Air & Acoustic Consultants

Glenalmond Developments Ltd

Hill lane, Markfield

Noise Assessment

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Document Control			Final		
Prepared:	Reviewed:	Authorised:	Project No.:	Revision:	Issue Date:
LM	DS	DS	100376-B	[00]	26/11/2025

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Executive Summary

This noise assessment has been produced in support of an outline planning application for a residential development located on land at Hill Lane, Markfield.

Sound level measurements have been conducted over an 8-day period at the application site to measure ambient sound levels and sound propagation modelling has need undertaken which forms the basis of this residential noise assessment. The site is predominantly affected by road traffic noise from the nearby M1 Motorway to the southwest of the site and industrial noise to west of the site.

The assessment has concluded that while predicted noise levels show a large proportion of the site will not experience any adverse impacts, some noise mitigation measures are likely to be required at the western boundaries of the site. A suitably implemented mitigation strategy will ensure that noise levels are reduced to less than the relevant criteria and that acceptable acoustic conditions are achieved across the proposed site. The detailed design should follow the principles of 'good acoustic design' with collective sustainable measures being considered before alternative measures such as closed windows and façade enhancements.

With the inclusion of appropriate mitigation measures and following the principles of 'good acoustic design' it would be possible to minimise or remove the adverse noise impacts.

The noise from the industrial site adjacent to the eastern site boundary could have an adverse impacts on the closest receptors, however a scheme of mitigation can be used to ensure that the resulting noise levels achieve the relevant criteria.

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1 Introduction

1.1 Brief

1.1.1 Air & Acoustic Consultants Limited have been commissioned by Glenalmond Developments Ltd to undertake a noise impact assessment in support of an outline planning application for a proposed residential development located on land off Hill Lane, Markfield

1.2 Application Site

1.2.1 The site is located on the northwestern urban edge of Markfield, in an area of agricultural land that borders existing residential areas. Directly northwest of the site is Hill Lane followed by an industrial estate that only operates during the daytime, further to the west of this is agricultural land. North of the site are a number of residential dwellings that front onto Ashby Road, and beyond this is the A50. South of the site is covered by agricultural land and the Hill Hole Nature Reserve. The east part of the proposed site fills a gap in the existing residential area behind Ashby Road, The Elms and Upland Drive.

1.2.2 The national grid reference for the centre of the site is, SK 48700 10520 (British National Grid Coordinates E: 448700 , N: 310520). The site location and surrounding area is illustrated in Figure 1.1.

Figure 1.1: Site Location

1.3 Development Proposals

1.3.1 The application is for Outline Permission for a residential development and is shown below in Figure 1.2.

Figure 1.2: Site Layout

1.4 Assessment Scope

1.4.1 This assessment will consider the potential noise impacts of the existing noise environment on the proposed residential development.

1.4.2 To assist with the understanding of this report a glossary of acoustic terms is provided in Appendix A.

2 Legislation and Policy Context

2.1 Introduction

2.1.1 The prediction and assessment of the potential noise impacts on the proposed development have been considered against the relevant legislation policy and guidance regarding noise, which are discussed in turn below.

2.2 National Planning Policy Framework (NPPF)[1]

2.2.1 The NPPF sets out the Government's planning policy for England, to help achieve sustainable development within the planning sector. The planning system has three overarching objectives, one of which (Paragraph 8c) is an environmental objective:

> *"To protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy".*

2.2.2 The NPPF addresses noise as a planning issue primarily through the statements in paragraphs 187 and 198. It is also noted that paragraph 200 is linked to noise through the agent of change principle.

2.2.3 Paragraph 187 states:

> *'Planning policies and decisions should contribute to and enhance the natural and local environment by:'*
>
> *'e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.'*

2.2.4 Paragraph 198 states:

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

2.2.5 Paragraph 200 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,*

[1] Ministry of Housing, Communities and Local Government. 2024. *National Planning Policy Framework.*

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.'

2.2.6 The NPPF refers to the Noise Policy Statement for England (NPSE) for advice on the achievement of these policy aims, and particularly in connection with the explanation of 'adverse impacts.

2.3 Noise Policy Statement for England (NPSE)[2]

2.3.1 The NPSE is the overarching government policy on noise. It seeks to clarify the underlying principles and aims in past and existing policy documents, legislation, and guidance in relation to all forms of noise including environmental noise, neighbour noise and neighbourhood noise (but not noise in the workplace).

2.3.2 It uses the established concepts of No Observed Effect Level (NOEL) and Lowest Observed Adverse Effect Level (LOAEL). The NPSE extends these by introducing Significant Observed Adverse Effect Level (SOAEL), this is the level above which significant adverse effects on health and quality of life occur. However, the explanatory note to the NPSE states that it is not possible to identify a single objective value to define the SOAEL for noise that is applicable to all sources of noise in all situations. It is likely to be different for different noise sources, for different receptors and at different times.

2.3.3 The NPSE's vision is to:

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

This long-term vision is supported by the following aims:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life, through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development."*

2.3.4 The second aim of the NPSE refers to noise impacts that lie somewhere between LOAEL and SOAEL. The NPSE asserts that, while this means that all reasonable steps should be taken to mitigate and minimise adverse effects, this does not mean that such adverse effects cannot occur.

2.4 Planning Practice Guidance (Noise)[3]

2.4.1 The Government has published Planning Practice Guidance on a range of subjects including noise. The guidance forms part of the NPPF and provides advice on how to deliver its policies. The PPG (Noise) reiterates general guidance on noise policy and assessment methods provided in the NPPF, NPSE and

[2] Department for Environment, Food and Rural Affairs. 2010. *Noise Policy Statement for England*.

[3] Department for Levelling Up, Housing and Communities and Ministry of Housing Communities and Local Government. 2019. *Planning Practice Guidance Noise*

British Standards and contains examples of acoustic environments commensurate with various effect levels.

2.4.2 Paragraph 006 of (Reference ID: 30-006-20190722) of the PPG (Noise) explains that:

> *"The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation."*

2.4.3 Paragraph 004 Reference ID: 30-004-20190722 of the PPG (Noise) describes the different effect levels which are defined and briefly outlined below:

- No Observable Effect Level (NOEL);
- Lowest Observable Adverse Effect Level (LOAEL); and
- Significant Observed Adverse Effect Level (SOAEL).

2.4.4 The PPG (Noise) describes noise that is not noticeable as representing the NOEL. Noise exposures in this range are below the LOAEL and no mitigation is required. The PPG (Noise) suggests that noise exposures above the LOAEL cause small changes in behaviour. Examples of noise exposures above the LOAEL provided in the PPG (Noise) are having to turn up the volume on the television; needing to speak more loudly to be heard; or, where there is no alternative ventilation, closing windows for some of the time because of noise. In line with the NPPF and NPSE, the PPG (Noise) states that consideration needs to be given to mitigating and minimising effects above the LOAEL, but also to taking account of the economic and social benefits being derived from the activity causing the noise. The PPG (Noise) suggests that noise exposures above the SOAEL cause material changes in behaviour. Examples of noise exposures above the SOAEL provided in the PPG (Noise) are, where there is no alternative ventilation, keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. In line with the NPPF and NPSE, the PPG (Noise) states that effects above the SOAEL should be avoided and that whilst the economic and social benefits derived from the activity causing the noise must be taken into account, such exposures are undesirable.

2.4.5 The non-numeric guidance contained within the PPG (Noise), based upon the starting point in the NPSE, is summarised in Table 2.1 below.

Table 2.1: Summary of Guidance from NPSE and PPG (Noise)

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Adverse Effect Level			
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required

Perception	Examples of Outcomes	Increasing Effect Level	Action
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and / or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and / or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening, and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and / or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation / awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

2.4.6 In line with the NPPF and the NPSE, the guidance confirms that significant adverse effects should be avoided. At the next level down in the hierarchy, where there is an observed adverse effect, the PPG (Noise) confirms that effects should be mitigated and reduced to a minimum, as far as reasonably practicable. No mitigation measures are required for effects that are considered to be below LOAEL.

2.4.7 However, along with the NPSE it does not provide any numerical definition of the NOEL, LOAEL and SOAEL.

2.4.8 The NPSE also refers to the World Health Organisation, (WHO) when discussing noise impacts. The WHO Guidelines for Community Noise (1999) suggest guideline values for internal noise exposure which takes into consideration the identified health effects and are set, based on the lowest effect levels for the general population. Guideline values for amenity which relate to external noise exposure are set with an upper guideline criterion level of 55 dB(A) $L_{Aeq,16hour}$ and a desirable criterion level of 50 dB(A) $L_{Aeq,16hour}$, representing daytime levels below which most of the adult population will be protected from becoming moderately or seriously annoyed, respectively.

2.5 The Control of Pollution Act[4]

2.5.1 The Control of Pollution Act (1974) gives local authorities powers in relation to noise from construction sites, including to serve a notice under Section 60 specifying exactly how works should be carried out.

[4] UK Public General Acts. 1974. *Control of Pollution Act*.

2.5.2 An application for prior consent for the work can be completed under Section 61 of the Act providing a collaborative approach to the construction works.

2.5.3 A Section 61 application demonstrates to the local authority a pro-active approach to reducing environmental impacts and outlines what methods are in place to minimise disruption to the neighbourhood, thus reducing the number of potential complaints. By having a Section 61 consent, a local authority may not issue a Section 60 notice if the terms of the Section 61 agreement are not breached. Having a Section 61 consent in place minimises the likelihood of the contractor's work being stopped because a mitigation plan is already in place.

2.6 Local Planning Policy

Hinckley & Bosworth Core Strategy 2006 - 2026[5]

2.6.1 The Hinckley & Bosworth Core Strategy sets out the strategy for development across the Borough over the period 2006 to 2026. The document was adopted at a meeting of the full council in December 2009.

2.6.2 Upon review of the core strategy it is apparent that there is no mention of noise related policy. Despite this the assessment will be carried out with experience with other local planning policies.

Site Allocations & Development Management Policies DPD 2016[6]

2.6.3 The Hinckley and Bosworth Site Allocations & Development Management Policies DPD sets out clear guidelines for land use, development, and growth management within the borough. It identifies key sites for development and includes policies that govern how these sites should be developed, ensuring that the growth of the area is aligned with broader sustainability, environmental, and community objectives.

2.6.4 The following policies related to noise are as follows:

"DM2. Delivering Renewable Energy and Low Carbon Development

a) All reasonable steps have been taken to avoid or mitigate any adverse impacts including, but not limited to, landscape, noise, visual and cumulative impacts; and."

[...]

"DM7 Preventing Pollution and Flooding

d) It would not cause noise or vibrations of a level which would disturb areas that are valued for their tranquillity in terms of recreation or amenity"

[...]

"DM10 Development and Design

a) It would not have a significant adverse effect on the privacy and amenity of nearby residents and occupiers of adjacent buildings,

[5]Hinckley & Bosworth Council – December 2009 – Core Strategy
[6]Hinckley & Bosworth Council – July 2016 - Site Allocations and Development Management Policies DPD

including matters of lighting, air quality (including odour), noise, vibration and visual intrusion;"

Markfield Parish Neighbourhood Plan 2020-2039[7]

2.6.5 The Markfield Parish Neighbourhood Plan is a local planning document that outlines its future development and growth. The plan sets out policies for land use, development, housing, the environment, and community services. The goal is to ensure that future growth meets the needs of residents while preserving the character of the area.

2.6.6 The policies related to noise are as follows:

"M10. Design

5. The amenities of residents in the area should not be significantly adversely affected, including by loss of daylight/sunlight, privacy, air quality, noise and light pollution;"

[7]Hinckley & Bosworth Council – May 2017 – Markfield Parish Neighbourhood Plan

3 Assessment Approach

3.1 Construction Impacts

BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise[8]

3.1.1 BS 5228-1:2009+A1:2014 provides guidance on the prediction and assessment of noise from construction sites and other open sites where activities generate significant noise levels, such as quarries.

3.1.2 Site noise can have disturbing effects on the surrounding neighbourhood. The effects are varied and are complicated further by the nature of the site works, which will be characterised by varied noise sources which will change location throughout the construction works or operations. The duration of site operations is also an important consideration; higher noise levels may be acceptable if it is known that the levels will only occur for a limited period and affected receptors are warned.

3.1.3 BS 5228-1:2009+A1:2014 provides significance criteria for assessing the potential noise impacts associated with the construction phase of projects. There are two methods specified; the ABC method and the 5 dB(A) change method.

3.1.4 The ABC method involves categorising receptors using the ambient sound levels they experience, using the method and categories outlined in Table 3.1.

Table 3.1: BS 5228-1 ABC Method

Assessment category and threshold value period	Threshold value, in decibels (dB) ($L_{Aeq,T}$)		
	Category A [A]	Category B [B]	Category C [C]
Night-time (23:00-07:00)	45	50	55
Evenings and weekends	55	60	65
Daytime (07:00-19:00) and Saturdays (07:00-13:00)	65	70	75
Notes: 1) A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level 2) If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise. 3) Applied to residential receptors only			
[A] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. [B] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. [C] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values. [D] 19:00-23:00 weekdays, 12:00-23:00 Saturdays and 07:00-23:00 Sundays			

[8] BSI. *BS 5228-1:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites. Part 1: Noise.*

3.1.5 The 5 dB(A) change method assesses the change in noise levels as a result of the construction works. It states;

> *"Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB $L_{Aeq,T}$ from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect.*
>
> *These evaluative criteria are generally applicable to the following resources:*
>
> - *residential buildings;*
> - *hotels and hostels;*
> - *buildings in religious use;*
> - *buildings in educational use;*
> - *buildings in health and/or community use.*
>
> *For public open space, the impact might be deemed to cause significant effects if the total noise exceeds the ambient noise ($L_{Aeq,T}$) by 5 dB or more for a period of one month or more. However, the extent of the area impacted relative to the total available area also needs to be taken into account in determining whether the impact causes a significant effect."*

3.1.6 The document also contains a calculation method to estimate noise levels from sites. This accounts for fixed or stationary equipment and considers propagation losses from factors including distance, ground absorption and barriers. The noise level predicted at receptors is an equivalent continuous A-weighted sound pressure level $L_{Aeq,T}$ with corrections to account for times when individual pieces of equipment are not in use.

3.2 Operational Impacts

Professional Practice Guidance on Planning & Noise, New Residential Development[9]

3.2.1 The Professional Practice Guidance on Planning & Noise (ProPG), prepared jointly by the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH), seeks to secure good acoustic design for new residential development within England's planning system.

3.2.2 The guidance includes a framework to enable situations where noise is not an issue to be clearly determined, and to help identify the extent of risk at noisier sites. However, the guidance does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy.

3.2.3 The scope of the guidance is also restricted to sites that are exposed predominantly to noise from transportation sources. Where industrial or commercial noise is present on the site but is "not dominant", its contribution may be included in the noise level used to establish the degree of risk. Where industrial or commercial noise is present on the site and is considered to be "dominant", then the risk assessment

[9] Association of Noise Consultants, Institute of Acoustics, Chartered Institute of Environmental Health. 2017. *ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development*

should not be applied to the industrial or commercial noise component and regard should be had to the guidance in BS 4142:2014+A1:2019.

3.2.4 The ProPG advocates a 2-stage approach covering:

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

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

1. Demonstrating a "Good Acoustic Design Process";
2. Observing internal "Noise Level Guidelines";
3. Undertaking an "External Amenity Area Noise Assessment"; and
4. Consideration of "Other Relevant Issues".

3.2.6 The overall approach is underpinned by the preparation of an "Acoustic Design Statement" (ADS), for which guidance is contained in ProPG Supplementary Document 2, Good Acoustic Design. An ADS for a site assessed as high risk should be more detailed than for a site assessed as low risk, and an ADS should not be necessary for a site assessed as negligible risk. The ProPG's Supplementary Document 1, Planning & Noise Policy Guidance provides additional information regarding other planning guidance.

3.2.7 The site's day and night-time noise exposures are used to define whether the site falls into a negligible, low, medium, or high-risk noise category. A site considered to be negligible risk is likely to be acceptable from a noise perspective and need not normally be delayed on noise grounds.

3.2.8 Elements 1 and 2 of the Stage 2 assessment use the noise levels at new dwellings to determine good acoustic design, which aims to avoid 'unreasonable' acoustic conditions and prevent 'unacceptable' acoustic conditions. The internal noise level guidelines used by ProPG are largely those previously set out under BS 8233:2014, reproduced in Table 3.2, however with some additional guidance intended to assist with the determination of 'unreasonable' and 'unacceptable' acoustic conditions.

3.2.9 In addition to the risk assessment guidance, it is advised that in noise sensitive rooms the night-time noise level should not exceed 45 dB L_{AFmax} more than ten times is used to restrict exposure to individual events with high noise levels.

3.2.10 Element 3 of the ProPG's Stage 2 assessment is applicable to external amenity area noise assessments and similarly extends the current guidance applicable to outdoor areas in the following manner:

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

- 3(v) Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially offset if the residents are provided, through the design of the development or the planning process, with access to:
- a relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or
- a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different, protected, location); and/or
- a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or
- a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5-minute walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations.

3.2.11 The final element of Stage 2 is an assessment of other relevant issues, which may include the following matters:

- 4(i) Compliance with relevant national and local policy;
- 4(ii) Magnitude and extent of compliance with ProPG;
- 4(iii) Likely occupants of the proposed development;
- 4(iv) Acoustic design vs unintended adverse consequences; and
- 4(v) Acoustic design vs wider planning objectives.

3.2.12 Upon completion of the ProPG's Stage 1 and 2 assessments, the findings should enable one of four possible recommendations to be presented to the decision maker, i.e. to the Local Planning Authority (LPA), namely, to grant permission without conditions, grant with conditions, 'avoid' or 'prevent'.

BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound[10]

3.2.13 BS 4142:2014+A1:2019 is used to rate and assess sound of an industrial and/or commercial nature including:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and;
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

3.2.14 The purpose of the assessment procedure is to determine the likelihood and significance of any potential impacts that may result from sound of an industrial and/or commercial nature.

[10] BSI. *BS 4142:2014+A1:2019. Methods for rating and assessing industrial and commercial sound.*

3.2.15 BS 4142:2014+A1:2019 defines noise from industrial sources at the assessment location as the specific sound level and this is the term used in this report to refer to noise which occurs currently or is predicted to occur due to commercial or industrial operations.

3.2.16 Certain acoustic features can increase the significance of impacts over those expected from a simple comparison between the specific sound level and the background sound level. BS 4142:2014+A1:2019 includes allowances for a rating penalty to be added if the specific sound level contains tonal, impulsive or intermittent characteristics. There is also an allowance for features that are neither tonal, impulsive or intermittent but are readily distinctive. After any applicable penalties have been added to the specific noise level the result is termed the rating level.

3.2.17 The difference between the rating level and the background sound level provides an initial assessment of the magnitude of the noise impacts for affected noise sensitive receptors. The assessment criteria given by BS 4142:2014+A1:2019 are as follows:

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

3.2.18 During the daytime, BS 4142:2014+A1:2019 requires that noise rating levels be assessed over 1-hour periods. However, during the night-time, noise rating levels are required to be assessed over 15-minute periods.

3.2.19 Where the initial estimate of the impact needs to be modified due to context, BS 4142:2014+A1:2019 states that all pertinent factors should be taken into consideration, including:

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound; and

3.2.20 The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or external acoustic conditions.

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings[11]

3.2.21 BS 8233:2014 draws on the results of research and experience to provide information on the design of buildings to provide internal acoustic environments appropriate to their functions. It deals with control of noise from outside of the building, noise from plant and services within it, and room acoustics in non-critical situations.

3.2.22 BS 8233:2014 defines a range of indoor ambient noise levels for spaces when they are unoccupied. A summary of the noise levels recommended in BS 8233:2014, for rooms used for resting and sleeping,

[11] BSI. *BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.*

has been replicated in Table 3.2 below and represents levels for sources without a specific acoustic character.

Table 3.2: Desirable Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq, 16hour}$	-
Dining	Dining room	40 dB $L_{Aeq, 16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16hour}$	30 dB $L_{Aeq, 8hour}$
External Noise	Amenity Spaces	50 – 55 dB $L_{Aeq, 16hour}$	-

3.2.23 BS 8233:2014 provides the following guidance regarding acceptable noise levels in external amenity areas:

> *"7.7.3.2 Design criteria for external noise*
>
> *For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised 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."*

3.2.24 The values shown in Table 3.2, above, are generally regarded as the LOAEL for steady sound, i.e. no adverse impacts due to the sound would be expected if noise levels fall below these values. If the sound has certain characteristics, it could be appropriate to consider a lower value as the LOAEL.

3.2.25 BS 8233:2014 also states that:

> *"Where development is necessary or desirable the internal target levels can be relaxed by up to 5dB and reasonable internal conditions achieved."*

3.2.26 BS 8233:2014 contains examples of how to calculate internal sound levels for residential properties affected by external noise sources. The simple method involves a subtraction of the window performance in R_w from the external sound levels to attain an internal sound level and this can be acceptable when the resulting internal sound levels are more than 5 dB lower than the sound level criteria. Where this is not the case the guidance provides a rigorous method of calculating internal sound levels which uses sound insulation performance data for all façade elements and the acoustic effects of the room itself. The rigorous method is suitable for line sources such as roads.

World Health Organisation Guidelines for Community Noise[12]

3.2.27 The WHO Guidelines for Community Noise defines community noise as noise from all sources other than noise from industrial workplaces. While not stated explicitly in the document it is assumed that noise from

[12] World Health Organisation. 1999. *Guidelines for Community Noise*.

wildlife is not included in this definition. High levels of community noise can have adverse physiological effects including hearing impairment, sleep disturbance and mental illness.

