FORMER NOVARTIS SITE, HORSHAM – PHASE 3

ADO (Overheating) Noise Assessment

Reference: 15998.RP01.ADO.1
Prepared: 21 October 2026
Revision Number: 1

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ADO (Overheating) Noise Assessment

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Reference: 15998.RP01.ADO.1
Prepared: 21 October 2026

Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	17 August 2026	Toby Walton	Joe Allen
1	Revision following comments received	21 October 2026	Toby Walton	Joe Allen

Terms of contract:

RBA Acoustics Ltd have prepared this report in accordance with our Scope of Work 15998.ACB01.0 dated 30 June 2026. RBA Acoustics Ltd shall not be responsible for any use of the report or its contents for any purpose other than that for which it was provided. Should the Client require the distribution of the report to other parties for information, the full report should be copied. No professional liability or warranty shall be extended to other parties by RBA Acoustics Ltd without written agreement from RBA Acoustics Ltd.

The recommendations within this report relate to acoustics performance only and will need to be integrated within the overall design by the lead designer to incorporate all other design disciplines such as fire, structural integrity, setting-out, etc. Similarly, any sketches appended to this report illustrate acoustic principles only and will need to be developed into full working drawings by the lead designer to incorporate all other design disciplines.

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Contents

1. INTRODUCTION 1
2. PRE-COMMENCEMENT CONDITION 11 1
3. BUILDING REGULATIONS APPROVED DOCUMENT O (ADO) 2
4. ANC ACOUSTICS VENTILATION AND OVERHEATING GUIDE 3
5. EXTERNAL BUILDING FABRIC CRITERIA 7
6. SITE DESCRIPTION 8
7. ENVIRONMENTAL NOISE SURVEY 9
8. ADO ASSESSMENT 11
9. AVO LEVEL 2 ASSESSMENT 14
10. EXTERNAL BUILDING FABRIC ASSESSMENT 17
11. POST CONSTRUCTION COMMISSIONING METHODOLOGY 19
12. CONCLUSION 19

APPENDIX A - ACOUSTIC TERMINOLOGY

APPENDIX B - INSTRUMENTATION

APPENDIX C – ABSORPTION COEFFICIENTS

APPENDIX D – EXTERNAL BUILDING FABRIC ACOUSTIC SPECIFICATION

APPENDIX E – CDM CONSIDERATIONS

APPENDIX F - GRAPHS AND SITE PLANS

APPENDIX G – WATERSTONE OVERHEATING REPORT

1. INTRODUCTION

RBA Acoustics has undertaken an assessment of the external noise levels affecting future residential dwellings at the Former Novartis Site, Horsham with regards to the risk of overheating.

Many buildings require closed windows to provide good internal acoustic conditions, however, opening a window is the normal way to keep a building cool, especially during the warmer summer months. These opposing requirements have become a major issue in the design of buildings, in particular for housing, especially given the requirement to avoid the widespread use of mechanical cooling.

An assessment has been undertaken, based on typical room and window dimensions for the development, to indicate the extent of internal noise levels when windows are open to mitigate overheating. Where there are exceedances of the criteria, the largest window opening area to achieve the noise level criteria has been given.

Additionally, an assessment has been carried out in relation to the noise levels likely to be incident on the proposed building façades and to provide acoustic performance specifications such that acceptable internal noise criteria can be achieved.

This report is intended to support the discharge of Pre-Commencement Condition 11.

2. PRE-COMMENCEMENT CONDITION 11

We are in receipt of the following pre-commencement condition which has been applied to the development:

> *"Other than works of site survey and investigations, no development shall commence until a scheme of noise mitigation and mechanical ventilation sufficient to prevent overheating and maintain thermal comfort for all dwellings shall be submitted to for approval in writing from the Local Planning Authority. Any mechanical ventilation shall then be designed in accordance with the ANC Acoustics Ventilation and Overheating: Residential Design Guide 2020. The scheme shall also include performance details and a glazing plan sufficient to achieve the habitable room standards as detailed in BS 8233:2014 (and appropriate consideration of Lamax including details of post construction validation measurements). The dwellings shall be constructed in accordance with the approved details."*

3. BUILDING REGULATIONS APPROVED DOCUMENT O (ADO)

Building Regulations Approved Document O (2021 edition) provides guidance for mitigating overheating within residential developments. The document states that the building should be constructed to meet the requirement using passive means as far as reasonably practicable. With regards to removing excess heat, the first choice is therefore to use openable windows to mitigate overheating.

The document provides a simplified method for demonstrating compliance and an alternative, more detailed, dynamic thermal modelling approach. With regards to acoustic impact the following references are made:

3.1 The standards in this section may mean that the standards of the simplified method cannot be met. For example, if external noise is an issue, it is unlikely that windows would be opened by an occupant and therefore the minimum free areas of the simplified method cannot be met. In such cases, ***dynamic thermal modelling*** *should be used.*

NOISE

3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating strategy should take into account of the likelihood that windows will be closed during sleeping hours (11 pm to 7 am).

