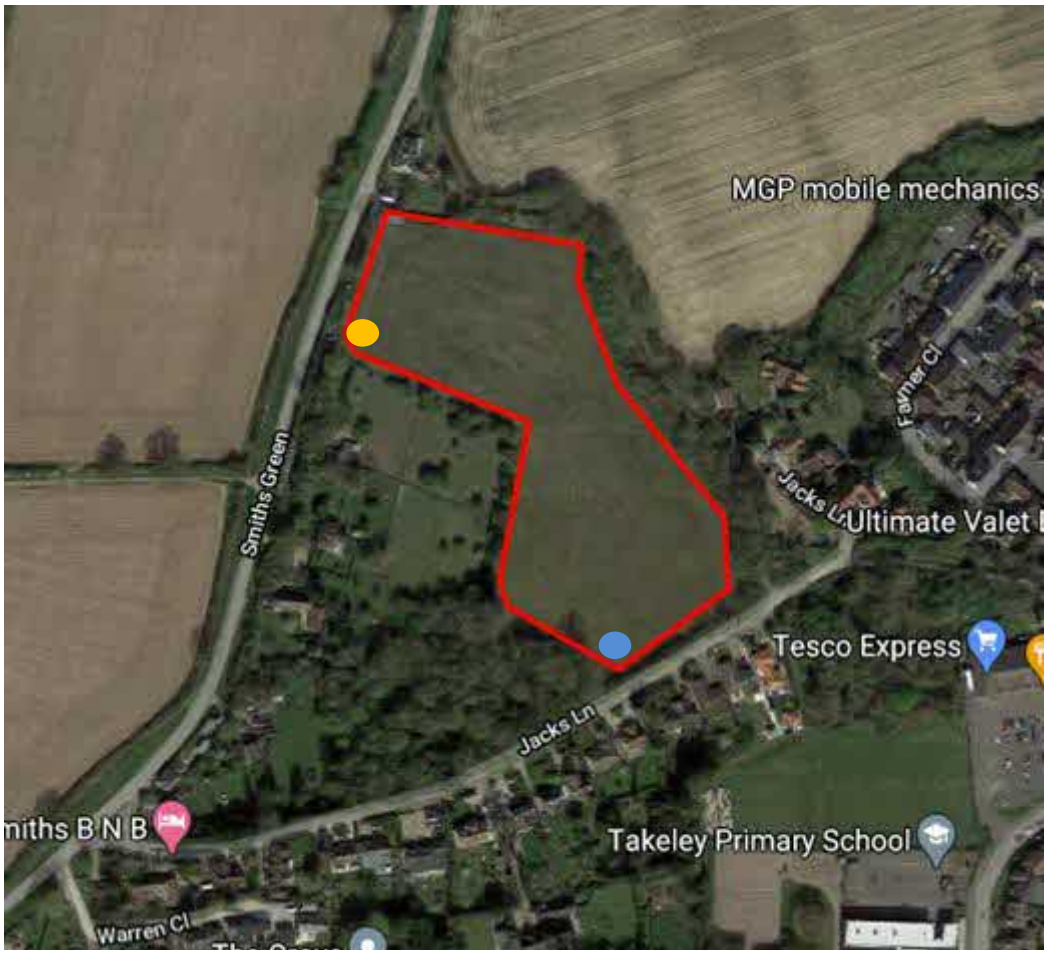

Figure 2 Site map (courtesy of Google Maps) with approximate measurement positions

Table 4 Noise Measurement Equipment

Equipment		Serial Number	Date of Calibration
Nor-1251	Calibrator	34436	15/06/2020
NTi Audio XL2	Sound Level Meter	A2A-17871-E0	24/09/2020
Sonitus System – EM2030-O	Sound Level Meter	00724	12/02/2021

As shown in Table 4, the sound level meter and calibrator had been calibrated within the previous year for the calibrator and within 2 years for the meter (at the time of survey was undertaken).

The noise survey and measurements were conducted in accordance with BS 7445-1:2003 'Description and measurement of environmental noise. Guide to quantities and procedures'.