3.2.28 The WHO guidelines indicate that sound pressure levels at the outside façades of living spaces should not exceed 60 dB L_{AFmax} so that people may sleep within bedrooms with windows open. These values assume the noise reduction with a window partially open is 15 dB, resulting in an internal noise level of 45 dB L_{AFmax}. The guidelines state that for good sleep, indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10 – 15 times per night. It is generally accepted that 60 dB L_{AFmax} at the façade represents a LOAEL.

3.3 Noise Modelling Inputs

3.3.1 The potential levels of sound from the operational development have been predicted across the site using the environmental noise modelling software CadnaA. Noise modelling details and inputs that have been used in the assessment are provided in Table 3.3.

Table 3.3: Noise Modelling Inputs and Details

Noise Modelling Input	Details
Software Version	CadnaA 2025 Version
Calculation Algorithm	ISO9613 and CRTN
Ground Levels	Defra Lidar 2 m resolution
Noise Sources	Measured on-site by AAC
Time Periods	Daytime 07:00 – 23:00 and Night-time 23:00 – 07:00
Illustrative Site Layout	N/A
Existing Building and Receptor Locations	Digitised from Google aerial imagery
Existing Feature Locations and Base Map	Google aerial imagery
Ground Absorption	0.0 for hard ground, 1.0 for soft ground
Project Co-ordinate System	OSGB 36 EPSG:27700

3.4 Uncertainty and Limitations

3.4.1 The baseline noise survey was conducted over an 8-day period to obtain a representative sample of the baseline noise environment. Baseline surveys conducted over a number of days reduce the uncertainty of the resulting measured noise levels.

3.4.2 The sound levels were measured during September 2025 which may mean that activities that occur more in colder times of the year, such as noise from heating systems, are excluded, while the reduction in vegetation during winter months would affect noise attenuation across the site.

3.4.3 All equipment was within laboratory calibration in accordance with the relevant standards (calibrators every year and sound level meters every 2 years).

3.4.4 Predictions have been made using the sound propagation software CadnaA, which is an industry standard and incorporates the required national standards for sound propagation. The propagation predictions have been made using CRTN and ISO9613. These methods have inherent errors, but this has been minimised as far as possible by ensuring all relevant features in the noise model are accurately captured. The ISO 9613 algorithm as implemented by CadnaA states a variation of ±3 dB for sources

and receptors with height above ground of between 0 m and 5 m for separation distances of up to 1000 m, which is relevant to this assessment because all noise contour grids produced are less than 5 m above the ground. The estimated error is for propagation with no reflections and no screening, the noise model contains buildings which reflect and screen the noise sources so the calculation error could be greater than ±3 dB.

3.4.5 The locations of existing buildings and features have been digitised from aerial imagery which is georeferenced to the WGS 84 system so all features are the correct distance from each other and are at a consistent scale, the conversion from WGS 84 to OSGB 36 typically has a maximum error of 1 metre.

3.4.6 The topography data used for the surrounding area is Defra Lidar data with a resolution of 2 metres, which captures small changes in topography.

3.4.7 In summary, it is considered that whilst there will always be a level of inherent uncertainty in any assessment, where possible, potential sources of uncertainty have been minimised and it is considered to be a representative and robust assessment of the likely impacts.

4 Baseline Conditions

4.1 Noise Survey Details

4.1.1 A baseline noise survey was undertaken between Tuesday the 23rd of September and Monday the 1st of October 2025. The survey consisted of 2 long-term measurement positions, as illustrated in Figure 4.1 and detailed below:

- L1 – southwestern border of the site, unattended long-term;
- L2 – northeastern border of the site, unattended long-term; and

4.1.2 Measurement location L1 was chosen to capture road traffic noise from the M1 Motorway while measurement location L2 were chosen to capture background noise levels for the industrial estate assessment.

Figure 4.1: Measurement Locations

4.1.3 All measurements were taken using class 1 sound level meters. The microphones' measurement positions were in the acoustic free field and were mounted on monopods at 1.5 metres above the ground. The details of the survey equipment used is set out in Table 4.1.

Table 4.1: Noise Survey Equipment

Equipment Type	Manufacturer	Model	Serial Number	Calibration Due
Sound Level Meter	Larson Davis	Model Lxt1	7375	07/2027
Pre-Amplifier		PRMLxT1L	77731	
Microphone		377BO2	347791	
Sound Level Meter	Larson Davis	Model Lxt1	5818	02/2027
Pre-Amplifier		PRMLxT1	55726	
Microphone		377BO2	311751	
Calibrator	Larson Davis	Cal 200	17574	11/2025

*SLMs are calibrated every 2 years, and sound calibrators are calibrated every year

4.1.4 Calibration checks were performed at the start and end of the survey. The calibration deviation over the course of the survey is set out in Table 4.2 and the recorded deviations are small enough that the data can be considered reliable.

Table 4.2: Calibration Deviation Recorded in Sound Level Meters During Survey Period

Sound Level Meter Serial Number	Calibration Deviation on Collection (dB)
5818	-0.22
7375	0.05

4.2 Weather Conditions

4.2.1 The weather conditions during the survey were generally influenced by low-speed winds under 5 m/s with a generally east-northeast direction for the survey period. The average daily temperature stayed between 11 °C and 13 °C for the whole survey period. There was a small amount of precipitation recorded on two days during the survey.

4.2.2 The information provided in Table 4.3, uses data provided by Weather Underground at a weather station in Markfield (station ID –IMARKF2).

Table 4.3: Summary of Weather Conditions

Date	Temp (°C)	Wind Speed (m/s)		Wind Direction	Total Precipitation (mm)
		Average	Peak		
23/09/2025	11.2	0.0	1.1	NE	0.0
24/09/2025	11.5	0.1	1.6	NE	0.0
25/09/2025	12.4	0.1	1.5	NE	0.0
26/09/2025	10.9	0.0	0.8	NE	0.0
27/09/2025	11.6	0.4	3.0	SSW	0.0
28/09/2025	13.1	0.4	3.1	WSW	11.2
29/09/2025	10.8	0.3	3.4	West	0.0
30/09/2025	11.7	0.4	2.9	WSW	0.0

Date	Temp (°C)	Wind Speed (m/s)		Wind Direction	Total Precipitation (mm)
		Average	Peak		
01/10/2025	12.9	0.5	3.8	WSW	0.5

4.2.3 Windy or rainy conditions may affect the measured sound levels, increasing them above what is normally created by the existing noise sources. Periods with rainfall rates greater than 0.5 mm/h or periods where wind speeds exceeded 5 m/s will likely affect results and have been excluded from the final results. Table 4.4 shows the periods of time excluded from the noise measurements.

Table 4.4: Periods Excluded from Noise Measurements Due to Weather Conditions

Date and Time Start	Date and Time End	Reason for Removal
28/09/2025 02:30	28/09/2025 03:30	Heavy Rainfall
28/09/2025 04:30	28/09/2025 07:45	Heavy Rainfall
01/10/2025 08:15	01/10/2025 09:15	Heavy Rainfall

4.3 Unattended Sound Measurement Results

4.3.1 A summary of the long-term sound levels measured at L1 is presented in Table 4.5. The data is presented as average levels for the daytime and night-time periods calculated from 15-minute sound indices.

Table 4.5: Noise Measurement Results – L1, Unattended Long-Term

Date	Period	Equivalent Continuous Sound Pressure Level (dBA)		
		$L_{eq,T}$	Standard Deviation	Range
23/09/2025	Day 07:00 - 23:00	52.8	1.6	49.5 - 55.4
	Night 23:00 - 07:00	50.1	2.5	46.1 - 54.6
24/09/2025	Day 07:00 - 23:00	53.5	2.0	48.5 - 57.1
	Night 23:00 - 07:00	52.3	2.7	48.3 - 58.1
25/09/2025	Day 07:00 - 23:00	54.0	2.3	49.3 - 58.9
	Night 23:00 - 07:00	50.8	2.5	45.3 - 56.9
26/09/2025	Day 07:00 - 23:00	52.0	3.3	45.1 - 61.8
	Night 23:00 - 07:00	45.4	2.4	41.0 - 51.3
27/09/2025	Day 07:00 - 23:00	51.4	1.2	48.9 - 54.8
	Night 23:00 - 07:00	47.3	1.6	44.6 - 51.7
28/09/2025	Day 07:00 - 23:00	56.0	2.0	50.0 - 60.4
	Night 23:00 - 07:00	54.7	2.9	49.6 - 61.6
29/09/2025	Day 07:00 - 23:00	55.5	2.0	50.4 - 59.7
	Night 23:00 - 07:00	51.6	2.5	46.5 - 56.8
30/09/2025	Day 07:00 - 23:00	53.9	2.8	47.1 - 58.7

Date	Period	Equivalent Continuous Sound Pressure Level (dBA)		
		$L_{eq,T}$	Standard Deviation	Range
	Night 23:00 - 07:00	52.1	2.3	48.6 - 60.0
01/10/2025	Day 07:00 - 23:00	56.3	2.7	51.9 - 62.3
	Night 23:00 - 07:00	-	-	-
Overall	Day 07:00 - 23:00	54.0	2.3	45.1 - 62.3
	Night 23:00 - 07:00	51.5	2.5	41.0 - 61.6

*Based on Partial Data.

4.3.2 A summary of the long-term sound levels measured at L2 is presented in Table 4.6. The data is presented as average levels for the daytime and night-time periods calculated from 15-minute sound indices.

Table 4.6: Noise Measurement Results – L2, Unattended Long-Term

Date	Period	Equivalent Continuous Sound Pressure Level (dBA)		
		$L_{eq,T}$	Standard Deviation	Range
23/09/2025	Day 07:00 - 23:00	52.3	2.0	48.4 - 55.6
	Night 23:00 - 07:00	48.4	2.7	43.5 - 53.0
24/09/2025	Day 07:00 - 23:00	52.8	1.7	47.9 - 55.5
	Night 23:00 - 07:00	50.9	2.9	46.5 - 57.1
25/09/2025	Day 07:00 - 23:00	54.0	2.2	48.9 - 57.9
	Night 23:00 - 07:00	49.1	2.4	43.7 - 53.2
26/09/2025	Day 07:00 - 23:00	51.1	2.6	46.1 - 57.4
	Night 23:00 - 07:00	46.1	2.3	41.9 - 52.0
27/09/2025	Day 07:00 - 23:00	51.6	1.3	48.8 - 55.5
	Night 23:00 - 07:00	46.9	1.1	44.8 - 48.7
28/09/2025	Day 07:00 - 23:00	54.4	1.6	49.2 - 56.7
	Night 23:00 - 07:00	53.2	3.1	48.1 - 59.0
29/09/2025	Day 07:00 - 23:00	53.9	2.1	49.2 - 59.1
	Night 23:00 - 07:00	50.7	2.5	45.7 - 56.5
30/09/2025	Day 07:00 - 23:00	53.3	2.5	47.3 - 57.2
	Night 23:00 - 07:00	50.9	1.8	48.2 - 54.9

Date	Period	Equivalent Continuous Sound Pressure Level (dBA)		
		$L_{eq,T}$	Standard Deviation	Range
01/10/2025	Day 07:00 - 23:00	54.1	1.8	50.5 - 55.6
	Night 23:00 - 07:00	-	-	-
Overall	Day 07:00 - 23:00	53.1	2.0	46.1 - 59.1
	Night 23:00 - 07:00	50.2	2.4	41.9 - 59.0

*Based on Partial Data.

4.3.3 While installing and collecting the measurement equipment both monitoring locations, the surrounding noise environment was observed. The noise environment consisted of intermittent road traffic noise from Hill Lane and Ashby Road as well as distant road traffic noise from the M1. Intermittent power tool noise from the industrial estate adjacent and environmental noise (such as wind, vegetation and birds).

4.3.4 Time history graphs for the entire monitoring period are given in Appendix B and include the L_{Aeq}, L_{A90} and L_{AFmax} for each 15-minute period.

4.4 Maximum Night-Time Sound Levels

4.4.1 Ordinarily the 10th highest L_{AFmax} individual noise event during each night-time period would be identified and this would be representative of the noise events for the measurement location. However, at all measurement locations, the road traffic noise was consistent and high which resulted in relatively unchanging night-time L_{AFmax} levels and very few individual noisy events, which can be seen graphically in time history graphs in Appendix B. Therefore, the arithmetic average of the night-time L_{AFmax} levels has been determined for each night at each measurement location. From these averages, the maximum level has been identified and is thought to be representative of maximum night-time noise levels at the measurement locations. The average L_{AFmax} levels are presented in Table 4.7 and will contribute to the assessment of night-time L_{AFmax} noise events that have the potential to cause sleep disturbance.

Table 4.7: Arithmetic Average L_{AFmax} Night-Time Noise Event Per Night

Date	10th Highest L_{AFmax} Night-Time Noise Level (dBA)	
	L1	L2
23/09/2025	60.3	60.6
24/09/2025	58.6	59.1
25/09/2025	59.2	58.2
26/09/2025	57.2	57.6
27/09/2025	-	65.8
28/09/2025	60.1	-
29/09/2025	62.2	60.2
30/09/2025	59.0	59.0
Overall	**62.2**	**65.8**

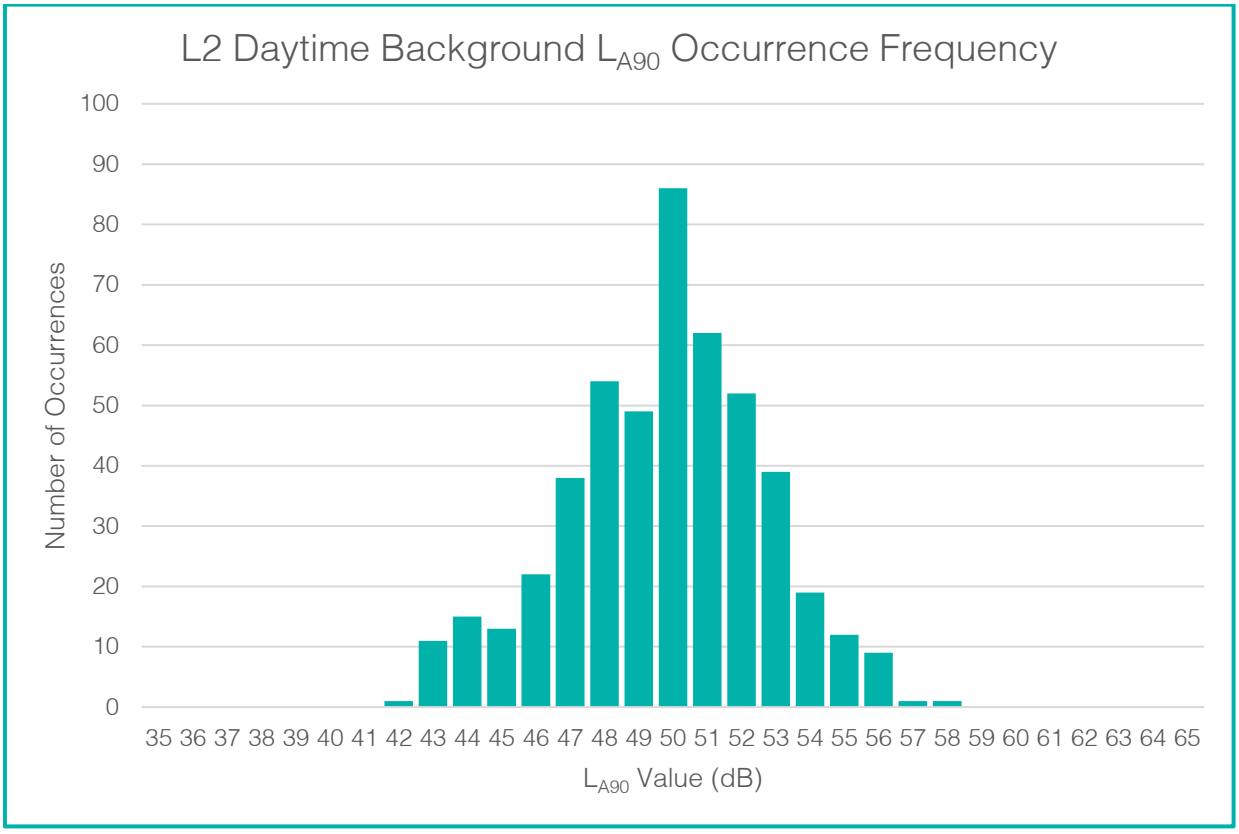
4.4.2 The highest arithmetic average sound levels on each night showed are shown to be consistent across both measurement locations which is likely due to the constant road traffic noise from the M1.

4.5 Background Sound Levels

4.5.1 As part of an assessment of industrial or commercial sound and following the guidance of BS 4142:2014+A1:2019, a representative background sound level must be determined. Typically, the modal $L_{A90,15min}$ value from the relevant time period is used. L2 was designated as the representative background position based on the location it was installed in.

4.5.2 The background sound levels are determined using statistical analysis, which shows how frequently each $L_{A90,15min}$ sound level occurs during each period. This frequency distribution data is presented graphically in Figure 4.2 for the daytime period at L2.

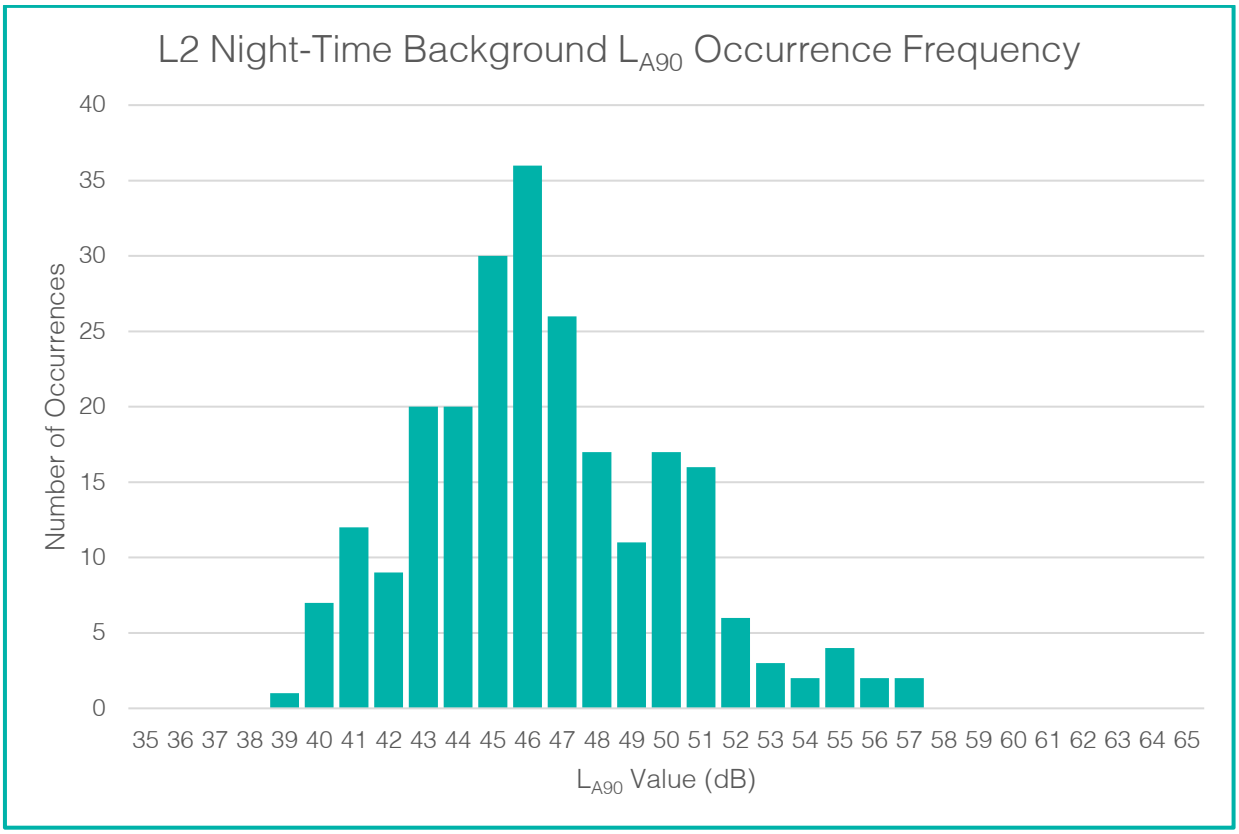
Figure 4.2: Occurrence Frequency of $L_{A90,15min}$ During Daytime Period Between 07:00 and 23:00 at L2



4.5.3 The graph in Figure 4.2 shows a significant singular peak in the distribution at 50 dB, which has been chosen as the representative background for the daytime.

4.5.4 The frequency distribution data is presented graphically in Figure 4.3 for the night-time period at L1.

Figure 4.3: Occurrence Frequency of $L_{A90,15min}$ During Night-time Period Between 23:00 and 07:00 at L2



4.5.5 The graph in Figure 4.3 shows a wider distribution in the data with a single peak with modal value 46 dB. For the purposes of a more robust assessment the lower value of 45 dB has been selected as the representative background level for the night-time assessment.

4.5.6 The modal $L_{A90,15min}$ has been identified for the measurement location during the daytime period 07:00 – 23:00 and night-time period 23:00 – 07:00 using statistical analysis and are summarised in Table 4.8.

Table 4.8: Background Sound Levels

Measurement Location	Background Sound Levels (dBA)	
	Daytime (07:00-23:00)	Night-Time (23:00-07:00)
L2	50	46

4.5.7 The values of 50 dB (A) for daytime and 46 dB (A) for night-time are considered to be the representative background sound levels for the respective periods.