3.3 Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

(a) 40 dB $L_{Aeq,T}$ averaged over 8 hours (between 11 pm and 7 am)
(b) 55 dB L_{AFmax} more than 10 times a night (between 11 pm and 7 am)

3.4 Where in-situ noise measurements are used as evidence of that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants' Measurement of Sound Levels in Buildings *with the overheating mitigation strategy in use.*

NOTE: *Guidance on reducing the passage of external noise into buildings can be found in the National Model Design Code: Part 2 – Guidance Notes (MHCLG, 2021) and the Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020)."*

With reference to the above Paragraph 3.3, the following limiting external free-field levels (as would be measured on a site prior to development) are implied (as no specific external threshold limits are provided directly). External noise levels above these values would not permit the use of the simplified method (as referred to in Paragraph 3.1) and dynamic thermal modelling should be used to demonstrate compliance:

Table 1* – External Noise Levels above which the Simplified Method cannot be Used

Parameter	High Risk Location	Moderate Risk Location
$L_{Aeq,\,8h}$, averaged over 8 hours (between 23:00 – 07:00)	44 dB	49 dB
L_{AFmax}, more than 10 times a night (between 23:00 – 07:00)	59 dB	64 dB

* This table has been reproduced with reference to the IOA & ANC document *'Guide to Demonstrating Compliance with the Noise Requirements of Approved Document O – July 2022'.*

The following should be noted with regards to the above:

- High / Moderate Risk refers to the risk of overheating (not noise)
- The noise thresholds are low and likely to be exceeded at most sites within towns and cities and also those in proximity to infrastructure / transport routes etc.

4. ANC ACOUSTICS VENTILATION AND OVERHEATING GUIDE

The Acoustics Ventilation and Overheating (AVO) guide published by the Association of Noise Consultants (ANC) and Institute of Acoustics (IOA) involves a two-level approach to addressing issues of overheating with respect to noise as described in Figure 1.

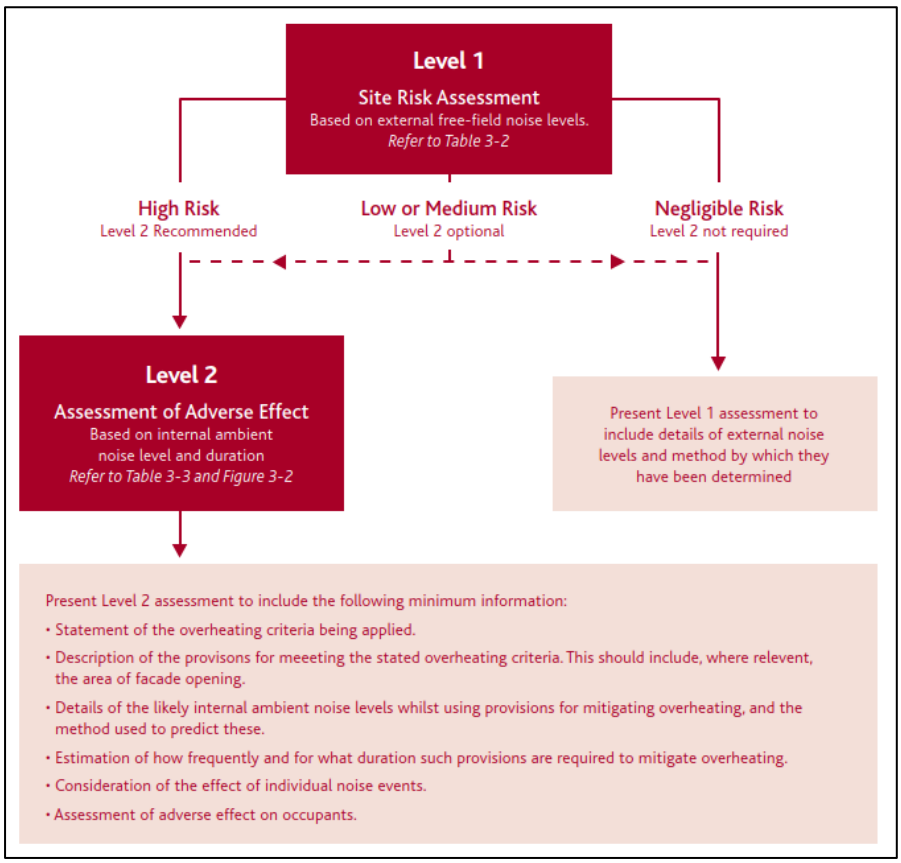


Figure 1 – AVO Assessment Process

4.1 AVO Level 1 Assessment

A Level 1 assessment is based purely upon external noise levels incident upon the façade of the assessment building. The areas are categorised is Low, Medium, or High risk depending the external noise levels incident upon the façade, as detailed in Figure 2.