Weather conditions throughout the entire noise survey period were noted to be between approximately -1-12° Celsius, clear to cloudy skies (30-90% cloud cover approximately) with a light wind (<5m/s). These weather conditions were checked against and confirmed by the use of the Met Office mobile application available on smart phone technology. These conditions were maintained throughout the majority of the survey period and are considered reasonable for undertaking environmental noise measurements.

The noise monitoring equipment was field-calibrated before and after the noise survey period. No significant drift was recorded. Equipment calibration certificates can be provided upon request.

4. Measurement Results

The results of the unattended noise measurements are summarised in the following tables. The measured raw data and graph showing the results of the unattended measurement is provided in Appendix 5.

Day and night-time ambient noise levels measured during the unattended survey are presented in Table 5.

Maximum noise levels during the unattended survey are presented in Table 6.

Table 5 Ambient noise levels measured during the unattended survey

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Tuesday 6th April	53.7*	45.5
Wednesday 7th April	54.3	47.5
Thursday 8th April	52.3	46.0
Friday 9th April	54.3	48.1
Saturday 10th April	51.9	-
Average	53.3	46.8

* Measurement not made over full period due to monitoring start and end time

Table 6 Maximum noise levels measured during the unattended survey

Date	Daytime (07:00 – 23:00) $L_{Afmax,16h}$ (dB)	Night (23:00 – 07:00) $L_{Afmax,8h}$(dB)
Tuesday 6th April	59.8*	52.3
Wednesday 7th April	59.5	49.0
Thursday 8th April	58.0	47.5
Friday 9th April	60.8	51.4
Saturday 10th April	58.8	-
Average	59.4	50.1

* Measurement not made over full period due to monitoring start and end time

The sound pressure levels recorded during the attended measurements are summarised in Table 7.

Table 7 Sound pressure levels from attended measurements

Start time	Sound pressure levels (dB)			Dominant noise sources
	$L_{Afmax,15min}$	$L_{Aeq,15min}$	$L_{A90,15min}$	
11:10	74.5	60.4	48.8	Road traffic from A120 and Smiths Green
11:25	62.5	51.9	47.6	
11:40	65.8	51.3	48.1	
11:55	67.5	51.4	47.8	
Average	67.6	55.8	48.1	

5. Design Criteria

Site Suitability for Residential Development

This section describes an assessment of facade sound insulation to control noise ingress. The required façade specification largely depends on the external noise levels and the internal noise criteria.

With appropriate sound insulation measures and building construction as exampled within this report, the site is more than capable of achieving the recommended internal noise levels inside the residential premises.

Local Authority requirements

The site lies within the jurisdiction of the Local Authority, Uttlesford District Council. The Local Authority refers to the standards set out for internal noise level in BS8233:2014, as outlined in Section 3.4.

At this site, the facade performance requirements are driven by the daytime ambient noise levels and the night time ambient noise levels.

Table 8 Façade Elevations Required Sound Insulation Performance

Period	Measured External Noise Level, dB	Internal Noise Level Requirement, dB	Minimum Sound Reduction Performance Requirement, dB SRI
Daytime (07:00 - 23:00)	55.8dB $L_{Aeq,16hour}$	35 $L_{Aeq,16hour}$	21
Night-time (23:00 - 07:00)	47dB $L_{Aeq,8hour}$	30 $L_{Aeq,8hour}$	17
Night-time (23:00 - 07:00)	50.1dB L_{AFmax}	45 L_{AFmax}	5

Non-glazed elements

The proposed residential developments will be of masonry construction. The construction is anticipated to provide a sound reduction performance of 57dB; the same performance would also be required for the roof construction to provide suitable sound insulation. The non-glazed elements spectral data is presented below in Table 9.

Table 9 Non-glazed elements assumed sound reduction performance

Element	Octave band centre frequency SRI, dB					
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
Non-glazed element SRI	36	40	41	45	52	52

Guidance on glazing, and ventilation strategy

The recommended glazing configuration and ventilation strategy is highlighted below in Table 10.