5 Construction Impact Assessment

5.1.1 At this stage of the scheme, details regarding the construction traffic movements and the type, number and size of construction equipment are not available. Therefore, it is not possible to predict, with any great degree of accuracy, the possible effects arising from construction activities associated with the proposed development.

5.1.2 For the purposes of a generic construction noise assessment, the associated works can be divided into three main phases:

- Earthworks;
- Concreting; and
- Main build.

5.1.3 On weekdays, typical construction working hours are anticipated to be 08:00 – 18:00. On Saturdays, working hours are expected to be between 08:00 and 13:00 hours. Work on Sundays/Bank Holidays will only take place in exceptional circumstances. The construction work will be carried out under the Considerate Constructors Scheme, which, as one of its objectives, aims to reduce adverse noise impacts on nearby residents.

5.1.4 During the construction phase, there would be a slight increase in HGV movements on the surrounding highway network. However, this will be a temporary impact and will decrease as the proposed development progresses towards completion.

5.1.5 Overall, based on the experienced gained from similar sites, and on the existing ambient noise levels at the closest residential receptors, it is anticipated that although the main construction phases may be audible at times, they will result in no more than a minor adverse impact, only during the daytime. It should also be noted that this effect will only be temporary, whilst the construction phase(s) are moving forward.

5.1.6 Following the BS 5228-1:2009+A1:2014 ABC classification method, during the daytime working hours mentioned above, the nearby sensitive receptors would be category B or C with a threshold noise level criteria of 70 or 75 dB(A) during the daytime.

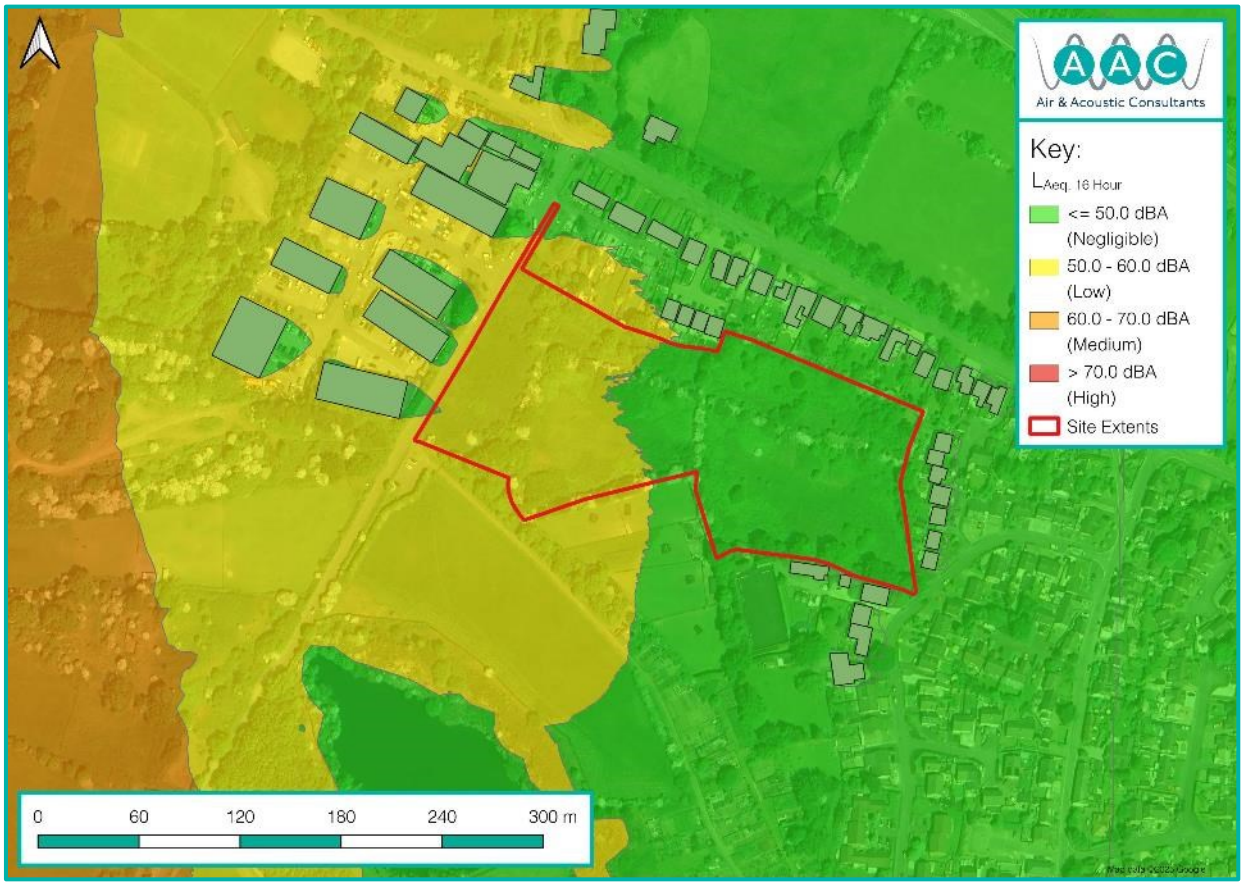
6 Operational Impact Assessment

6.1 ProPG Risk Assessment

6.1.1 This assessment considers the potential impacts of the existing ambient sound levels on the proposed residential development. During the survey it was observed that the site was predominantly affected by the M1 southwest of the site.

6.1.2 An initial site noise risk assessment, as defined by ProPG has been completed and is shown for the daytime scenario in Figure 6.1.

Figure 6.1: Daytime ProPG Noise Risk Levels Across the Application Site



6.1.3 The predicted noise contours shown in Figure 6.1 are for the daytime scenario because the daytime period represents the worst-case scenario, compared to the night-time. The noise contours for both the daytime and night-time scenarios are provided in Appendix C.

6.1.4 The colour palette on the noise contour plans provides the predicted risk levels, as defined within ProPG; with green representing negligible risk areas, yellow depicting low risk areas, orange depicting medium risk areas and red depicting high risk areas

6.1.5 Figure 6.1 shows that the majority of the site area to the northwest would be classified in the low-risk classification according to ProPG. When a site is classified as low-risk, ProPG states:

"At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development."

6.1.6 The sound propagation model has not included any buildings or structures within the application site which would reduce the propagation of noise across the site substantially.

6.1.7 A large area of the site to the east is classified as negligible and when a site is classified as negligible, ProPG states:

"These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds."

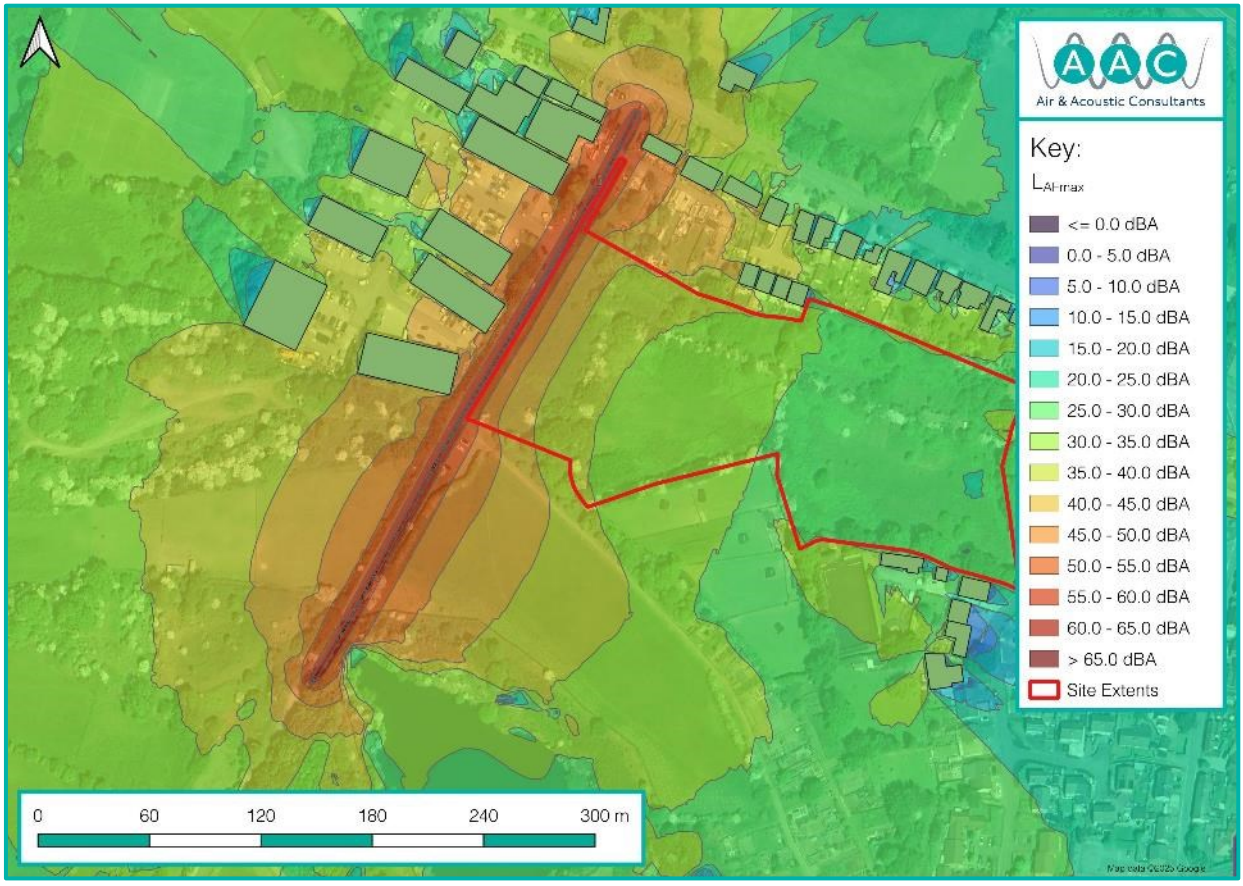
6.1.8 According to ProPG the development should follow a good acoustic design process to reduce both internal and external sound levels within the most exposed areas of the site, this is discussed in detail in Section 7.

6.2 Maximum Night-Time Noise Levels

6.2.1 Night-time maximum noise levels have the potential to cause sleep disturbance during the night-time if the external L_{AFmax} sound levels are greater than 60 dB(A).

6.2.2 The measured L_{AFmax} levels presented in Table 4.7 are higher than the WHO criterion of 60 dB(A) by 2.2 dB(A) and 5.8 dB(A). The sound level meters were located close to the noise source, but noise levels will be lower further into the application site, Figure 6.2 shows the predicted noise contours.

Figure 6.2: Predicted Maximum Night-Time Noise Contours



6.2.3 The predicted noise contours show the site area closest to Hill Lane currently experiences night-time noise levels, as a result of maximum night-time noise events, which exceed the 60 dB(A) LOAEL value.

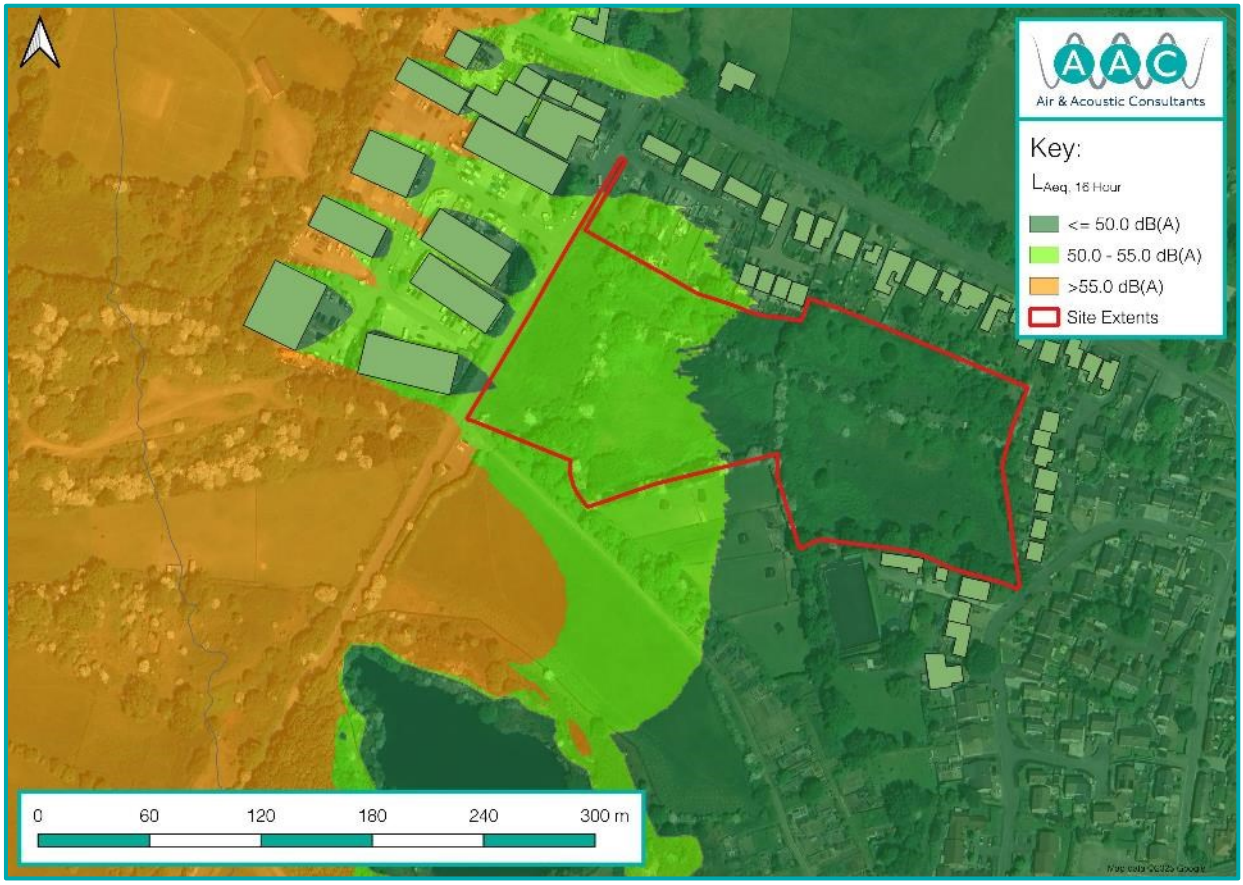
6.2.4 It should be noted that the predicted noise contours do not include any proposed residential dwellings or structures at this stage. The inclusion of the development buildings would provide screening and significantly reduce the propagation of noise into and through the application site.

6.2.5 Specific mitigation measures will likely need to be considered at the detailed design stage; however potential measures are discussed further in Section 7.

6.3 External Amenity Sound Levels

6.3.1 The predicted sound level contours for the external amenity areas are displayed in Figure 6.3, showing the predicted sound levels in external amenity areas compared with the desirable criterion level of 50 dB(A) $L_{Aeq,16hour}$ and the upper guideline criterion level of 55 dB(A) $L_{Aeq,16hour}$.

Figure 6.3: Predicted External Amenity Noise Contours



6.3.2 The figure shows that all of the site area is predicted to currently experience sound levels between the desirable criterion of 50.0 dB(A) and the upper guideline criterion of 55.0 dBA).

6.3.3 As stated previously, at this stage of the design, with no development buildings or structures included in the noise model, the road traffic noise propagates across the site. However, when buildings and property boundaries are included (including garden fencing) the structures will provide screening and reduce the noise levels further into the site reducing the likelihood for adverse impacts.

6.4 Operational Commercial Sound

6.4.1 The potential adverse effects of commercial and/or industrial sound experienced at the closest noise sensitive receptors have been assessed using the methodology in BS 4142:2014+A1:2019. The typical background sound levels for the daytime and night-time periods used in the assessment are given Table 4.8.

6.4.2 The primary sources of operational sound by the proposed development have been identified as metal/steel sawing, vacuuming, forklift, and van noise. It is apparent that the businesses on the industrial estate only operate during daytime hours, so a night-time assessment has not been carried out.

6.4.3 The noise source levels used for predictions of industrial noise have been measured on site but have also been taken from the Air and Acoustic Consultants library of sound measurements. Details of the sources used in the assessment are provided in Table 6.1.

Table 6.1: Sound Sources Used in the Commercial Noise Assessment

Activity	Sound Power Level (dB) at Octave Band Centre Frequencies (Hz)								Overall dB(A)
	63	125	250	500	1 k	2 k	4 k	8 k	
Van reversing	77.4	66.6	65.0	64.6	71.6	66.6	63.9	58.3	74.3
HGV Movement	65.9	64.2	63.5	66.4	79.6	69.8	63.1	56.6	80.4
Forklift unloading HGV*	95.0	87.4	84.2	81.9	81.3	79.6	75.5	77.5	86.8
Steel Fabricators*	66.8	58.2	53.9	54.9	55.1	53.5	50.7	45.6	60.0
Vacuuming*	66.4	62.1	54.0	58.7	55.8	54.3	50.3	43.5	61.2
Steel Sawing*	69.6	58.2	52.0	52.8	54.2	47.8	41.6	44.0	57.3

*Data gathered from measurements undertaken on site

6.4.4 The on-time corrections for the operations are from typical industrial operations observed by Air and Acoustic Consultants and a number of worst-case assumptions based on the proposed site layout.

6.4.5 The on-time corrections are made using the following equation:

$$10 \times \log\left(\frac{d \times 10^{\frac{L}{10}}}{D}\right)$$

6.4.6 Where d is the duration of the activity in minutes, L is the sound power level of the activity and D is the assessment duration in minutes, 1 hour during the daytime and 15 minutes during the night-time. The on-time corrected noise sources are provided in Table 6.2.

6.4.7 The duration of HGV movements has been calculated based upon the length of the line source and the number of movements along the line source in an hour / 15-minute period, assuming a speed limit of 10 mph along the line source included in the noise model.

6.4.8 Vans reversing has been included in the noise model as a one-point source closest to the nearest receptor. It was noted that during the survey on site that vans were constantly arriving and leaving the industrial estate, so a time correction was not added in this assessment.

6.4.9 Time corrections for Steel Fabricators, Vacuuming and Steel sawing have been calculated using the data gathered on site.

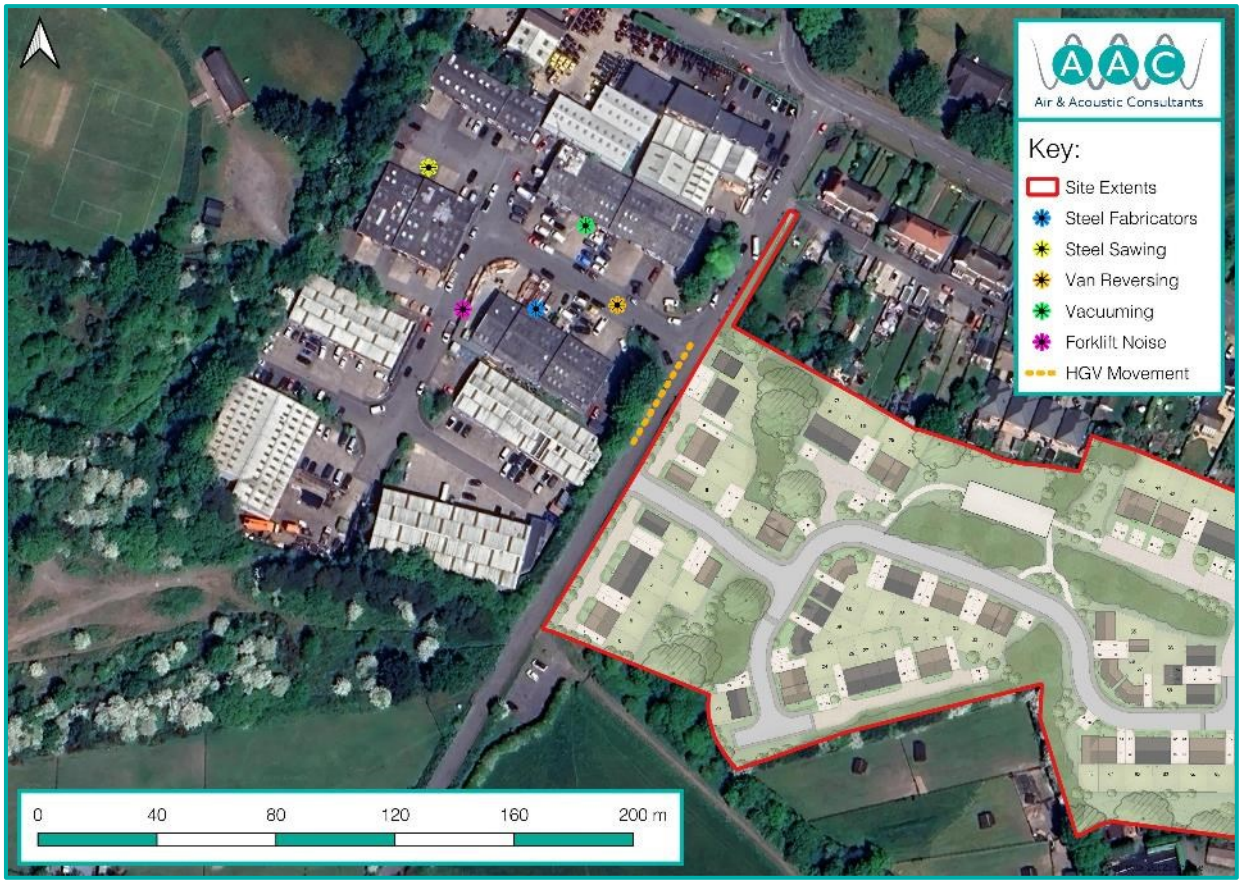
6.4.10 The corrected sound power levels have been summarised below in Table 6.2 for point and line sources representing the noise generating activities of future operations.