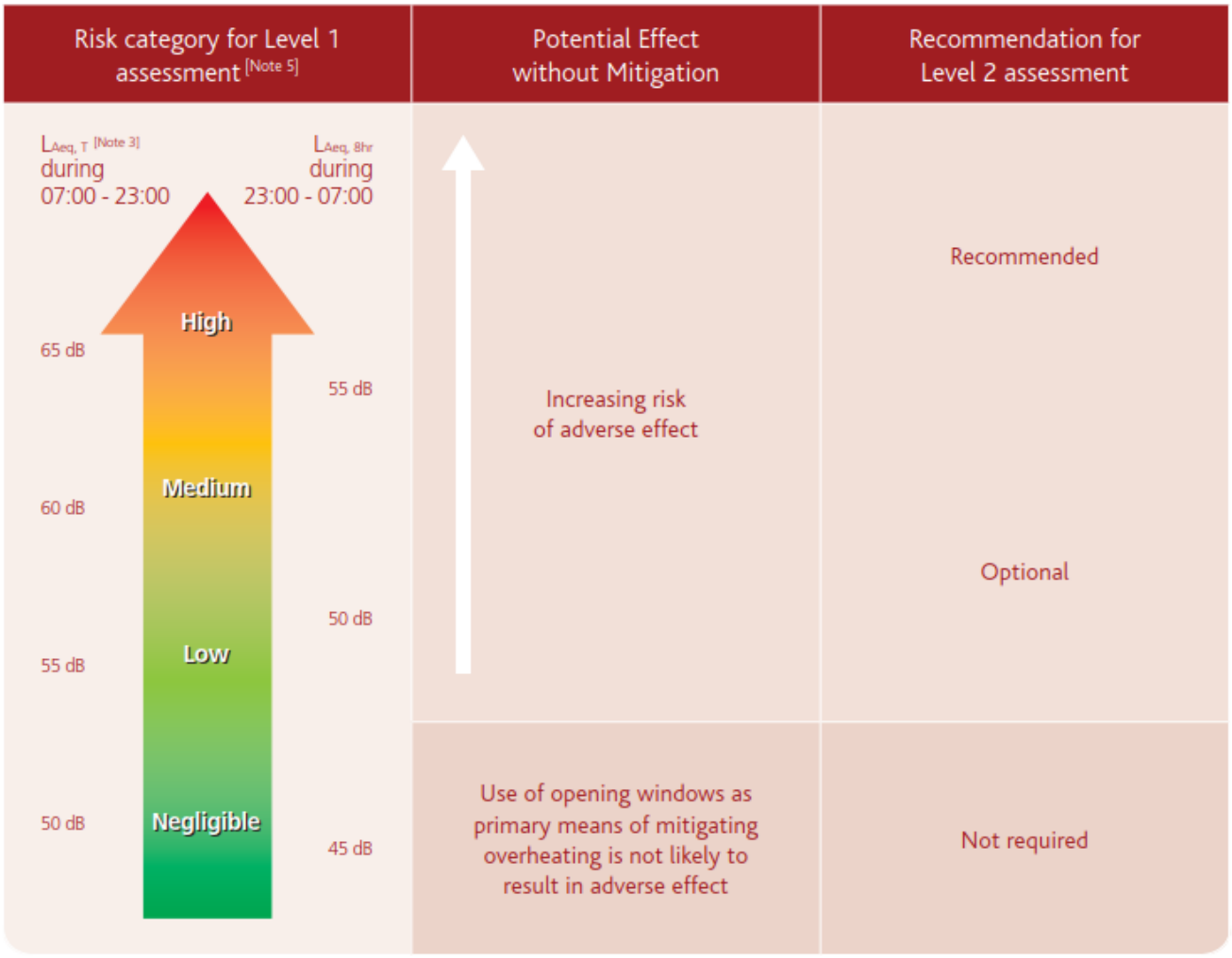


Figure 2 – Guidance for Level 1 site risk assessment of noise from transport noise sources relating to overheating conditions

The categorisation of risk was based on a design intent to achieve the recommended internal ambient noise levels for dwellings provided in Table 4 of BS 8233:2014, assuming a reduction of 13 dB for a partially opened window.

Although these standards relate to internal noise levels due primarily to steady external noise (e.g. road traffic noise) and should not be deemed fixed thresholds, we consider the guidance within BS 8233:2014 to represent an appropriate design target for the overheating condition in this instance.

4.2 AVO Level 2 Assessment

A Level 2 assessment considers internal noise levels within habitable rooms during the overheating condition in relation to the likely outcomes and risk of adverse effect for the occupants, as presented in Figure 3.