Table 10 Example glazing configurations and ventilation strategies for overall facade sound insulation

Overall facade sound insulation, R_w+C_{tr} (dB)	Example glazing configuration	Ventilation strategy
≤10	6 mm glass/16 mm cavity/6 mm glass	Open windows
10-15	6 mm glass/16 mm cavity/6 mm glass	Limited open area opening windows
15-27	6 mm glass/16 mm cavity/6 mm glass	Acoustically attenuated passive ventilation (eg, trickle vents)

A minimum of 25dB R_w+C_{tr} noise reduction is required for all glazed elements in habitable rooms at the premises. The performance is specified for the whole window unit, including the frame and other design features such as the inclusion of trickle vents. Glazing performance calculations have been based on achieving the measured ambient (L_{Aeq}) noise levels and for maximum (L_{Amax}) night-time noise levels as given in BS8233:2014.

The attenuation of sound provided by an open window is typically in the region of 10 to 15dB, depending on the open area. As such, where the required facade sound insulation performance is less than R_w+C_{tr} 10dB, it is likely that opening windows can be used for ventilation while achieving the necessary internal noise levels.

External Amenity Spaces

It is noted that external ambient noise levels at the rear of the site in the residential gardens generally comply with the WHO's 'Guideline for Community Noise' (2009) guideline values for external amenity space (55dB $L_{Aeq16hour}$) due to the development being outside of Stansted Airport's flight path highlighted in the noise exposure report from the Civil Aviation Authority (CAA).

BS8233:2014 states that 'for traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed an upper guideline value of 55dB L_{Aeq}, which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances…in higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited'.

6. Conclusions

Stansted Environmental Services (SES) Ltd has been commissioned by Weston Homes Plc to prepare, an Environmental Noise Assessment for the proposed development at Jacks Lane, Takeley, CM22 6NT.

An environmental noise survey has been carried out by Stansted Environmental Services (SES), to establish the existing noise levels from road traffic, pedestrians and other significant noise sources in the area.

To provide suitable conditions for the proposed residential developments and minimise noise related impacts, it is necessary to achieve suitable internal ambient noise levels to meet BS8233:2014 recommendations.

A minimum of 25dB R_w+C_{tr} noise reduction is required for all glazed elements in habitable rooms at the premises. Example specifications with minimum sound reduction index figures are provided for the new glazing proposals. The performance is specified for the whole window unit, including the frame and other design features such as the inclusion of trickle vents.

With the implementation of the controls stated above, the required internal and external noise levels can be achieved as referred to in BS8233:2014 and noise should not be a concern for the development of the site.

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7. Appendices

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Appendix 1 – Glossary of Acoustics Terminology

Noise

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20Hz to 20,000Hz and over the audible range of 0dB (the threshold of perception) to 140dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features, such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the "A"-Weighting Scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc, according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a channel guide a 10dB(A) increase can be taken to represent a doubling of loudness, whilst an increase of 3dB(A) in generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

An indication of the range of sound levels commonly found in the environment is given in the table.

Typical Sound Levels found in the Environment

Sound Level	Location
0dB(A)	Threshold Hearing
20-30dB(A)	Quiet Bedroom at night
30-40dB(A)	Living Room during the day
40-50dB(A)	Typical Office
50-60dB(A)	Inside a Car
60-70dB(A)	Typical High Street
70-90dB(A)	Inside a Factory
90-100dB(A)	Burglar Alarm at 1m away
100-110dB(A)	Jet Aircraft on Takeoff
140dB(A)	Threshold of Pain

Terminology

dB(Decibel)	The scale on which sound pressure level is expressed. It is defined as 20 x the logarithm of the ratio between the ratio route mean square pressure of the sound field and a reference pressure ($2x10^{-5}$Pa)
dB(A)	A-Weighted Decibel. This is measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. A-Weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur which may have little effect on the overall L_{eq} noise level but will still effect the noise environment. Unless described otherwise, it is measured using the fast sound level meter response.
L_{Cpeak}	The absolute highest sound pressure of the noise signal of either the positive or negative part of the sound with a 'C' weighting. 'C' weighting is the frequency response often used to measure very high noise levels.
L_{10} and L_{90}	If a non-steady noise is to be described it is necessary to know both its level and degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the average maximum level. Similar L_{90} is the average minimum level and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
Free Field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Fast	A time weighting used in the route mean square section of a sound level meter with a 125milisecond time constraint.
Slow	A time weighting used in the route mean square section of a sound level meter with a 1000milisecond time constant.
R_w	A single-number quantity which characterises the airborne sound insulation of a material or building element over a range of frequencies.
C_{tr}	A-weighted urban traffic noise spectrum.