Table 6.2: Sound Source On-Time Calculations

Activity / Equipment Name	Source Sound Power Level L_{WA} (dBA)	Duration (min)		Corrected Sound Power Level L_{WA} (dBA)	
		Daytime	Night-Time	Daytime	Night-Time
HGV Movement	80.4	1		62.6	
Steel Fabricators	60.0	55		59.6	
Vacuuming	61.2	30		58.2	
Steel Sawing	57.3	55		56.9	

6.4.11 The sound sources and their respective location within the noise propagation model for the operational noise assessment is shown in Figure 6.4.

Figure 6.4: Modelled Sound Source Locations, BS 4142 Commercial Noise Assessment



6.4.12 The predicted specific sound levels require a penalty to account for distinctive characteristics in line with the BS 4142:2014+A1:2019 methodology. Penalties account for distinctive characteristics within the sound that may make it more prominent than the existing noise environment. Penalties can be added for tonality, impulsivity, intermittency, or other characteristics not captured in the three defined classes.

6.4.13 The specific noise sources that the assessment considers the metal sawing/grinding, vacuuming, forklift noise, HGV noise, and van noise. Details of all noise character penalties that have been applied to the assessment are set out in Table 6.3.

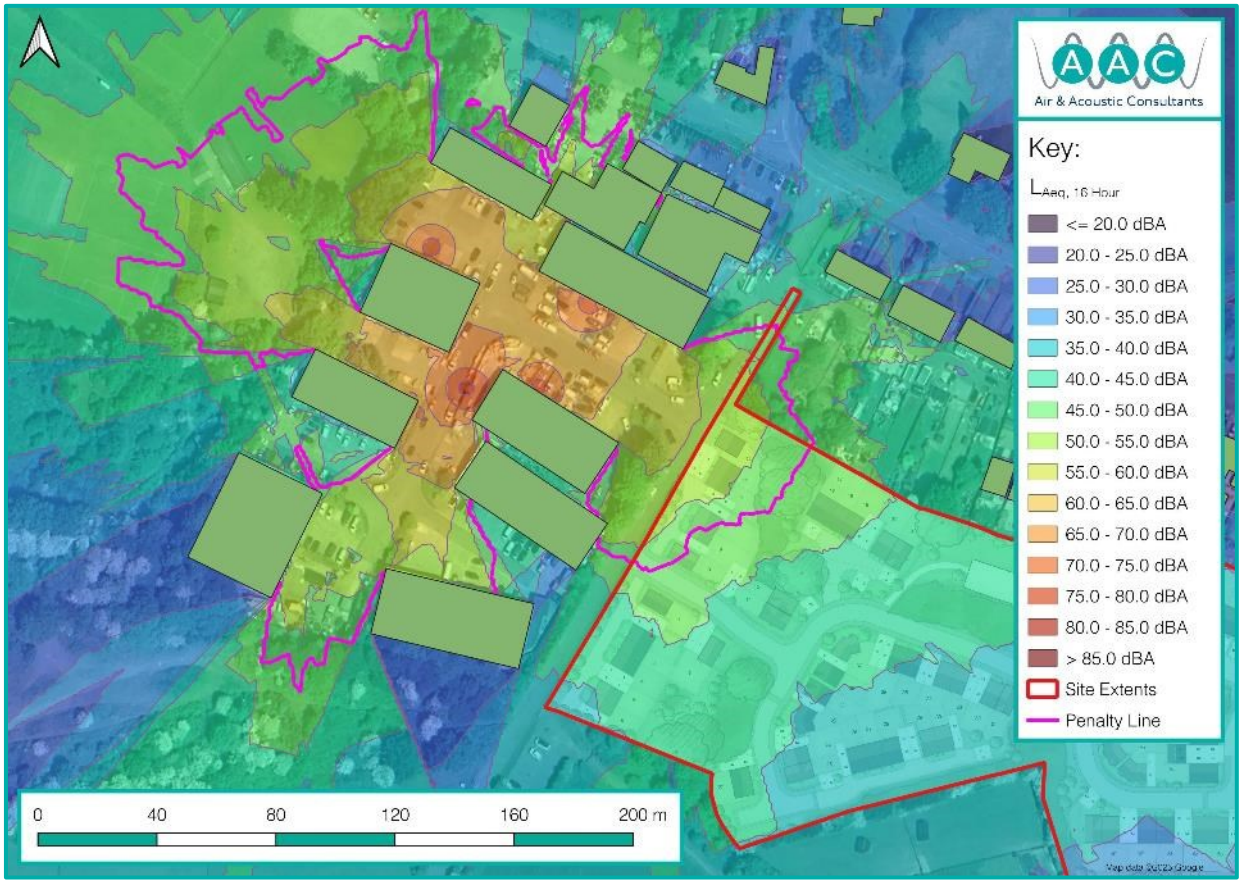
Table 6.3: Rating Level Penalties

Receptor	Penalty (dB)	Rating Penalty Description
R01, R02, R03 & R05	7	Tonality – 4 dB(A), Impulsivity – 0 dB(A), Intermittency – 3 dB(A). Predictions show the identified receptors are likely to be affected by the industrial estate as the level at facades are above the background sound levels. Therefore distinctive characteristics are likely to be audible; penalties have been applied based on this.

6.4.14 Looking at the assessment and considering the specific context, the industrial estate has a long history if use and generating this type of noise as part as daily operations across the various units. The proposal is to introduce new residential receptors into the existing environment, and these specific new receptors will know of the industrial estate prior to occupying the proposed residential dwellings. Mitigation measures on site will be required to negate impact on the proposed site.

6.4.15 Figure 6.5 shows noise contours from the industrial activity adjacent to the sit for a comparison with the background sound level of 50 dB(A) on Monday to Saturday daytimes, measured on site.

Figure 6.5: Impact line of industrial estate onto proposed site



6.4.16 A review of Figure 6.5 shows that industrial noise levels with the addition of the character penalties will exceed the relevant background sound level up until the penalty line indicated at 48 dB(A). The penalty line represents the line where mitigation will not be required to achieve the assessment criteria noise levels. Receptors within this area will require some form of mitigation which is discussed in Section 7.

6.4.17 In accordance with national policy, the site-specific context must be considered. This development will introduce new receptors into the existing environment, and the new receptors will have a lower sensitivity compared to a receptor who experiences an increase in industrial noise as a result of the development. The existing industrial noise sources have a long history of operating from the site which is already located close to existing residential dwellings at the junction of Ashby Road and dwellings on Hill Lane.

6.4.18 After taking into consideration the site-specific context, the impacts arising at the proposed noise sensitive receptors as a result of the existing environment, can be categorised as less than SOAEL with mitigation required at dwellings between the western boundary and the 48 dB penalty line.

7 Mitigation Measures

7.1 Construction

7.1.1 Operators should be properly trained in the use of equipment, made aware of any noise mitigation requirements, and where necessary, be supervised so that reasonable care is taken to minimise their noise impact. BS 5228-1:2009+A1:2014 provides advice on minimising noise from construction activities with the implementation of Best Practicable Means (BPM).

7.1.2 The contractor would regularly brief the construction staff so that they are considerate of the surrounding residents and operate construction plant in a manner which controls noise (where practicable). Once the exact construction methods and plant to be employed are confirmed, any required mitigation measures will be identified. Such measures could include:

- Avoidance of the use of horns and excessive revving of engines;
- Vehicles, generators, concrete pumps, air compressors and other constant noise sources being turned off when not required, or at least throttled back to a minimum;
- Plant to operate at low speeds, where possible, and incorporate automatic low speed idling;
- Selection of 'silenced' plant and equipment where practicable;
- Locating noisy plant and equipment as far away from sensitive receptors as reasonably possible;
- Reducing impulsive noise generating activities such as slamming doors, noisy brakes, impacts etc.;
- Screening either in the form of localised temporary acoustic fencing where the distances between source and receptor cannot be managed, or on the site boundary; and
- All plant being properly maintained (greased, blown silencers replaced, saws kept sharpened, teeth set and blades flat, worn bearings replaced, etc.).

7.2 Mitigation for Residential Properties

7.2.1 The ProPG risk assessment classifies less than half of the area to be low risk with the remainder classified as negligible. The western area of the site is classified as low risk, so it is recommended to follow a good acoustic design process.

7.2.2 To mitigate the potential for adverse impacts to any future noise sensitive receptors, the principles of 'good acoustic design' must be followed. This is defined in ProPG and aims to provide a good acoustic environment in residential developments without introducing specific acoustic mitigation features.

7.2.3 The principles of good acoustic design dictate that the first priority is to reduce the source of the noise itself, where this is not possible then the layout of the development should allow for setbacks from the sources of noise or the layout can be used to protect noise sensitive spaces. If it is not possible to use the layout because the site is small or affected by noise at many locations, the next option is to mitigate the noise as close to the source as possible and this normally includes landscaping and boundary treatments such as bunds or barriers. The last option is to provide additional mitigation to the receptors; this could include altering the internal layout to place noise sensitive rooms on quieter façades or the use of façade treatments such as enhanced glazing and ventilation.

7.2.4 In this development it will not be possible to reduce the road traffic noise from the surrounding roads as this would require a reduction in the number of vehicles on the surrounding roads or a change in speed limit, which is outside of the control of the applicant.

7.2.5 The next recommended measure under ProPG would be to set properties back from the noise sources, which must be considered in terms of the impact on the wider development constraints.

7.2.6 It is possible to enhance the layout of buildings within the site to defend against and reduce noise propagation through the site. Any proposed buildings and structures closest to the noise sources could provide shielding and protection for other residential properties further into the site and away from these sources.

7.2.7 While the application is for Outline consent, a proposed layout has been provided, and this has including a consideration good acoustic design seeking to provide a setback from the site boundary for the properties closest to the northwestern site boundary, and to provide the external amenity areas to the rear of the dwellings to shield these area from noise. The wider strategy tries to reduce gaps between the houses to reduce the permeability of the site to noise.

7.2.8 The detailed mitigation strategy will also include additional boundary treatments round the individual dwellings, such as garden fencing and internal orientation of the habitable area to place non habitable area in on the facades that face the site boundary. Where required façade enhancements such as glazing and acoustic vents can also be provided.

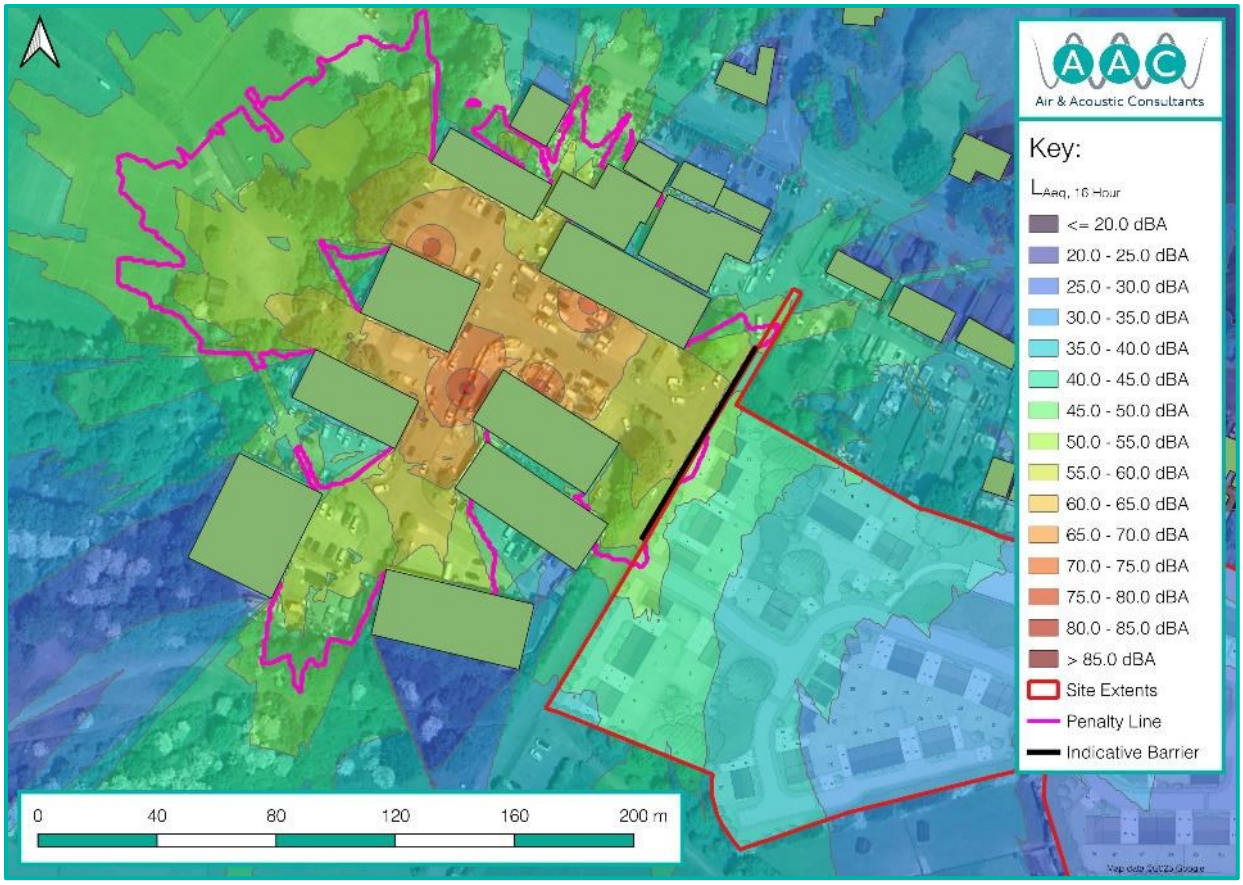
7.3 Mitigation Against Industrial Noise

7.3.1 The BS 4142:2014+A1:2019 assessment predicts that a small area in the northwest of the site adjacent to the industrial site could experience sound levels above required assessment criteria. At the details stage of the development this can be considered in the context of the specific layout, boundary treatments to ensure that the internal habitable areas and then external amenity areas achieve the required criteria levels.

7.3.2 To demonstrate what is possible the assessment has included a consideration of a boundary mitigation and for the basis of the outline assessment has tested a standard boundary noise fence or barrier, however this could include other landscaping features. At this outline stage the specific position and height cannot be refined, however the predicted noise contours provided in Figure 7.1, demonstrate that with the inclusion of boundary mitigation the predicted sound levels within the site are reduced and achieve the assessment criteria.

7.3.3 At the detailed stage the specific mitigation strategy will be based upon the specific layout and follow the principles of good acoustic design to minimise to minimise the potential for adverse impacts.

Figure 7.1: Example Boundary Mitigation



7.3.4 The example boundary mitigation barrier is based upon a wooden fence with a sound reduction performance of 10 dB (this reduction could be provided by a fence with a surface density of 12 kg/m^3), and show that the resulting noise levels within the site area would be reduced and lower than the assessment criteria and it would be expected that the noise levels across the site will be less than the LOAEL.

7.4 Mitigation for External Amenity Areas

7.4.1 The principles of 'good acoustic design' apply to mitigation for external amenity areas as well. The predicted noise contours presented in Figure 6.3 show external noise levels between 50 dB(A) and 55 dB(A).

7.4.2 At the detailed design stage measures such as layout design, locating gardens in areas that are shielded by the structures and boundary treatments will reduce the propagation of sound into the site and further reduce the amenity noise levels.

8 Summary & Conclusions

8.1 Baseline

8.1.1 Air and Acoustic Consultants Ltd have been instructed to undertake a noise impact assessment in support of the planning application for a proposed outline residential development located on land off Hill Lane, Markfield.

8.1.2 A long-term unattended baseline noise survey was undertaken at the site to characterise the existing noise environment and help assess the potential impacts on future proposed residential dwellings from the existing noise environment, which was dominated by road traffic and industrial noise.

8.2 Construction Phase

8.2.1 The specific details of the construction methodology are not known at this stage; however, the potential construction impacts have been considered, based upon the nature and scale of the proposed development, and appropriate mitigation measures have been given.

8.2.2 Assuming the appropriate mitigation measures are employed, the potential construction impacts can be minimised, to the point that any adverse impacts will be temporary in nature and result in NOEL to LOAEL in terms of potential impacts.

8.3 Operational Phase

8.3.1 The operational noise levels have been predicted using a CadnaA noise propagation model and calibrated using data from a comprehensive noise measurement survey in line with the relevant British Standards, Guidance documents and Planning Policy.

8.3.2 The assessment has considered the potential noise impacts inside any proposed residential dwellings during the daytime, night-time and night-time maximum scenarios, as well as potential noise impacts in external amenity areas during the daytime.

8.3.3 The predictions and measurements show that under reasonable worst-case conditions the site would be classified as low to negligible risk under ProPG, and a good acoustic design process should be followed to mitigate against any potential adverse impacts. Predictions show the potential for proposed residential dwellings to exceed the BS 8233:2014 and WHO criteria unlikely.

8.3.4 The Industrial noise assessment shows a potential exceedance of the assessment criteria in the northwest corner of the site. To ensure dwellings closest to the industrial sources meet guideline criteria mitigation will be required. Mitigation has been considered, and it has been demonstrated that noise levels within the assessment criteria are achievable and noise levels across the site will be less than the LOAEL.

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Appendices

APPENDIX A – Definition of Terms

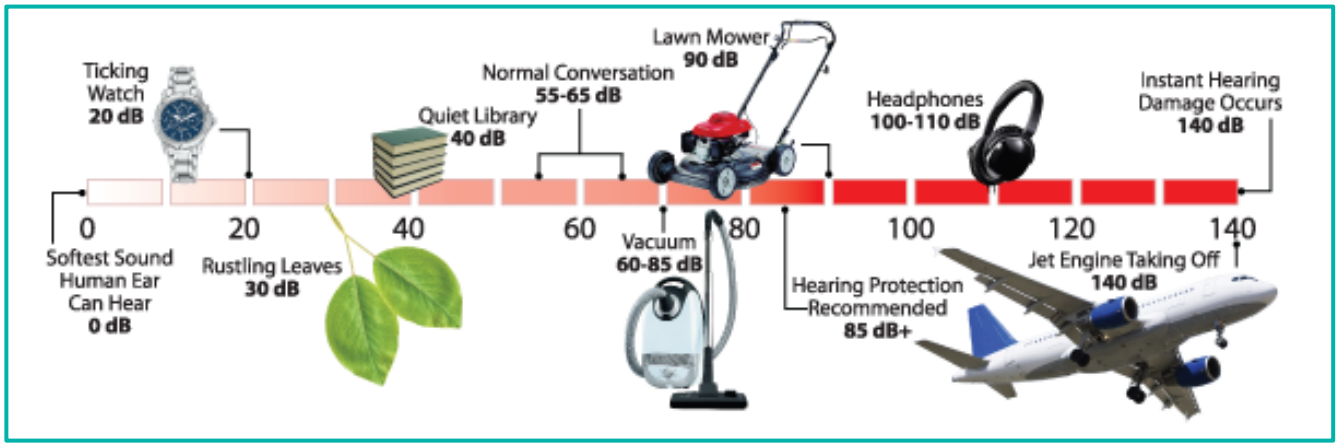
Sound Pressure - Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.

Sound Pressure Level - The sound level is the sound pressure relative to a standard reference pressure of 20 μ Pa (2x10-5 Pascals) on a decibel scale.

Decibels dB - Noise is commonly defined as unwanted sound. The range of audible sound is from 0 dB to 140 dB, which is taken to be the threshold of pain. The sound pressure detected by the human ear covers an extremely wide range. The decibel (dB) is used to condense this range into a manageable scale by taking the logarithm of the ratio of the sound pressure and a reference sound pressure.

The decibel scale is logarithmic and therefore when two noise sources are present together, they must be combined logarithmically, therefore, when two sound sources of the same sound pressure level are combined the resultant level is 3dB(A) higher than the single source. However, in subjective terms the ear can distinguish a difference in 'loudness' between two simple noises sources when there is a 3dB(A) difference between them. I emphasis, loudness, not a measure of annoyance. Again, for simple sources, when two sounds differ by 10dB(A) one is said to be twice as loud as the other.

Figure A.1: Examples of Typical Noise Levels



Noise Level Indices - Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.

'A' Weighted Decibels dB(A) - The frequency response of the ear is usually taken to be about 18Hz (number of oscillations per second) to 18,000Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than at the lower and higher frequencies, and because of this, the low and high frequency component of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most used, and which correlates best with the subjective response to noise, including that of music, is the dB(A) weighting. This electronic filter matches the variation in the frequency sensitivity of the meter to that of the human ear. This is an internationally accepted standard for noise measurements.