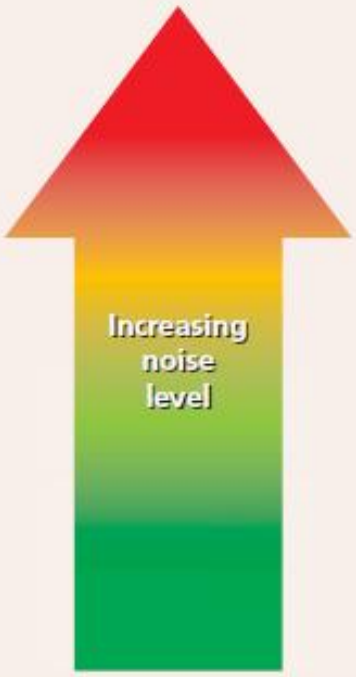
Internal ambient noise level [Note 2]			Examples of Outcomes [Note 5]	
$L_{Aeq,T}$ [Note 3] during 07:00 – 23:00 [Note 6]	$L_{Aeq,8h}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 [Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{AF,max}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. 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.
			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. [Note 8]
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{AF,max}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response[Note 9]. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

Figure 3 – AVO Level 2 Assessment Guidance

The numerical values shown are chosen to reflect the design intent to achieve the reasonable internal conditions as recommended in BS 8233:2014.

The Level 2 assessment introduces the concept of Effect Levels as a way of determining the impact of a particular outcome. The effect levels are outlined in the Noise Policy Statement for England (NPSE) and are as follows:

- No Observed Effect Level (NOEL)
- Lowest Observed Adverse Effect Level (LOAEL)
- Significant Observed Adverse Effect Level (SOAEL)

The NPSE guidance is that the SOAEL should be avoided, and that impacts which sit between the LOAEL and SOAEL should be mitigated and reduced to a minimum. The effect level will be a product of not only the noise level experienced, but also the duration and frequency of the overheating condition as well as the time of day at which it occurs and any number of other factors. Qualification of the potential impact on occupants is therefore a product of both acoustic and thermal comfort. To this end, the AVO guide presents an indicative graph in order to consider the relationship between the frequency/ duration of the overheating condition and the magnitude of the noise with respect to the likely adverse effect on occupants of the dwellings, as shown in Figure 4. This graph provides qualitative guidance on the combined effect of internal ambient noise level and duration for the overheating situation.

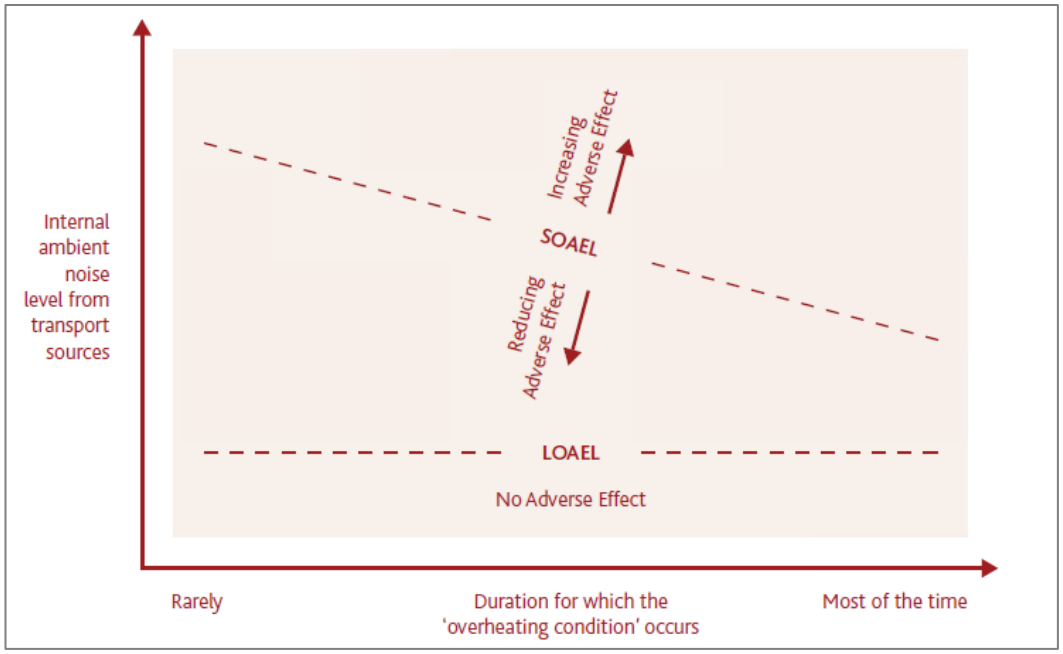


Figure 4 – Qualitative guidance on the combined effect of internal noise level and overheating duration

From Figure 4, it can be seen that the noise level at which a Significant Adverse Effect (SOAEL) is observed reduces with increasing frequency/duration of the predicted overheating condition. Similarly, if the frequency/duration of the overheating condition can be reduced, the magnitude of the noise that is considered reasonable for occupants to experience can increase.