Appendix 2 – Limitations to this Report

Notes on limitations

This report has been prepared for the titled project or named part thereof and should not be used in whole or part and relied upon for any other project without the written authorisation of Stansted Environmental Services Ltd. Stansted Environmental Services Ltd, accept no responsibility or liability for the consequences of this document if it is used for a purpose other than that for which it was commissioned. Persons wishing to use or rely upon this report for other purposes must seek written authority to do so from the owner of this report and oblique all Stansted Environmental Services Ltd, and agree to indemnify Stansted Environment Services Ltd for any and all loss or damage resulting there from. Stansted Environment Services Ltd accepts no responsibility or liability for this document to any other party other than the person by whom it was commissioned.

The findings and opinions are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations, Stansted Environment Services Ltd, reserve the right to review the information, reassess any new potential concerns and modify our opinions accordingly.

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Appendix 3 – Stansted Airport noise contours

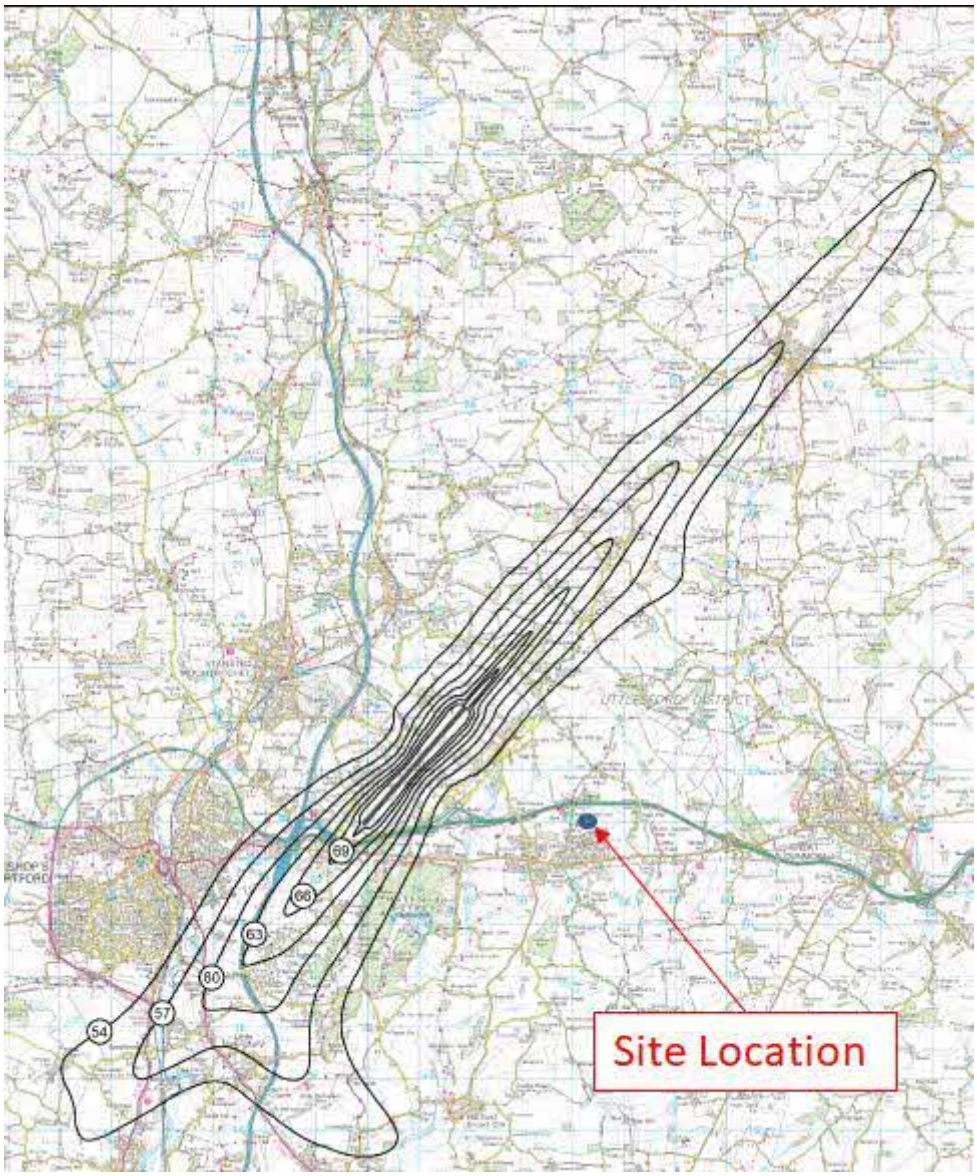

Figure 3 Stansted 2019 summer day actual modal split (75% SW / 25% NE) Leq contours