Table A.1: Other Standard Noise Units

Symbol	Name	Definition
$L_{Aeq,T}$	Equivalent Continuous Sound Level	The A-weighted sound pressure level of a steady sound that has, over a given period, the same energy as the fluctuating sound under investigation. The LAeq provides a single value to express the average sound energy over the measurement period and is the most widely used indicator for environmental noise.
$L_{Amax,T}$	maximum 'A' weighted noise level	This is the maximum 'A' weighted noise level recorded during the measurement period, (T).
$L_{A90,T}$	the 'A' weighted noise level	This is the 'A' weighted noise level exceeded for 90% of the measurement period (T). This is normally used to describe the

Symbol	Name	Definition
		background noise.
$L_{A10,T}$	the 'A' weighted noise level exceeded for just 10 % of time	This is the 'A' weighted noise level exceeded for just 10 % of the measurement period, (T). This is normally used to describe traffic noise.
$L_{A90,T}$	the 'A' weighted noise level exceeded for just 90 % of time	A noise level index. The noise level exceeded for 90% of the time over the period T. L90, can be considered to be the "average minimum" noise level and is often used to describe the background noise.
L_S	Specific noise level.	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.
$L_{Ar,Tr}$	Rating noise level	The specific noise level plus any adjustments for characteristic features of the noise.
$D_{n,c,w}$	Laboratory Insulation Rating	A single-number rating of the laboratory measurement of room-to-room airborne sound insulation of a suspended ceiling with a plenum above it.
$D_{nf,w}$	Weighted normalised flanking level difference	A single-number that quantifies the in-situ airborne sound insulation between rooms, when the transmission only occurs through a specified flanking path.
$D_{nT,w}$	Weighted standardized level difference	Single-number quantity that characterizes the in-situ airborne sound insulation between rooms.
R_w	Weighted sound reduction index.	Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies in a laboratory.
C_{tr}		Correction term applied against the sound insulation single-number values (R_w, D_w and $D_{nT,w}$) to provide a weighting against low frequency performance.
NOEL	No Observed Effect Level	Noise Policy Statement for England (2010) - The noise 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	Noise Policy Statement for England (2010) - The noise level above which adverse effects on health and quality of life can be detected.
SOAEL	Significant Observed Adverse Effect	Noise Policy Statement for England (2010) - The noise level above which significant adverse effects on health and quality of life occur.

Appendix B – Noise Measurement Time Histories

Time History Graph B.1

Project Name:	Hill Lane, Markfield
Measurement Location:	L1
Survey Date:	23/09/2025

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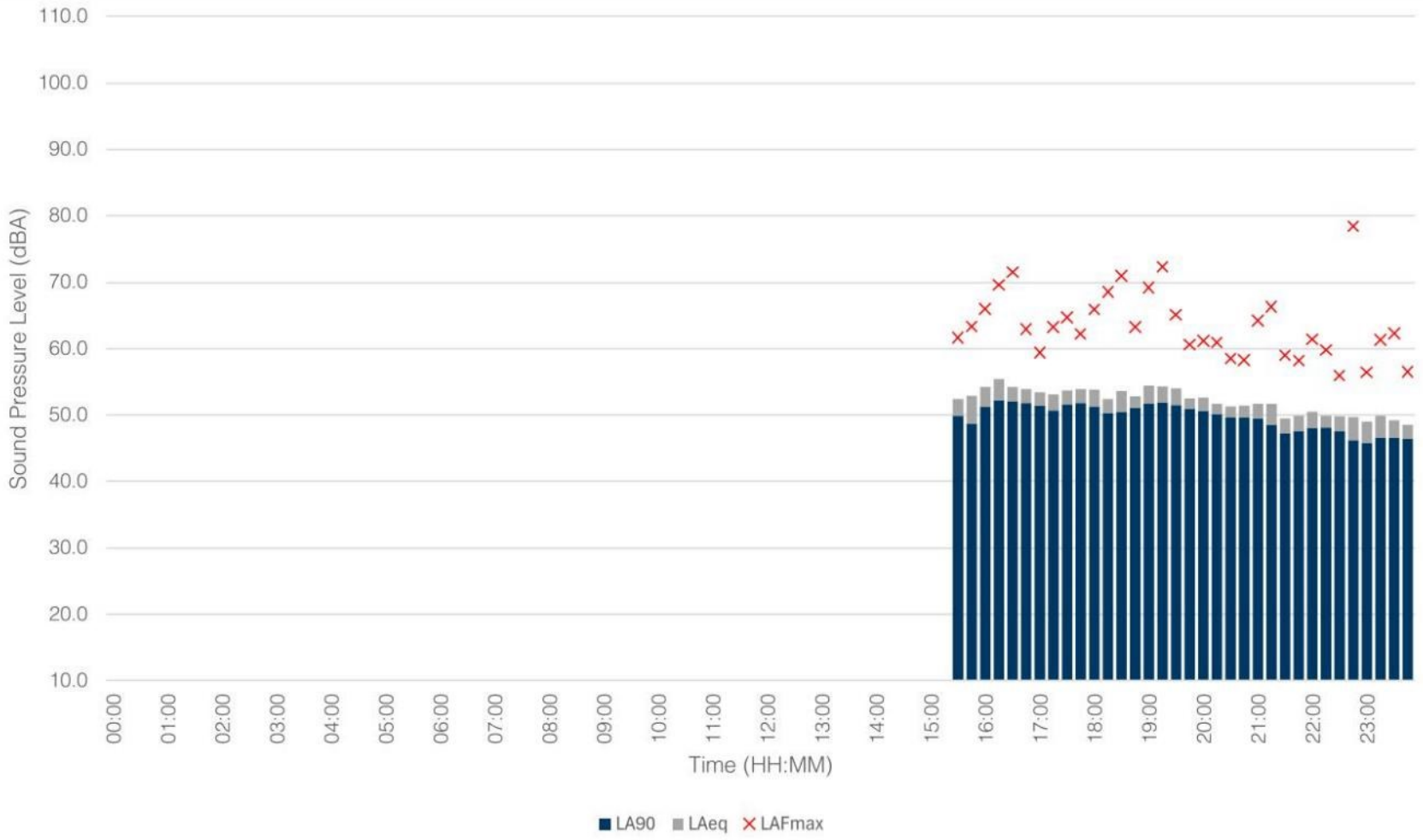
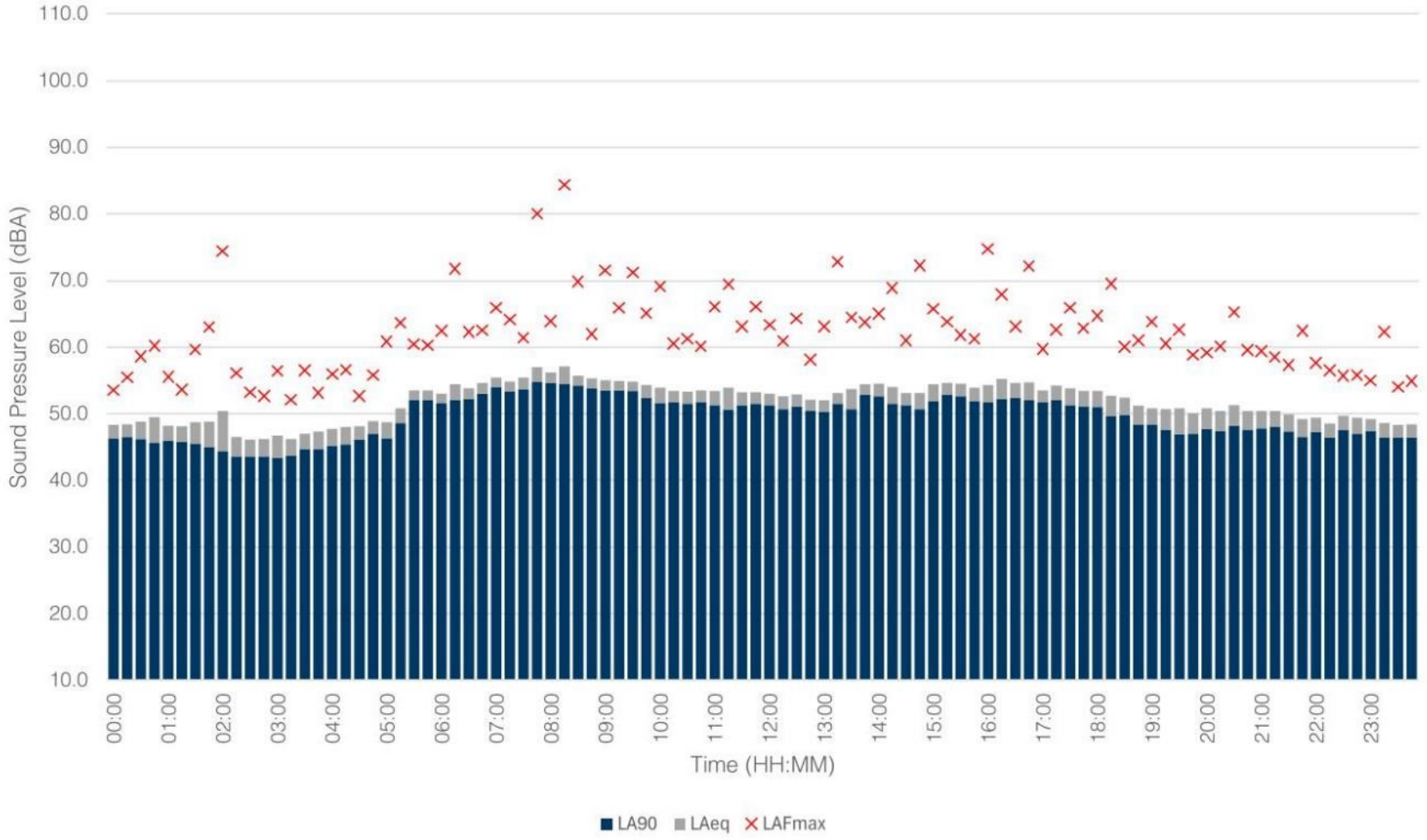


Time History Graph B.2

Project Name:	Hill Lane, Markfield
Measurement Location:	L1
Survey Date:	24/09/2025

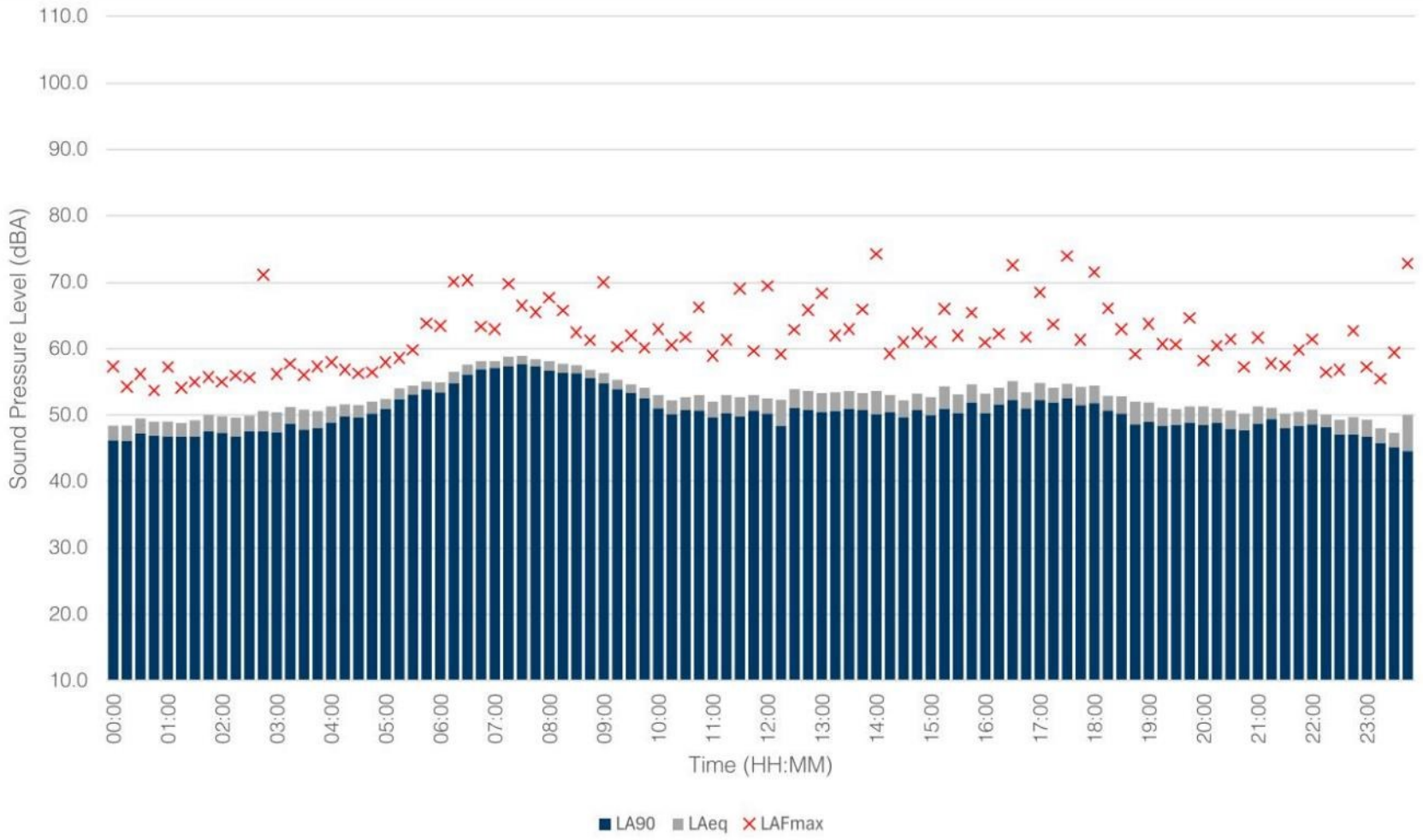
Air & Acoustic Consultants



Time History Graph B.3

Project Name:	Hill Lane, Markfield
Measurement Location:	L1
Survey Date:	25/09/2025

Air & Acoustic Consultants



Time History Graph B.4

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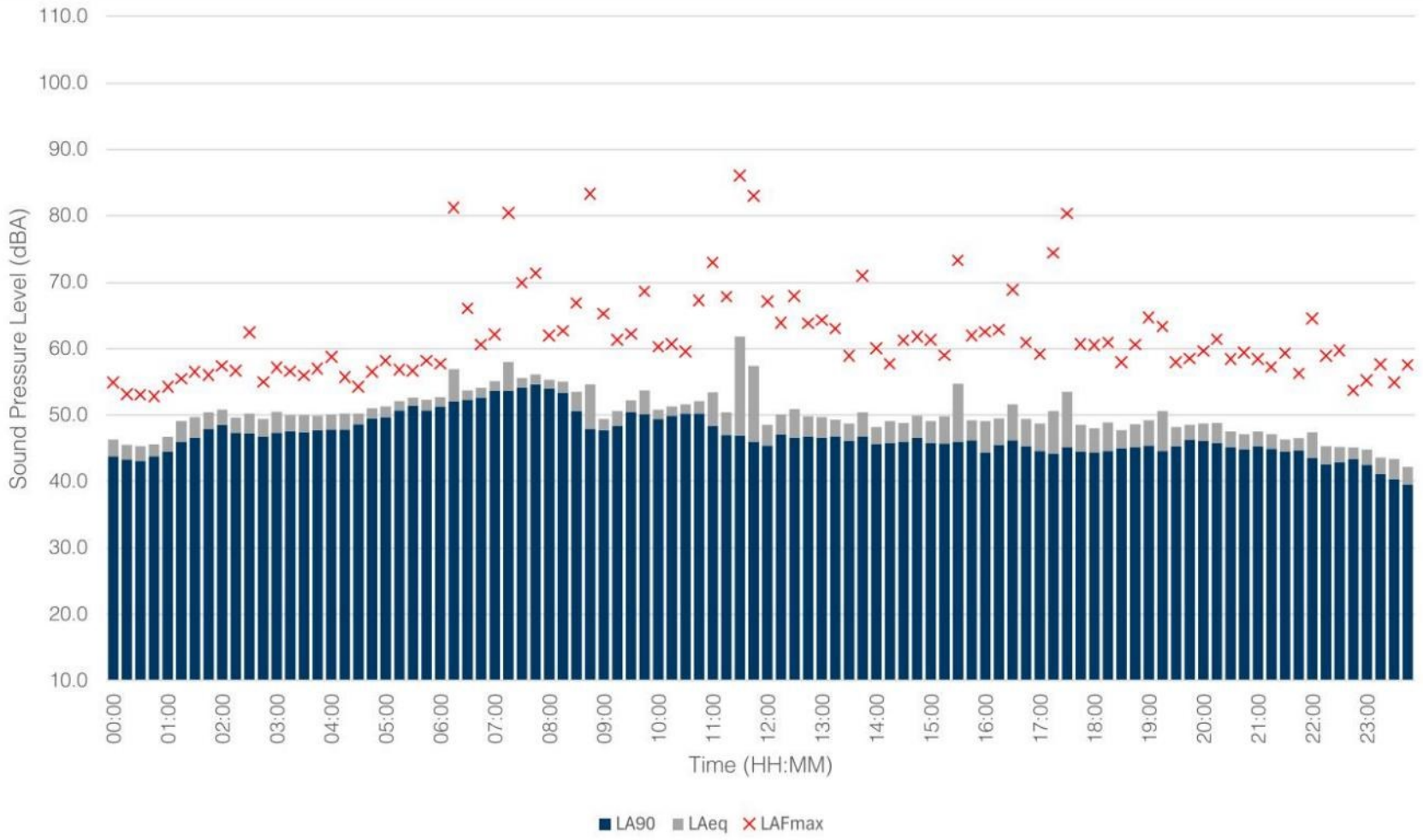
Measurement Location:	L1
Survey Date:	26/09/2025

Air & Acoustic Consultants



Time History Graph B.5

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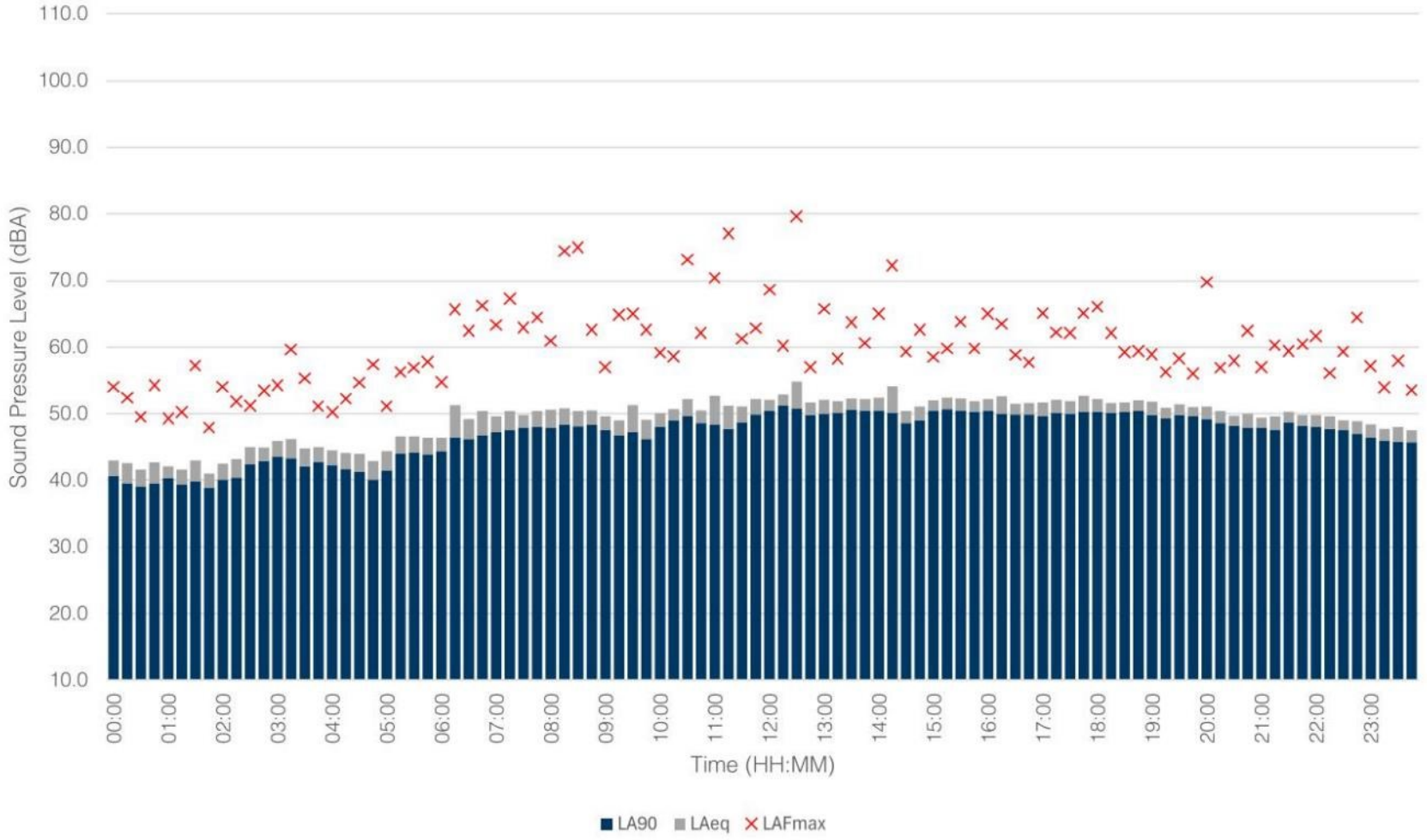
Measurement Location:	L1
Survey Date:	27/09/2025