5. EXTERNAL BUILDING FABRIC CRITERIA

This section outlines typical assessment criteria in terms of the relevant standards.

A summary of acoustic terminology is included in Appendix A.

5.1 British Standard 8233:2014

British Standards Institution (2014) *BS 8233:2014: Guidance on Sound Insulation and Noise Reduction for Buildings* draws on the results of research and experience to provide information on achieving internal acoustic environments appropriate to their functions.

The noise level values given are in terms of an average (L_{Aeq}) level.

The standard advises internal ambient noise levels for achieving suitable resting and sleeping conditions within residential properties as set out in Table .

Table 2 – BS 8233:2014 Residential Criteria

Room	Daytime (07:00 to 23:00)	Night-time (23:00 to 07:00)
Living Rooms	35 dB $L_{Aeq,16hour}$	--
Dining Room/area	40 dB $L_{Aeq,16hour}$	--
Bedrooms	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

5.2 World Health Organisation (WHO) Guidelines

WHO (2018) *Environmental Noise Guidelines for the European Region* sets out to define "*recommended exposure levels for environmental noise in order to protect population health*". The guidance document relates specifically to external noise levels, and recommends that "*all CNG* [WHO (1999) *Guidelines for Community Noise*] *indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid*". RBA therefore make reference to Guidelines for Community Noise for recommendations on internal noise levels.

Guidelines for Community Noise describes guideline levels that are "*essentially values for the onset of health effects from noise exposure*". A table of guideline values is included, relating to adverse health effects, defined as any temporary or long-term deterioration in physical, psychological, or social functioning that is associated with noise exposure. The following is an extract from Table 4.1: Guideline values for community noise in specific environments, as stated in the WHO document.

Table 3 – Guideline Values for Community Noise

Specific Environment	Critical Health Effect(s)	L_{Aeq} (dB)	Time Base (hours)	L_{Afmax} (dB)
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-times	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

With reference to maximum noise levels the following guidance is provided within the WHO guidance:

> *"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night (Vallet & Vernet 1991) and most studies show an increase in the percentage of awakenings at SEL values of 55-60 dBA (Passchier-Vermeer 1993; Finegold et al. 1994; Pearsons et al. 1995). For intermittent events that approximate aircraft noise, with an effective duration of 10-30s, SEL values of 55-60 corresponds to a L_{Amax} value of 45 dB. Ten to 15 of these events during an 8 hour night-time implies a $L_{Aeq,\,8h}$ of 20-25 dB. This is 10-15 dB below the $L_{Aeq,\,8h}$ or 30 dB for continuous night-time noise exposure, and shows that intermittent character of noise must be taken into account when setting night-time noise limits for noise exposure. For example, this can be achieved by considering the number of noise events and the difference between the maximum sound pressure level and the background of these events."*

Therefore, the frequency of occurrence of maximum noise events should not typically exceed 10-15 times in any night.

5.3 Summary of Internal Noise Level Criteria

The adopted project criteria are given below for habitable rooms used during the daytime (e.g.: living rooms and bedroom) and during the night-time (e.g.: bedrooms):

Table 4 – Summary of Internal Noise Level Criteria

Measurement Period	Period-Averaged Noise Level, $L_{Aeq,T}$ (dB)	Maximum Noise Level, $L_{AFmax,5min}$ (dB)
Daytime (07:00 – 23:00)	⩽ 35	-
Night-time (23:00 – 07:00)	⩽ 30	⩽ 45

6. SITE DESCRIPTION

The site is located in Horsham town centre, with Parsonage Road running to the north. A trainline runs along the east of the site serving Horsham and Littlehaven stations, with an industrial park located on the other side of the line. A trainline also runs to the south of the site serving Horsham and Warnham stations. To the west of the site is the area designated for Phases 1 and 2 of the same development.

Noise levels at the site were noted to mainly consist of road traffic noise arising from Parsonage Road and the wider road network. Noise levels at the east of the site were also noted to consist of slow-moving train-pass bys, and low-level industrial noise.

The site is shown in relation to its surroundings in the site plan in Figure 1 in Appendix F.

7. ENVIRONMENTAL NOISE SURVEY

7.1 Survey Methodology

Monitoring of the prevailing background noise was undertaken over the following periods:

- MP1-3: 15:00 hours Tuesday 19 November to 14:00 hours Thursday 21 November 2024.
- MP4: 15:00 hours Friday 29 August to 15:00 hours Tuesday 2 September 2025.

As the survey was unattended it is not possible to comment with certainty regarding meteorological conditions throughout the entire survey period. However, based on observations during the site visits and weather reports for the area, conditions were generally considered suitable for obtaining representative noise measurements, being predominantly dry with little wind.

Measurements were made of the L_{A90}, L_{Amax} and L_{Aeq} noise levels over sample periods of 15 minutes.