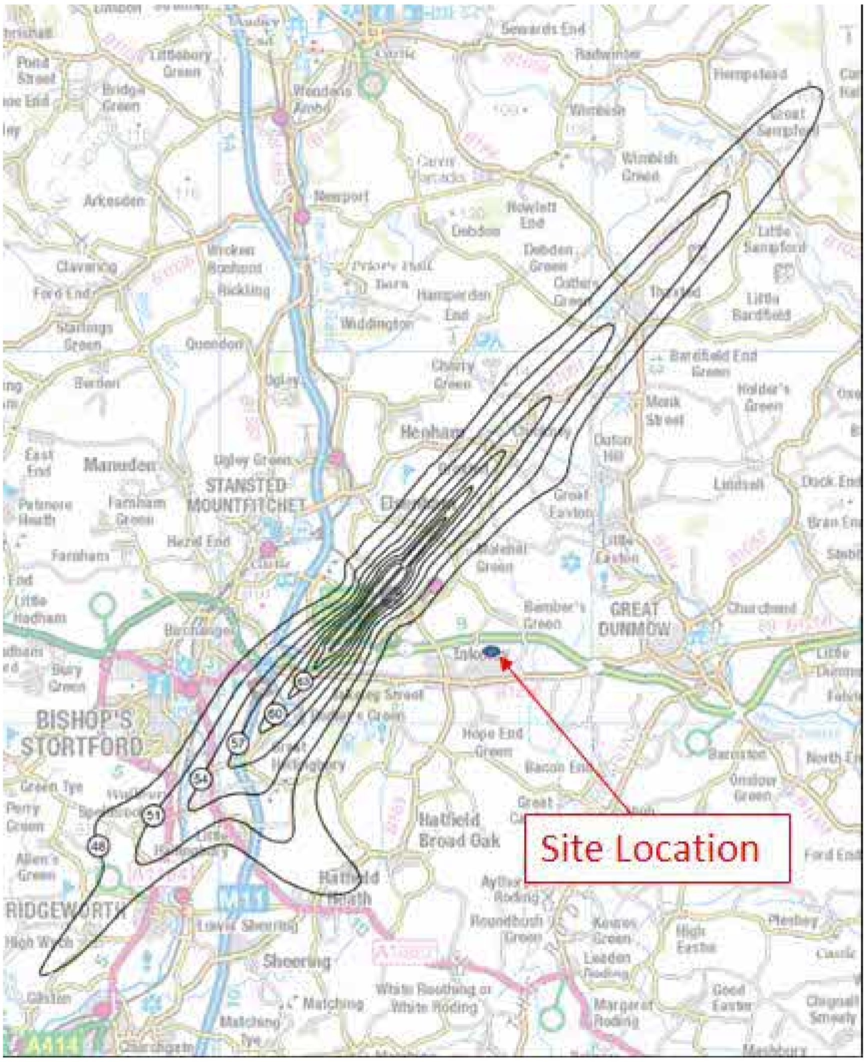

Figure 4 Stansted 2019 summer night actual modal split (75% SW / 25% NE) Leq

Appendix 4 – Proposed Site Plan

Figure 5 Proposed Plans for Jacks Lane