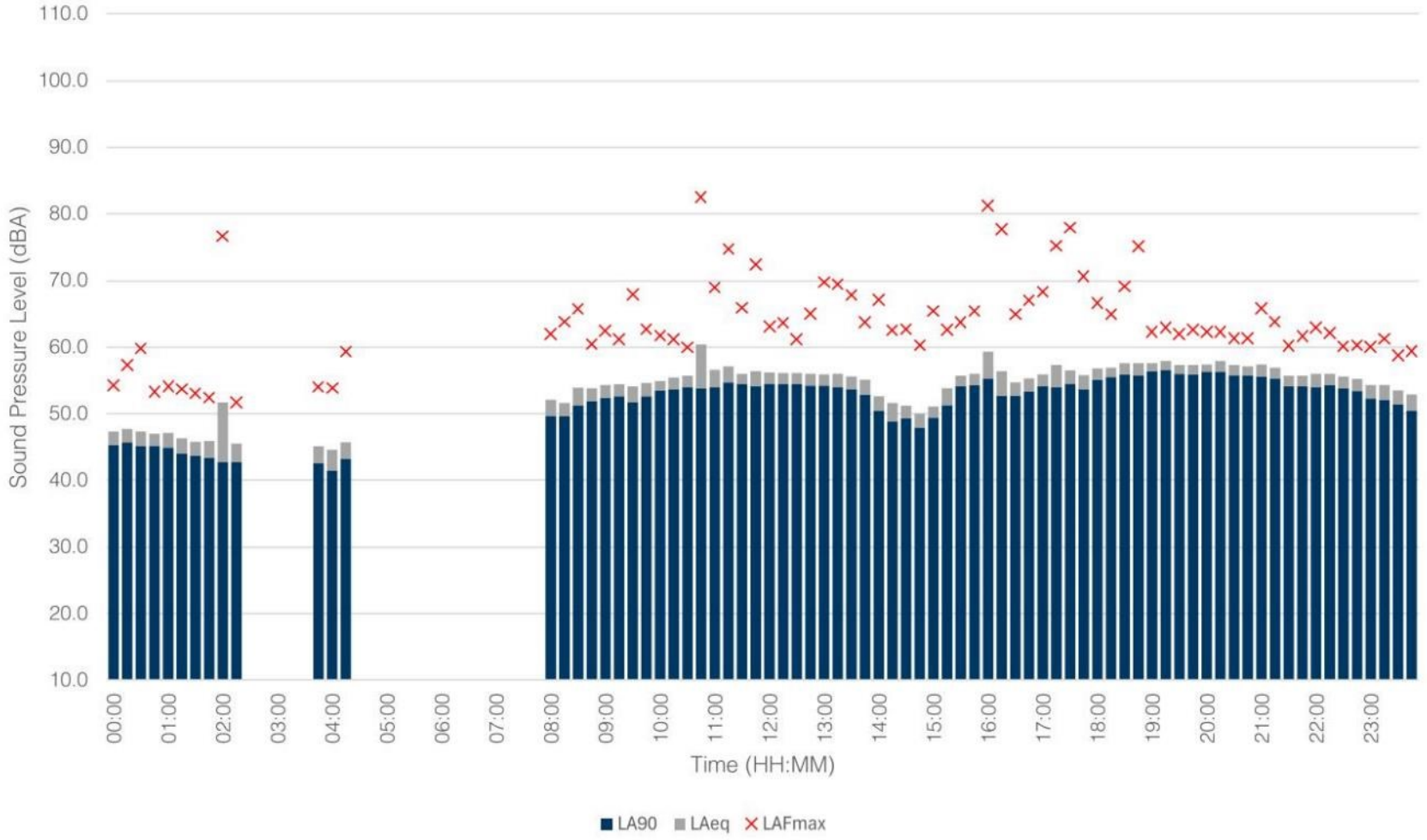
Air & Acoustic Consultants



Time History Graph B.6

Project Name:	Hill Lane, Markfield
Measurement Location:	L1
Survey Date:	28/09/2025

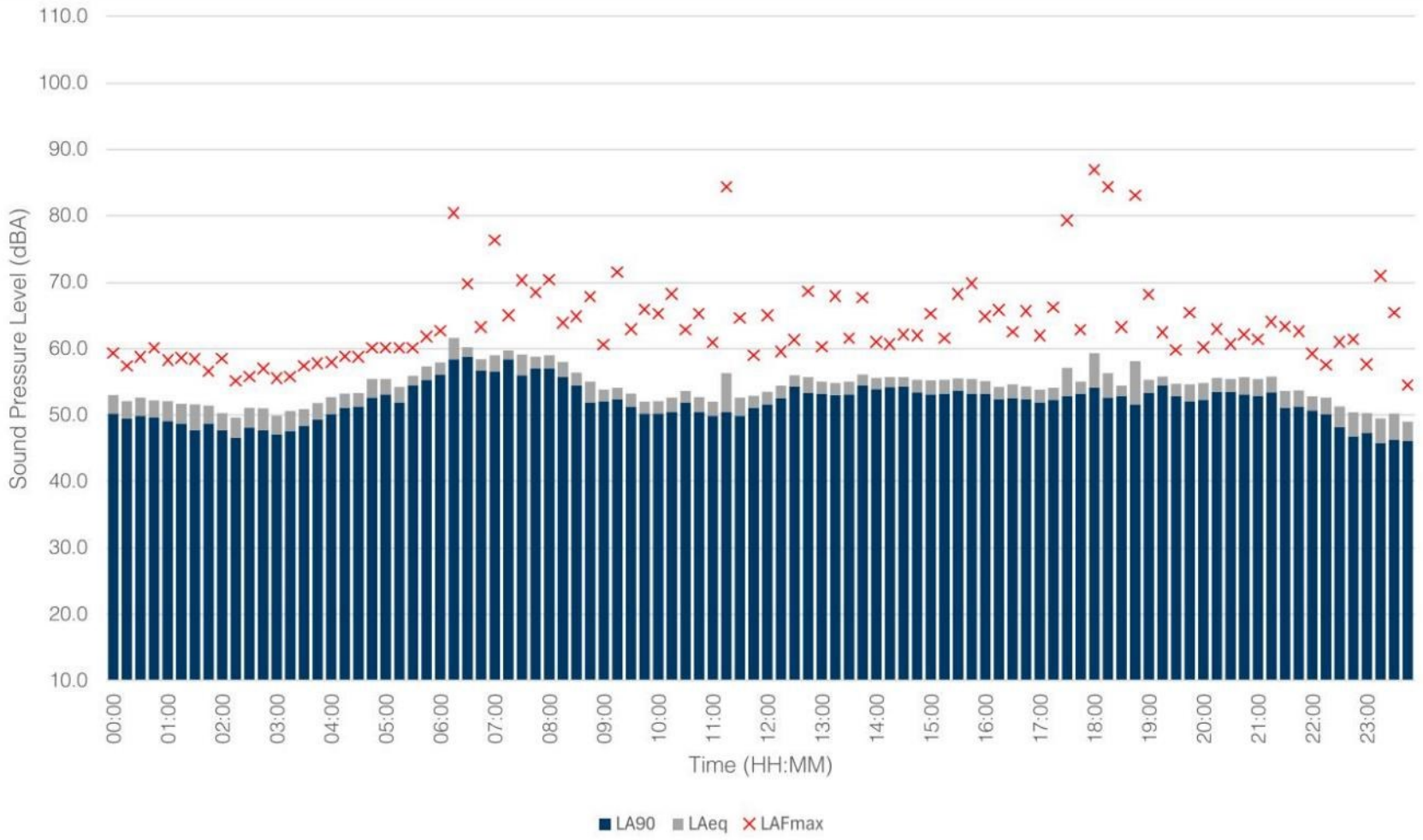
Air & Acoustic Consultants



Time History Graph B.7

Project Name:	Hill Lane, Markfield
Measurement Location:	L1
Survey Date:	29/09/2025

Air & Acoustic Consultants



Time History Graph B.8

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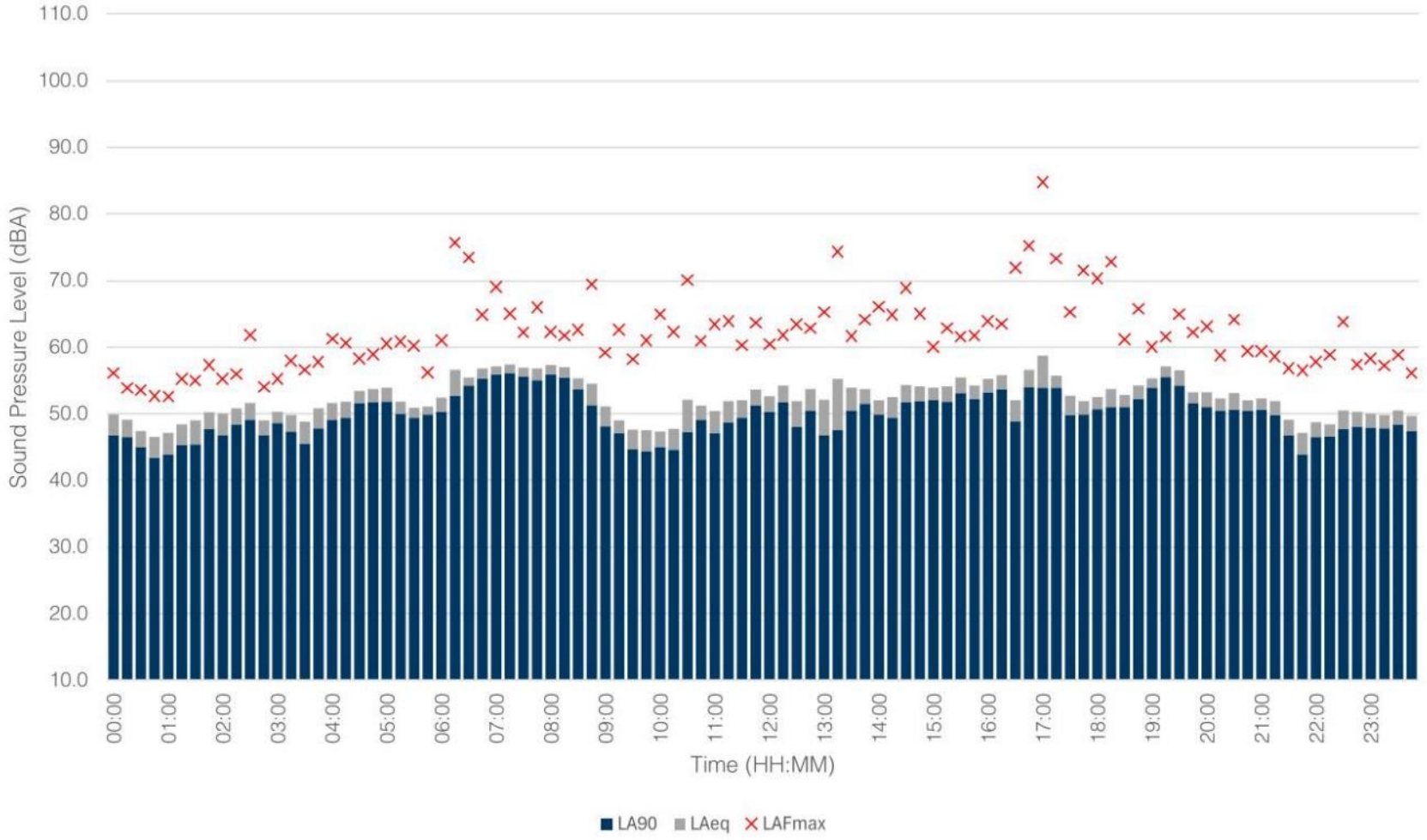
Measurement Location:	L1
Survey Date:	30/09/2025

Air & Acoustic Consultants



Time History Graph B.9

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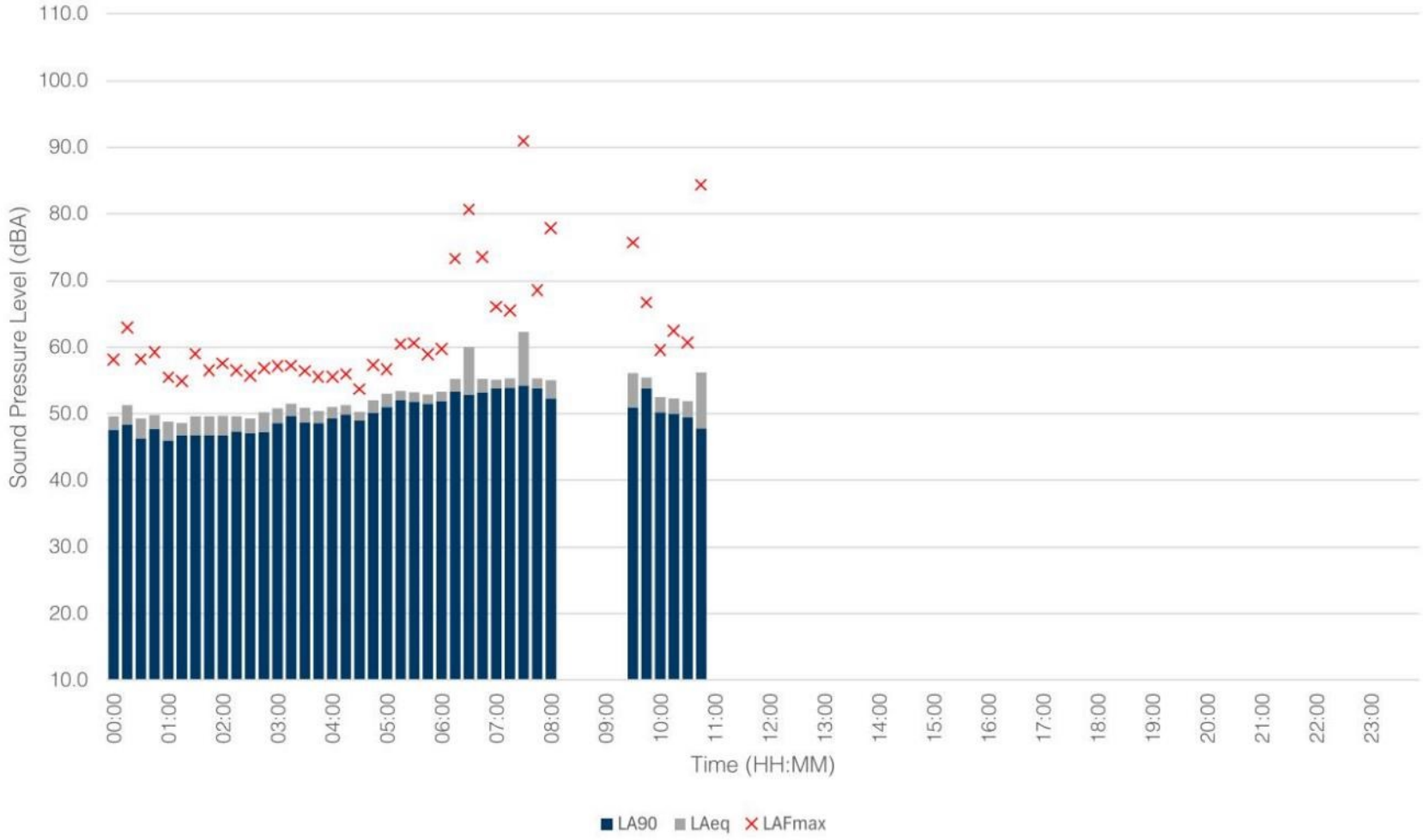
Measurement Location:	L1
Survey Date:	01/10/2025

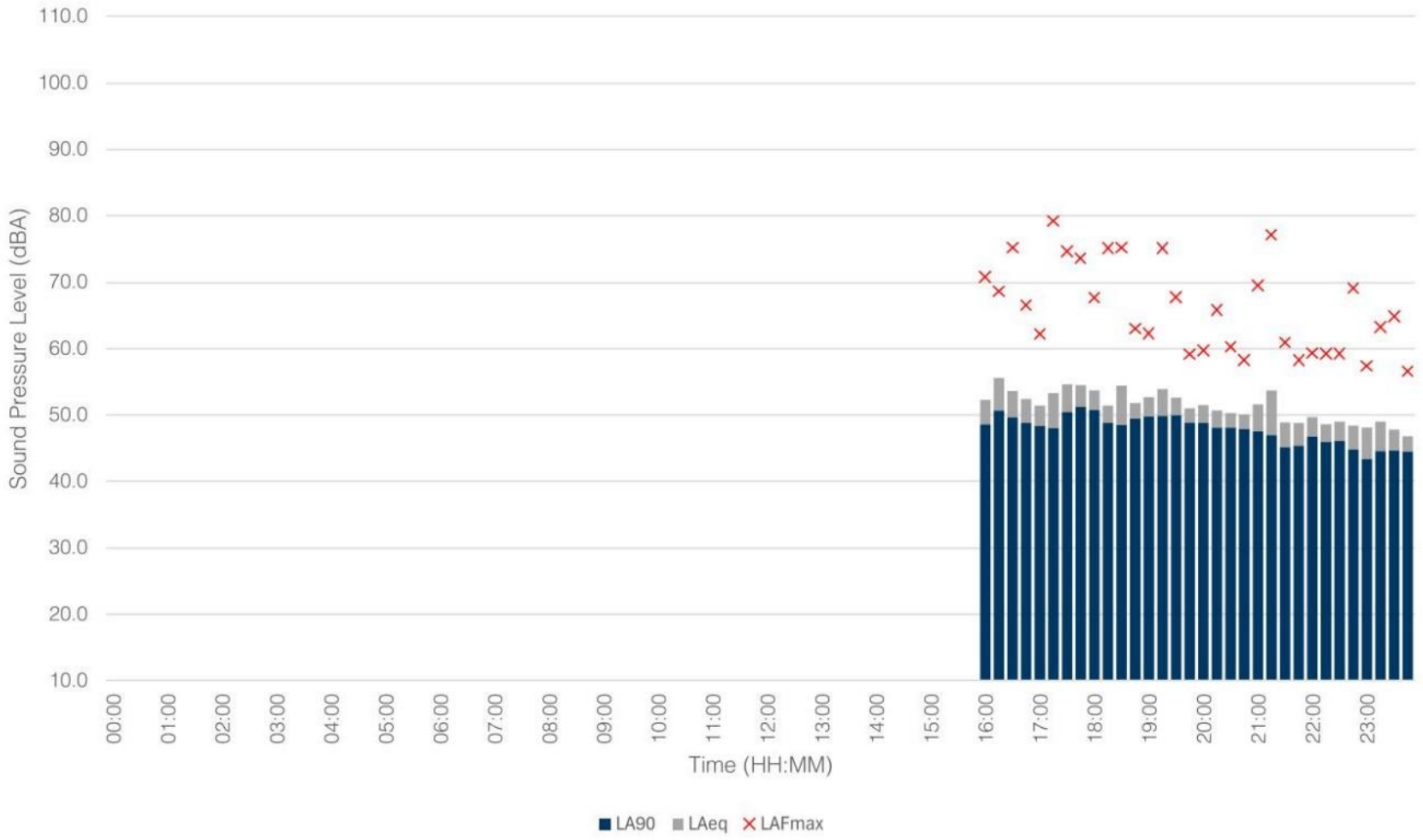
Air & Acoustic Consultants



Time History Graph B.10

Project Name:	Hill Lane, Markfield
Measurement Location:	L2
Survey Date:	23/09/2025

Air & Acoustic Consultants



Time History Graph B.11

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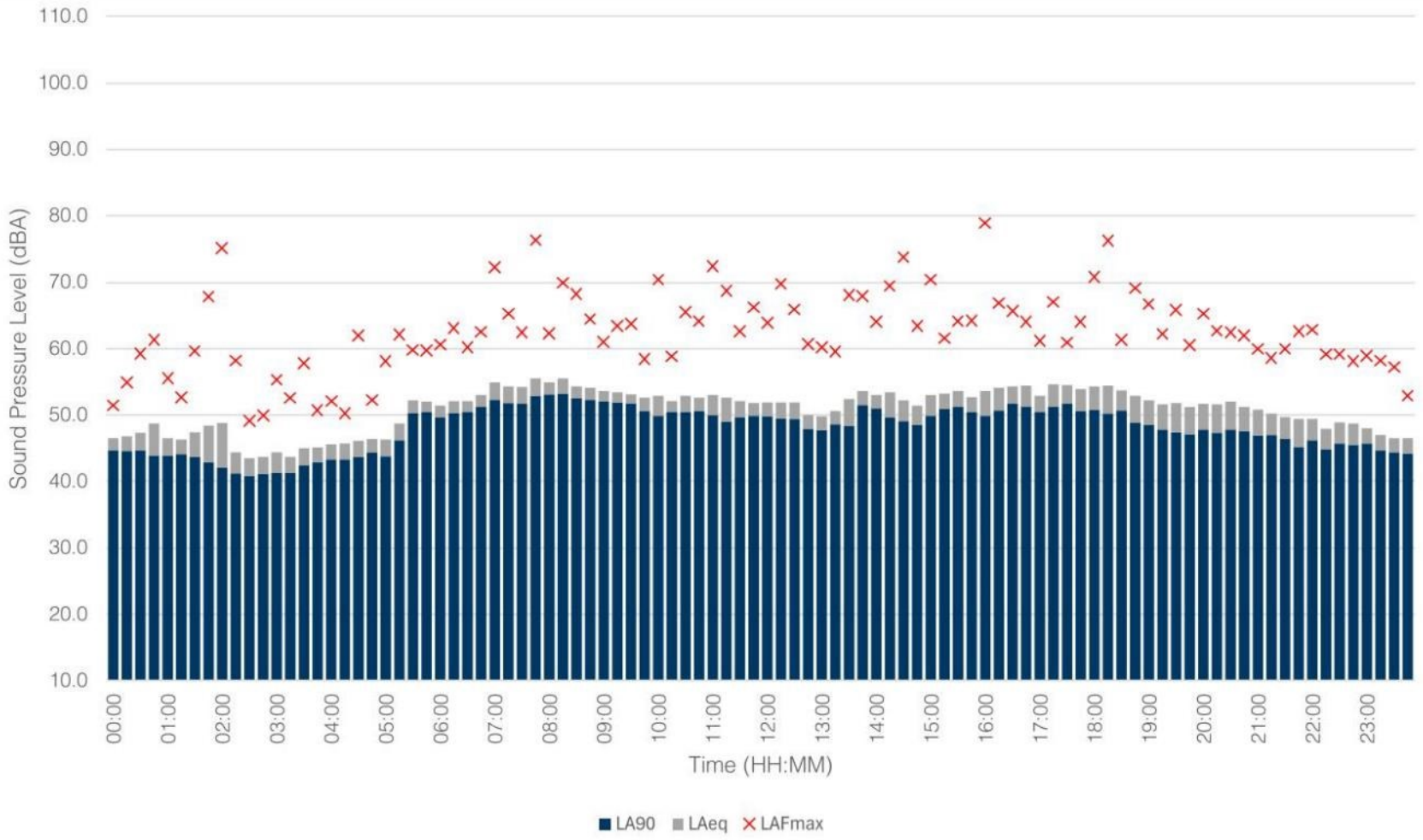
Measurement Location:	L2
Survey Date:	24/09/2025