7.2 Measurement Locations

To determine the existing noise climate around the site measurements were undertaken at the following locations:

Table 5 – Measurement Positions

Measurement Position	Location	Description
MP1	Parsonage Road	The microphone was installed on a boom at a height of approximately 3 m from ground level, to achieve line of sight to Parsonage Road above the site hoarding. The dominant noise source in this location was road traffic noise from Parsonage Road.
MP2	East Railway Line	The microphone was installed on a tripod, placed on a concrete upstand to achieve line of sight to the railway line. The dominant noise in this location was train-passbys and to a lesser extent, industrial activity from with the industrial park.
MP3	Centre of Site	The microphone was installed on a tripod at a height of approximately 1.5 m from ground level, located to the west of the existing Novartis building. Noise levels at this location were noted to be generally low level but were dominated by distant road traffic noise.
MP4	South Railway Line	The microphone was installed on a boom at a height of approximately 3 m from ground level, to achieve line of sight to the railway line above the site hoarding. The dominant noise source in the location was the occasional train-passby.

The measurement positions are also illustrated on the site plan attached in Figure 1 and photos in Figures 2 - 5 Appendix F.

7.3 Instrumentation

For information regarding the equipment used for the measurements please refer to Appendix B.

The sound level meters were calibrated both prior to and on completion of the survey with no significant calibration drifts observed.

7.4 Results

The noise levels measured are shown as time-histories on the attached Graphs 1-9 Appendix F.

The measured period-averaged L_{Aeq} and typical night-time L_{AFmax} noise levels are summarised in Table 6, below:

Table 6 – Baseline Survey Measured Noise Levels

Position	Typical Background Noise Level, $L_{A90,15min}$ (dB)		Time-Averaged Noise Level, L_{Aeq} (dB)		Typical Maximum Noise Level, $L_{AFmax,5min}$ (dB)
	Daytime (07:00-23:00)	Night-time (23:00-07:00)	Daytime (07:00-23:00)	Night-time (23:00-07:00)	Night-time (23:00-07:00)
MP1	49	37	65	55	76
MP2	47	44	61	56	74
MP3	47	32	51	43	59
MP4	47	42	53	50	69

8. ADO ASSESSMENT

This section provides a detailed assessment, which considers the sound reduction through an open window with recognition of the free area of opening.

8.1 Assumptions

8.1.1 Drawings

The following drawings have been used in the assessment.

Drawing Number	Revision	Description	Date
17100-HGP-P3-00-D-A-1004	P01	Block Plan - Ground	24 July 2026
17100-HGP-P3-00-D-A-1005	P01	Block Plan – First	24 July 2026
17100-HGP-P3-00-D-A-1006	P01	Block Plan - Second	24 July 2026
17100-HGP-P3-00-D-A-1007	P01	Block Plan – Third	24 July 2026

8.1.2 Noise Levels

The noise levels obtained in Section 7 have been used in the assessment to determine the façade incident noise levels.

8.1.3 External Wall

It is assumed that the external non-glazed areas are to comprise the following:

- Brickwork
- Thermal insulation and cavity
- Metsec type frame with mineral wool in void
- 2No. layers 15 mm dense plasterboard (min 12.5 kg/m^2 per board)

As such, we have assumed sound reduction indices equating to an overall R_w of 58 dB for all non-glazed façade areas comprising the above construction.

8.1.4 Openable Window Area

We understand that the window opening area for the bedroom windows is 1.28 m^2, based on the elevations and assuming that the openable window portion open to 90 degrees and is side hung. This gives an equivalent free area of 1.13 m^2.

8.2 Predicted Internal Noise Levels – Unrestricted Opening

Table 7 details the results of the assessment for the façades of the development. A façade zoning plan is provided in Figure 7 – Appendix F.

Table 7 - Measured levels and Risk Categorisation

Façade	Predicted Internal Night-time L_{Aeq} Noise Level (dB)	ADO Night-time L_{Aeq} Criteria (dB)	Predicted Internal Typical Night-Time L_{AFmax} (dB)	ADO Night-time L_{AFmax} Criteria (dB)
Zone 1	45	40	60	55
Zone 2	44	40	59	55
Zone 3	42	40	57	55
Zone 4	39	40	54	55

As can be seen from Table 7, a standard window opening area of 90 degrees results in exceedances of the Approved Document O criteria at some facades.

8.3 Predicted Internal Noise Levels – Restricted Opening

In order to further investigate, Table 8 outlines the window opening area that should prove acceptable acoustically.