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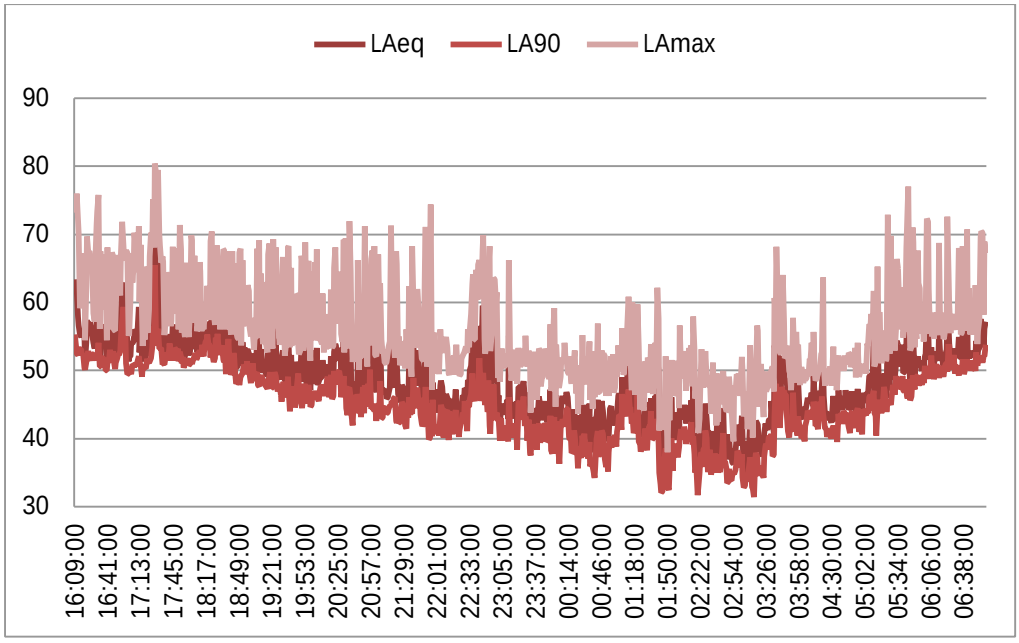
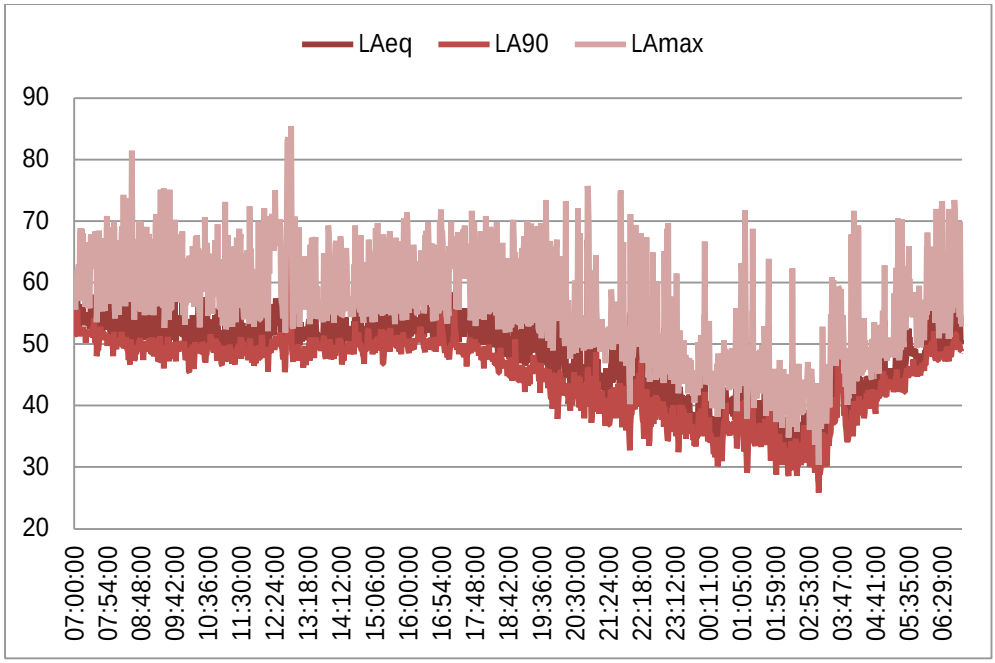
Appendix 5 – Noise Monitoring Data