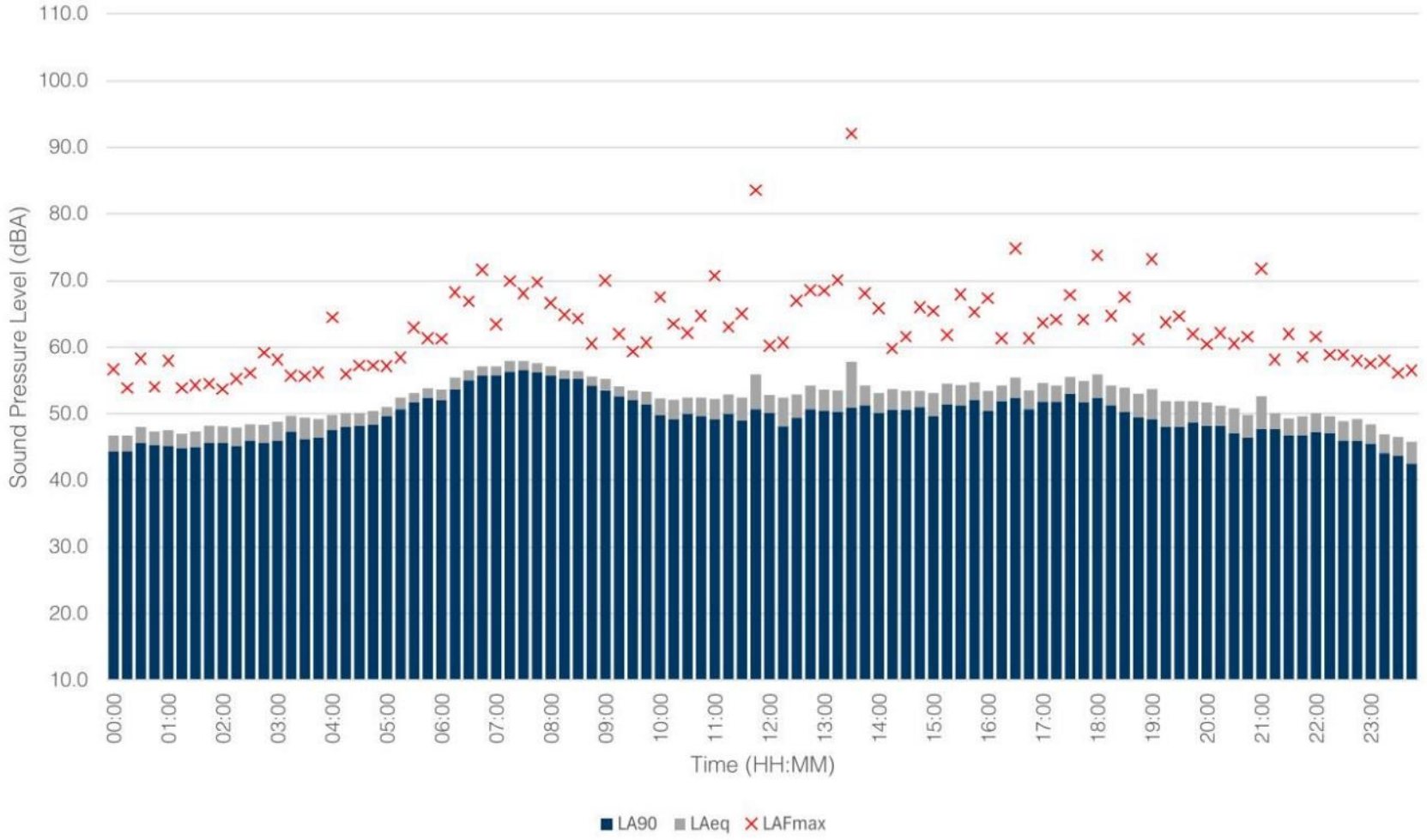
Air & Acoustic Consultants



Time History Graph B.12

Project Name:	Hill Lane, Markfield
Measurement Location:	L2
Survey Date:	25/09/2025

Air & Acoustic Consultants



Time History Graph B.13

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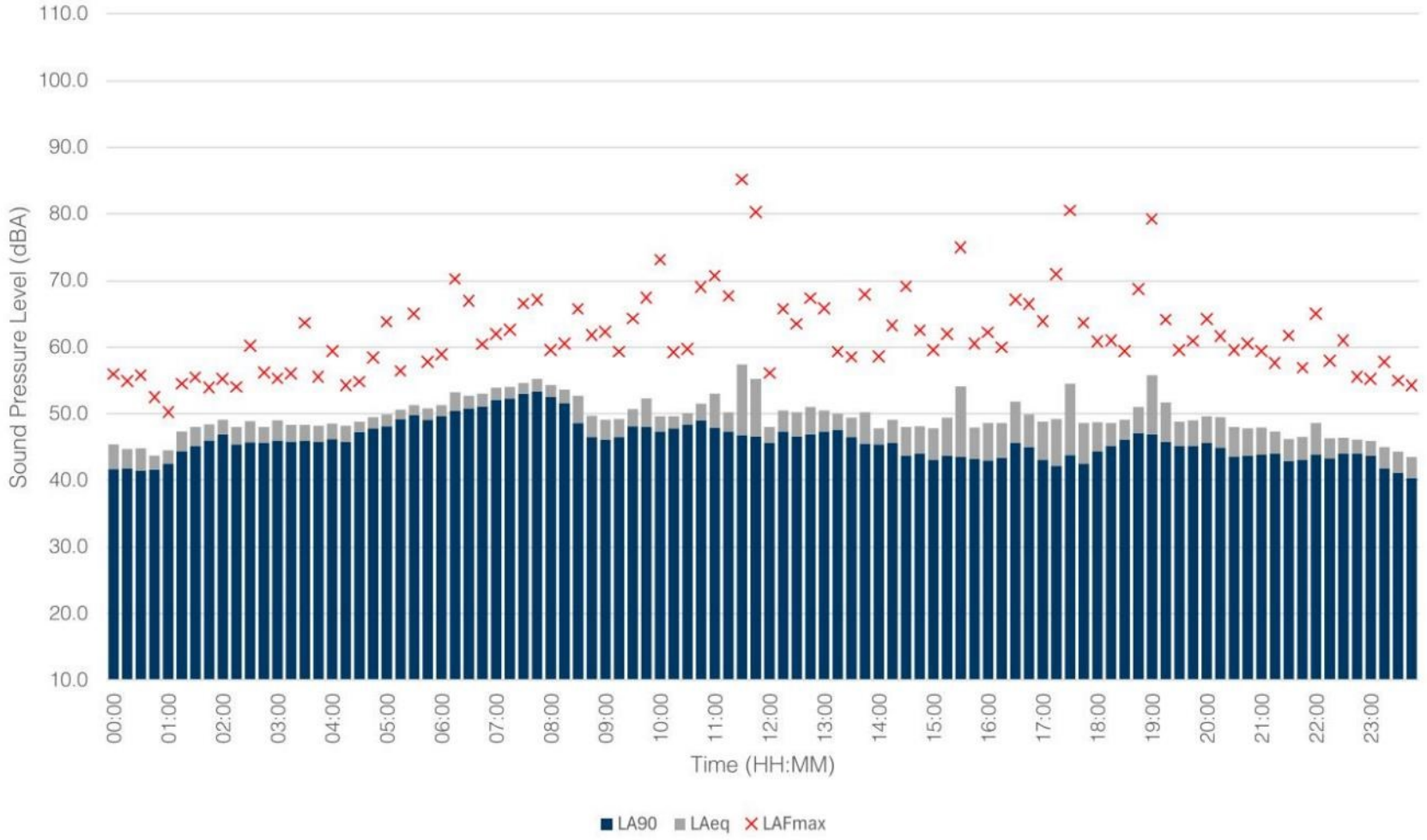
Measurement Location:	L2
Survey Date:	26/09/2025

Air & Acoustic Consultants



Time History Graph B.14

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Measurement Location:	L2
Survey Date:	27/09/2025

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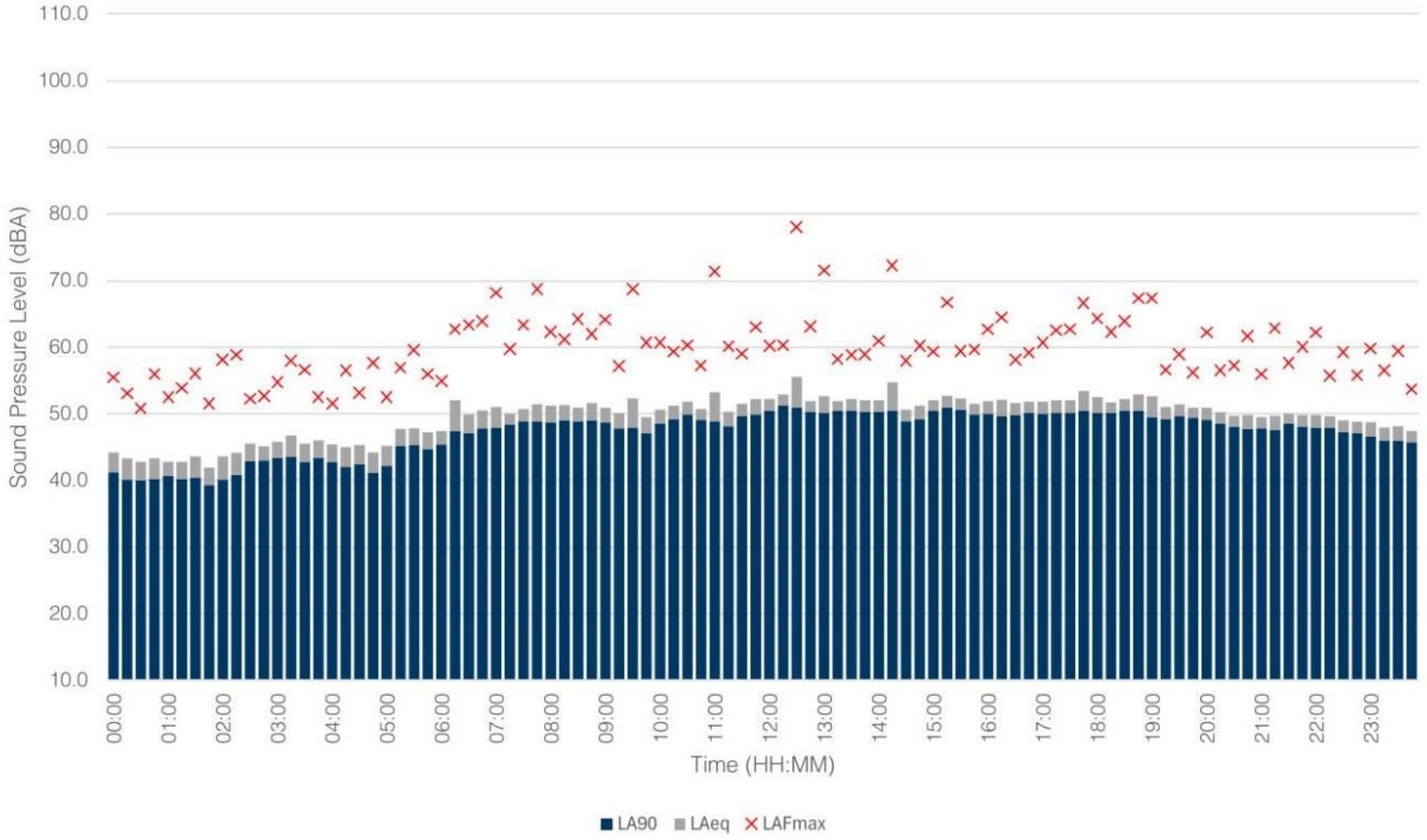

Time History Graph B.15

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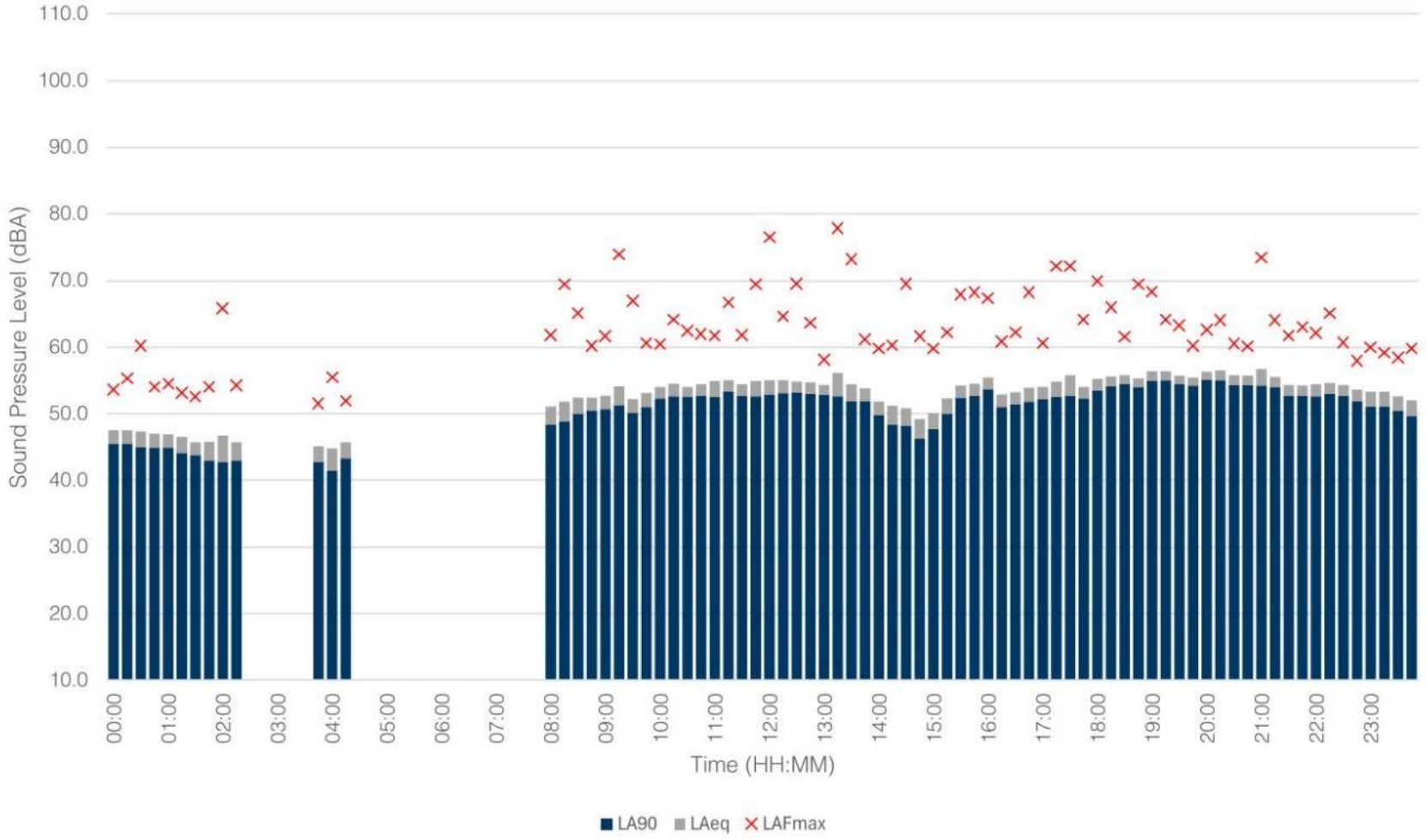
Measurement Location:	L2
Survey Date:	28/09/2025

Air & Acoustic Consultants



Time History Graph B.16

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Measurement Location:	L2
Survey Date:	29/09/2025

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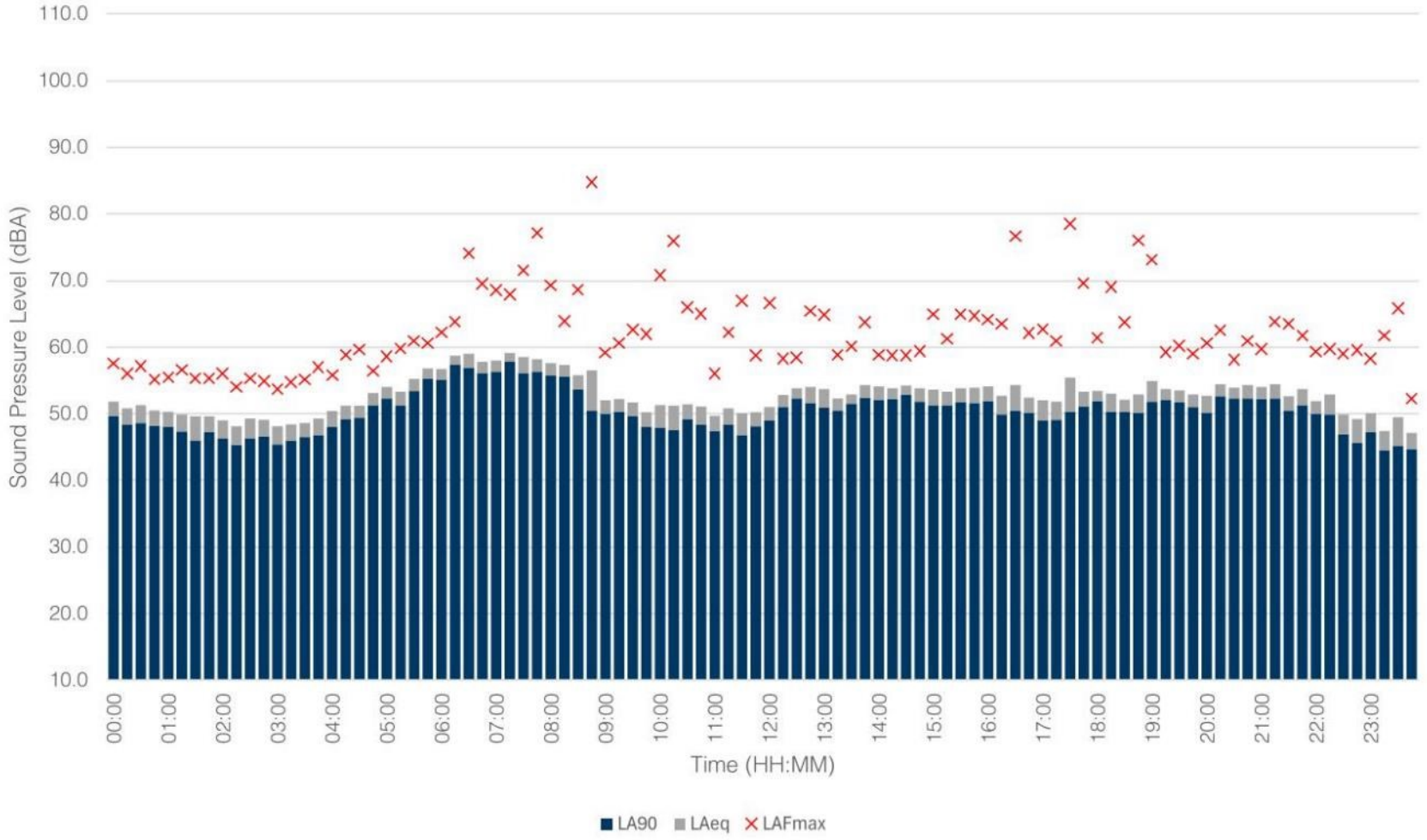