Table 8 – Maximum Window Opening Area to Achieve Internal Noise Level Criteria

Façade	Opening Angle	Indicative Restrictor Size	Associated Equivalent Area (m^2)
Zone 1	12 degrees	178 mm	0.44
Zone 2	15 degrees	222 mm	0.52
Zone 3	25 degrees	368 mm	0.73
Zone 4	90 degrees (i.e. unrestricted)	1202 mm	1.13

The above restrictions result in the following predicted internal noise levels:

Table 9 – Predicted Internal Noise Levels with Restricted Opening

Façade	Predicted Internal Night-time L_{Aeq} Noise Level (dB)	ADO Night-time L_{Aeq} Criteria (dB)	Predicted Internal Typical Night-Time L_{AFmax} (dB)	ADO Night-time L_{AFmax} Criteria (dB)
Zone 1	39	40	55	55
Zone 2	40	40	55	55
Zone 3	40	40	55	55
Zone 4	39	40	54	55

As can be seen above, varying levels of window opening are capable of achieving the Approved Document O criteria.

8.4 TM59 Assessment

The TM59 assessment undertaken by Waterstone Design is appended to this report.

9. AVO LEVEL 2 ASSESSMENT

9.1 Assessment Methodology

The assumptions made are the same as though provided in the assessment in Section 8.0.

Based on the results of the calculations, the predicted internal noise levels have then been used to categorise the rooms, based on the levels detailed in Approved Document O and AVO and Figures 6, 7, and 8, as follows:

Figures 6 and 7 provide a specified SOAEL, depending on the length of the overheating condition, with an upper and lower limit on the levels. If the predicted internal noise level is below the lower limit, then this will be acceptable regardless of the frequency/duration of the window opening. If the predicted internal noise level is above the upper limit, then the SOAEL is exceeded regardless of the extent of the frequency/duration of the window opening. If the predicted internal noise level is between the upper and lower limit, then the frequency/duration of the window opening will determine whether the SOAEL is exceeded.

Using the red and green lines on Figures 6, 7, and 8, the categories are defined as:

Table 20 – AVO Level 2 Noise Levels

Daytime Noise Levels ($L_{Aeq, 07:00-23:00}$)	Night-time Noise Levels ($L_{Aeq, 23:00-07:00}$)	Night-time Maximum Noise Levels ($L_{AFmax, 23:00-07:00}$)	Mitigation
⩽ 40 dBA	⩽ 35 dBA	⩽ 45 dBA	Acceptable regardless of frequency/duration of window opening
40 – 50 dBA	35 – 40 dBA	45 – 55 dBA	SOAEL may be exceeded depending on frequency/duration of window opening
⩾ 50 dBA	⩾ 40 dBA	⩾ 55 dBA	SOAEL exceeded regardless of frequency/duration of window opening

As indicated in the above categories, if the noise levels fall between the red line and green line, SOAEL may be exceeded depending on the duration/frequency of the window opening. Based on the Figures 6, 7, and 8, the duration/frequency of window opening can be set as a percentage of the daytime or night-time period, and these could then be split into classifications. Table 11 details RBA Acoustics' approach to this classification.

Table 11 – Overheating period classification

Percentage of the period for which the overheating condition occurs	Classification
0% to 25%	Rarely
25% to 50%	Occasionally
50% to 75%	Frequently
75% to 100%	Most of the Time

Please note – these classifications have been defined by RBA Acoustics based on our interpretation of the AVO guidance and they should be reviewed by the overheating assessor. If this approach is not agreed with, then the overheating assessor should contact RBA Acoustics to discuss this in further detail.