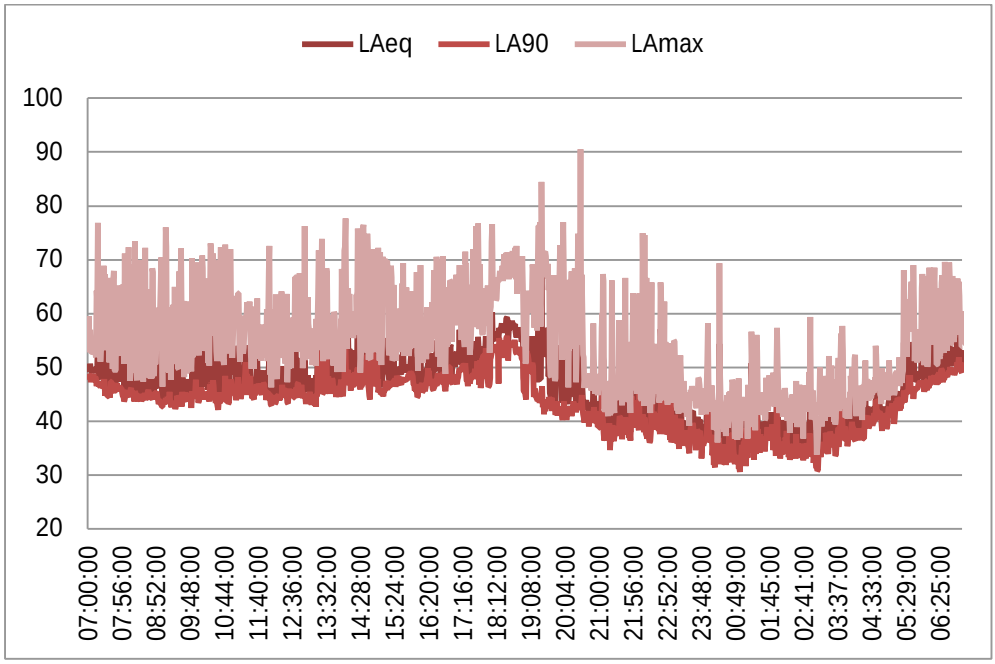
Graphical representation of the noise levels on the 6th/7th April 2021



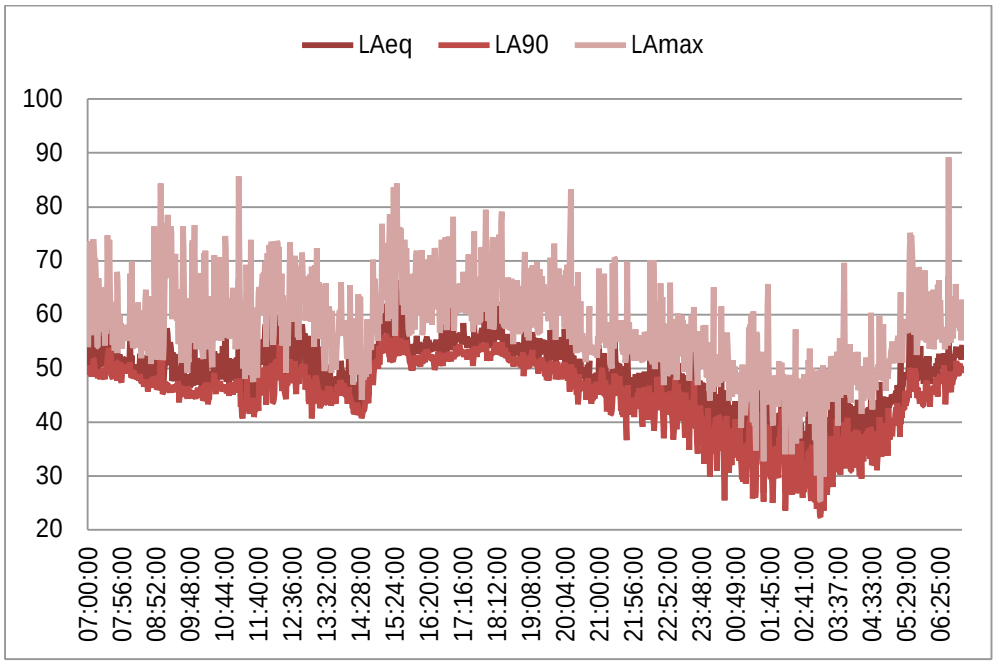
Graphical representation of the noise levels on the 7th/8th April 2021



Graphical representation of the noise levels on the 8th/9th March 2021



Graphical representation of the noise levels on the 9th/10th March 2021



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