Time History Graph B.17

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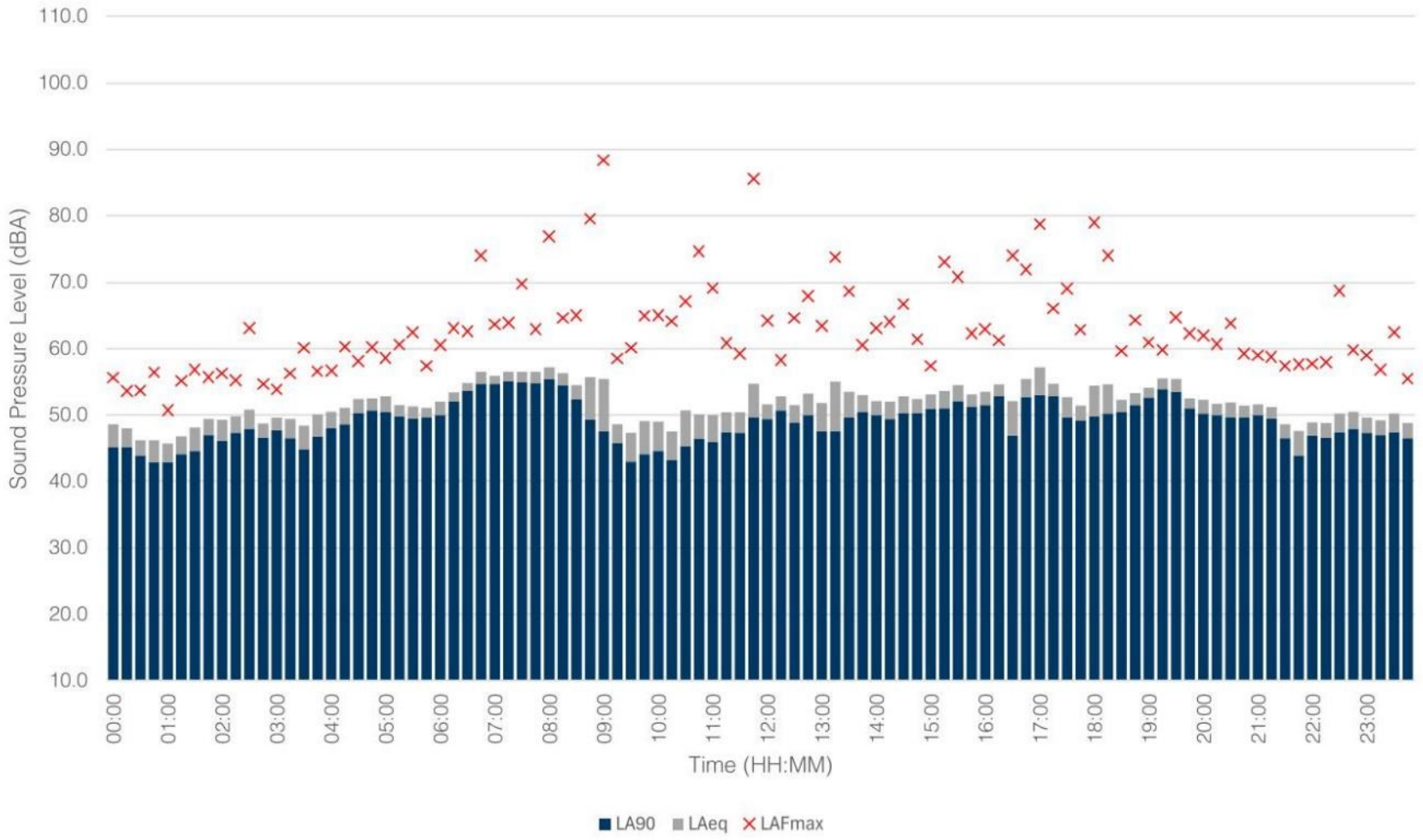
Measurement Location:	L2
Survey Date:	30/09/2025

Air & Acoustic Consultants



Time History Graph B.18

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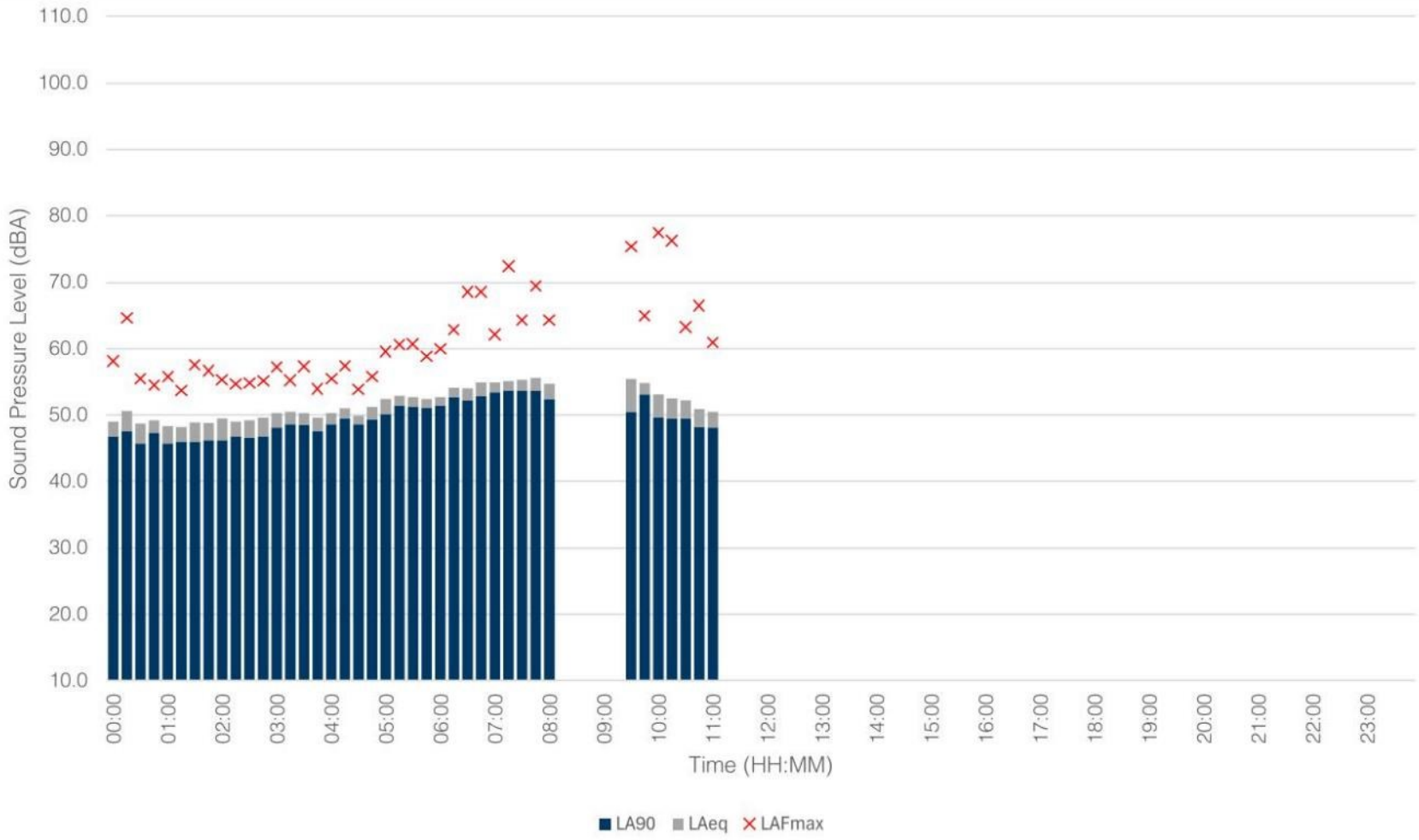
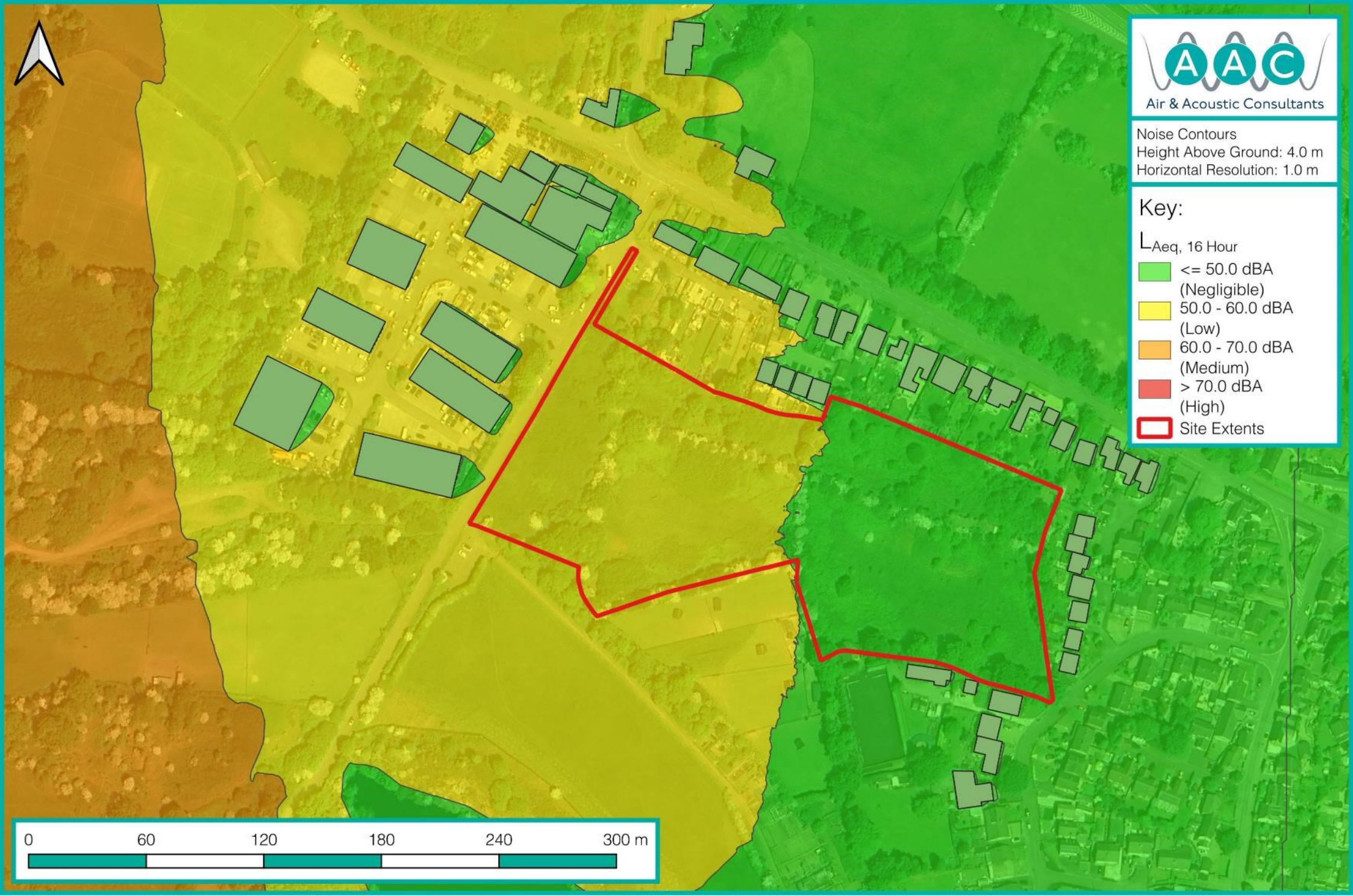
Measurement Location:	L2
Survey Date:	01/10/2025

Air & Acoustic Consultants

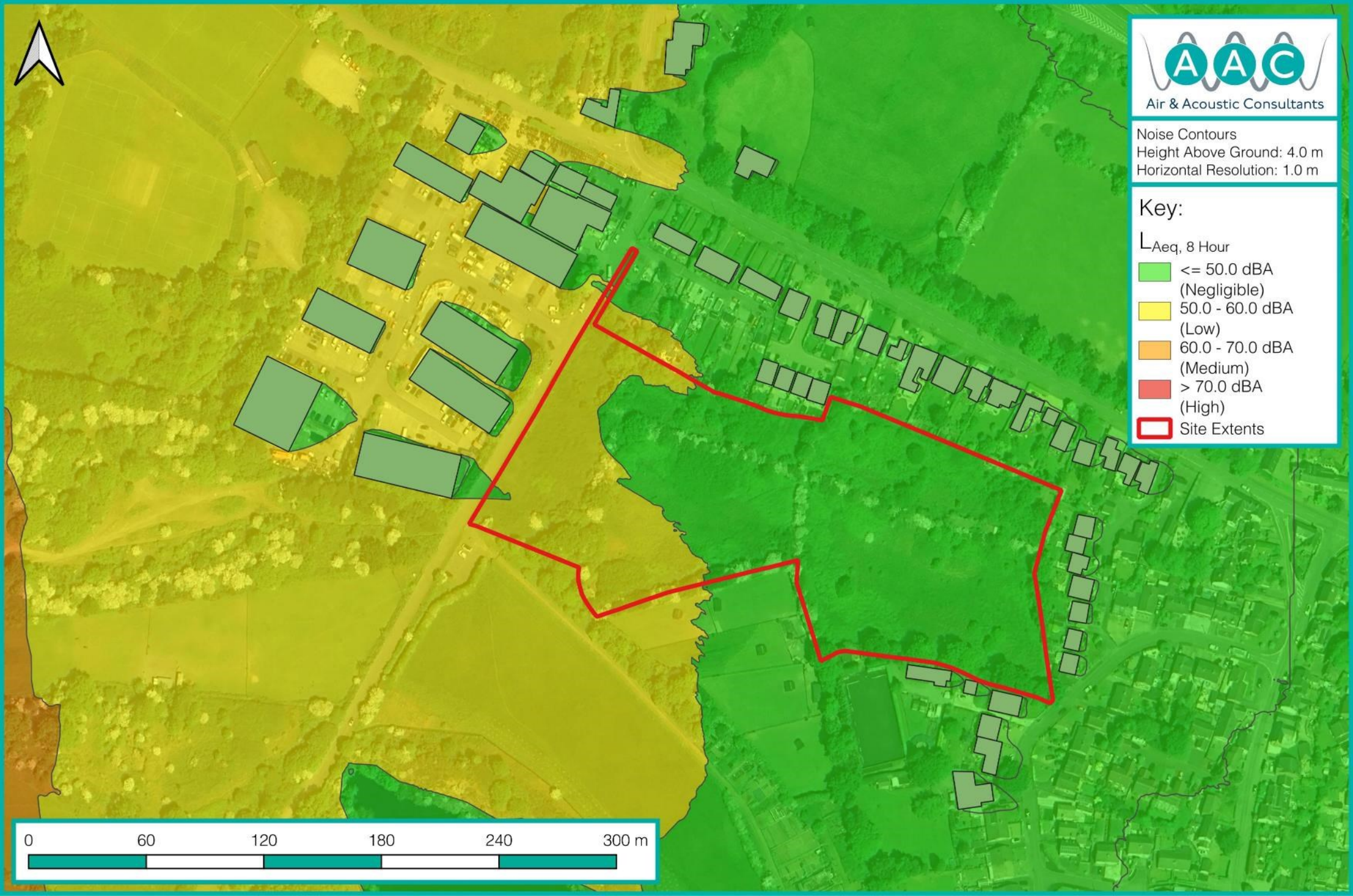


APPENDIX C – NOISE CONTOURS

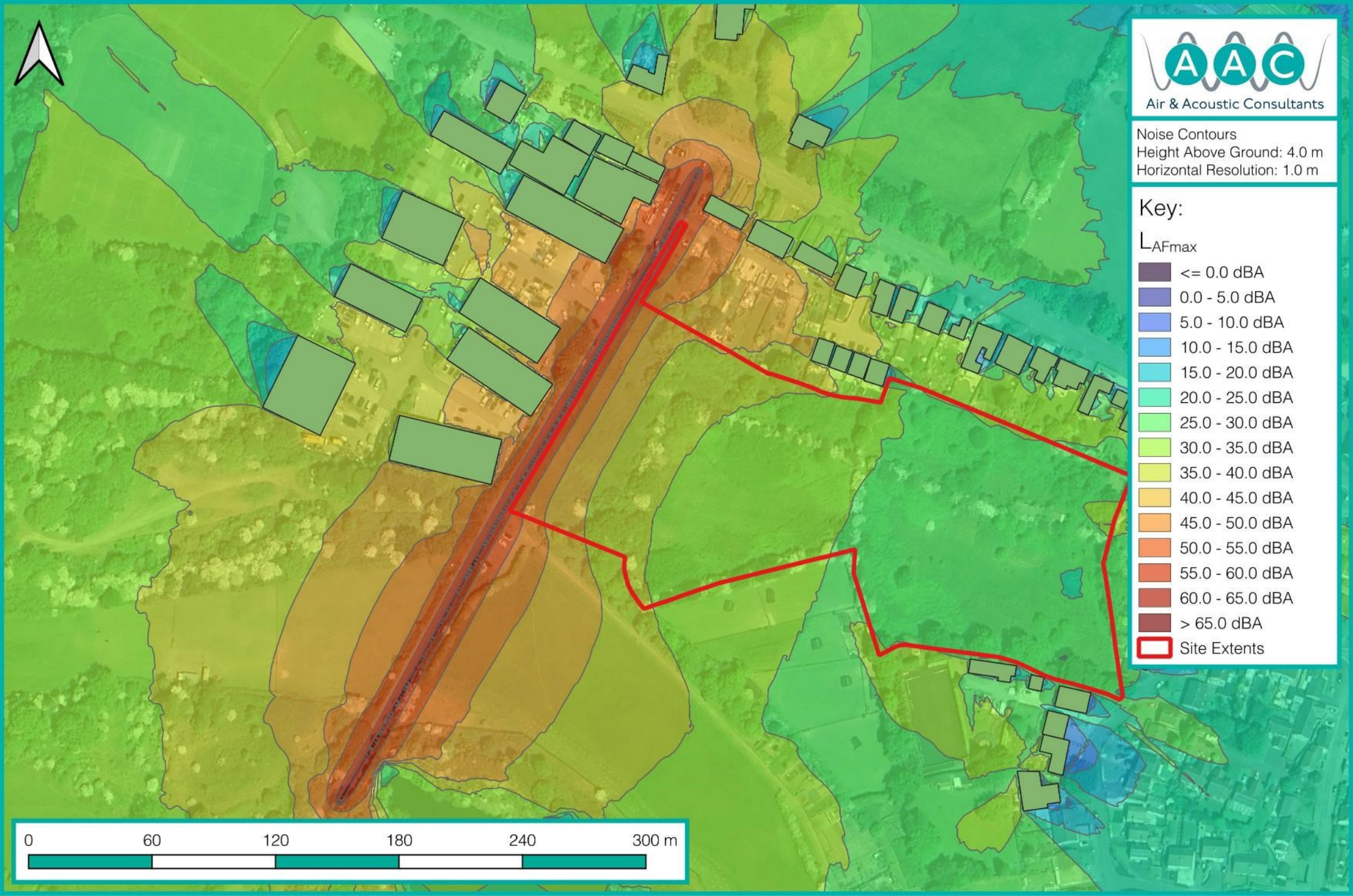
C.1 Daytime Noise Contours



C.2 Night-time Noise Contours

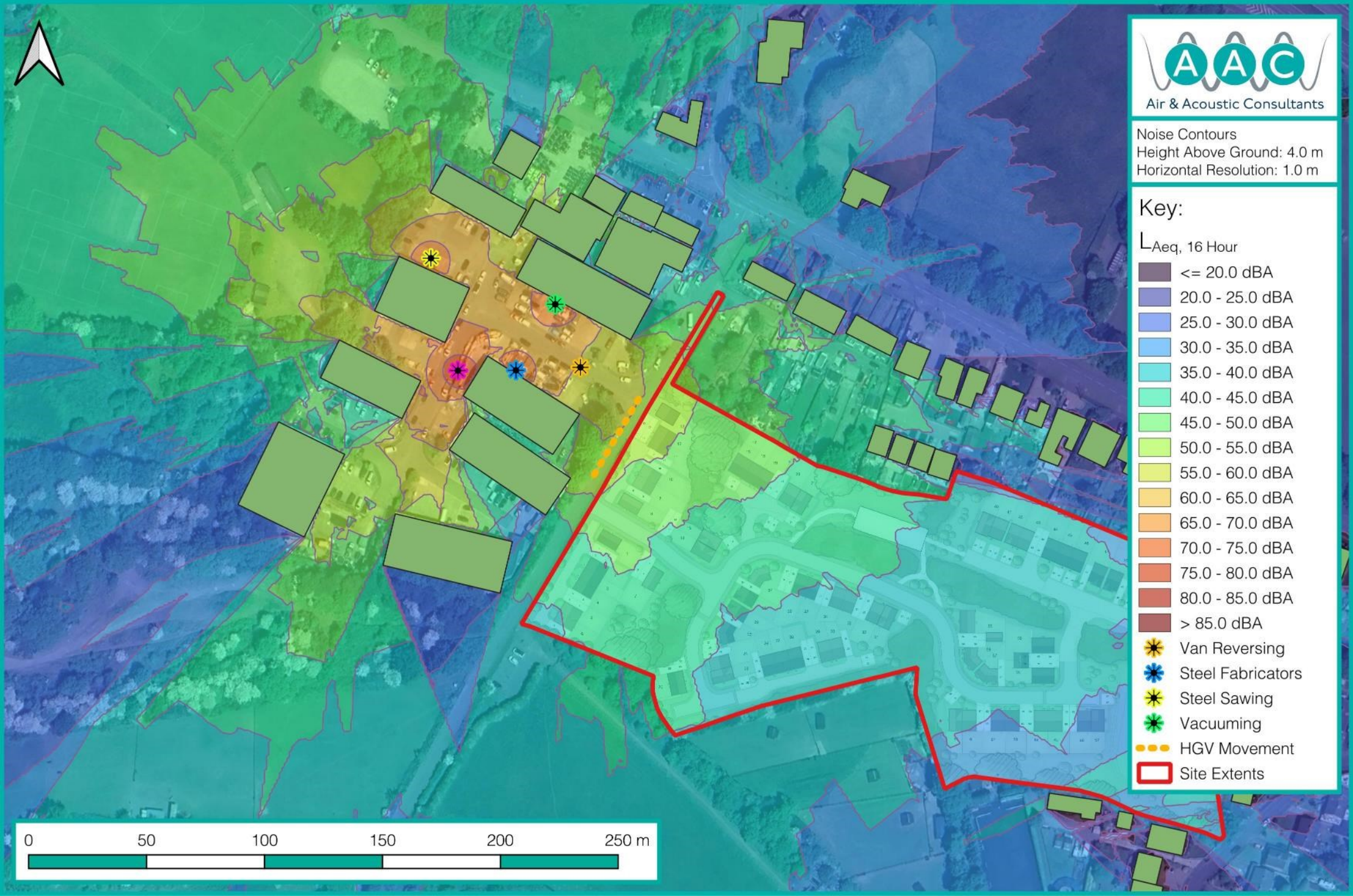


C.3 Night-time Maximum Noise Contours



C.4 Daytime External Amenity Noise Contours

C.5 Daytime Industrial Noise Contours



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