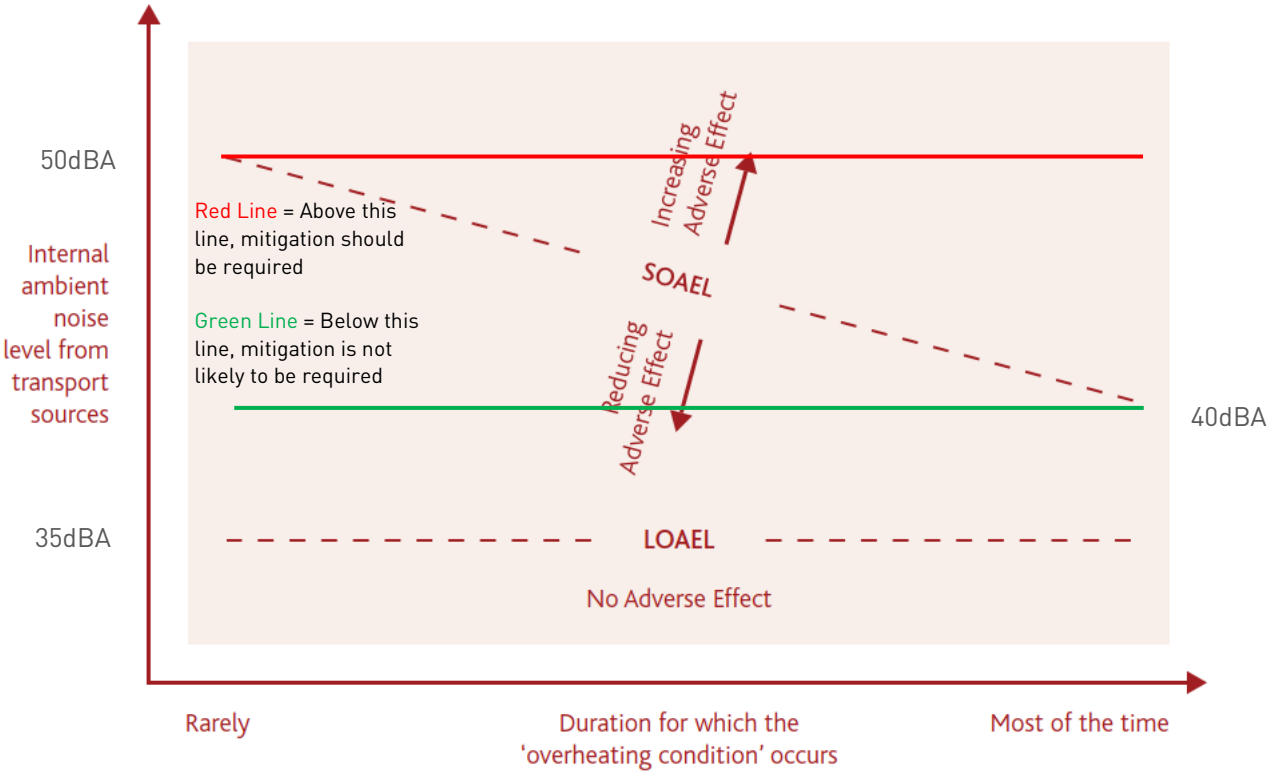


Figure 6 – Level 2 Assessment – Daytime $L_{Aeq,T}$

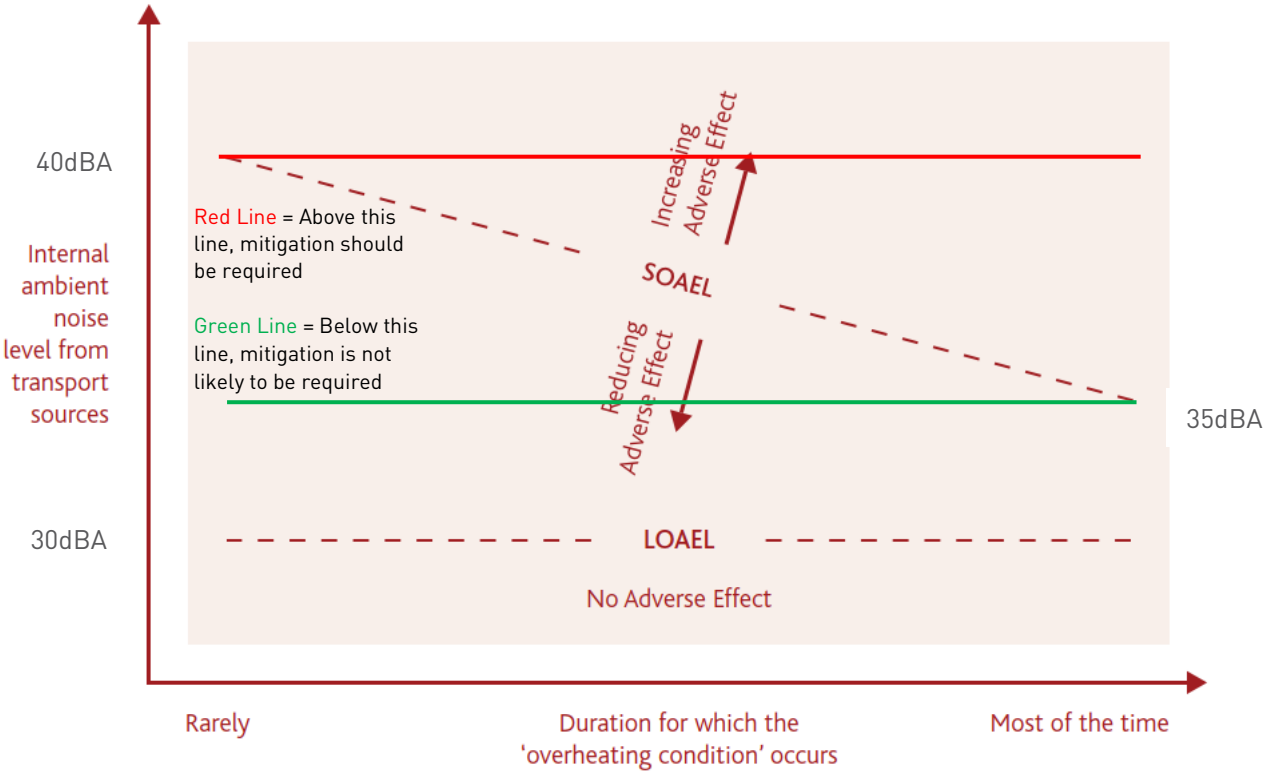


Figure 7 – Level 2 Assessment – Night-time $L_{Aeq,T}$

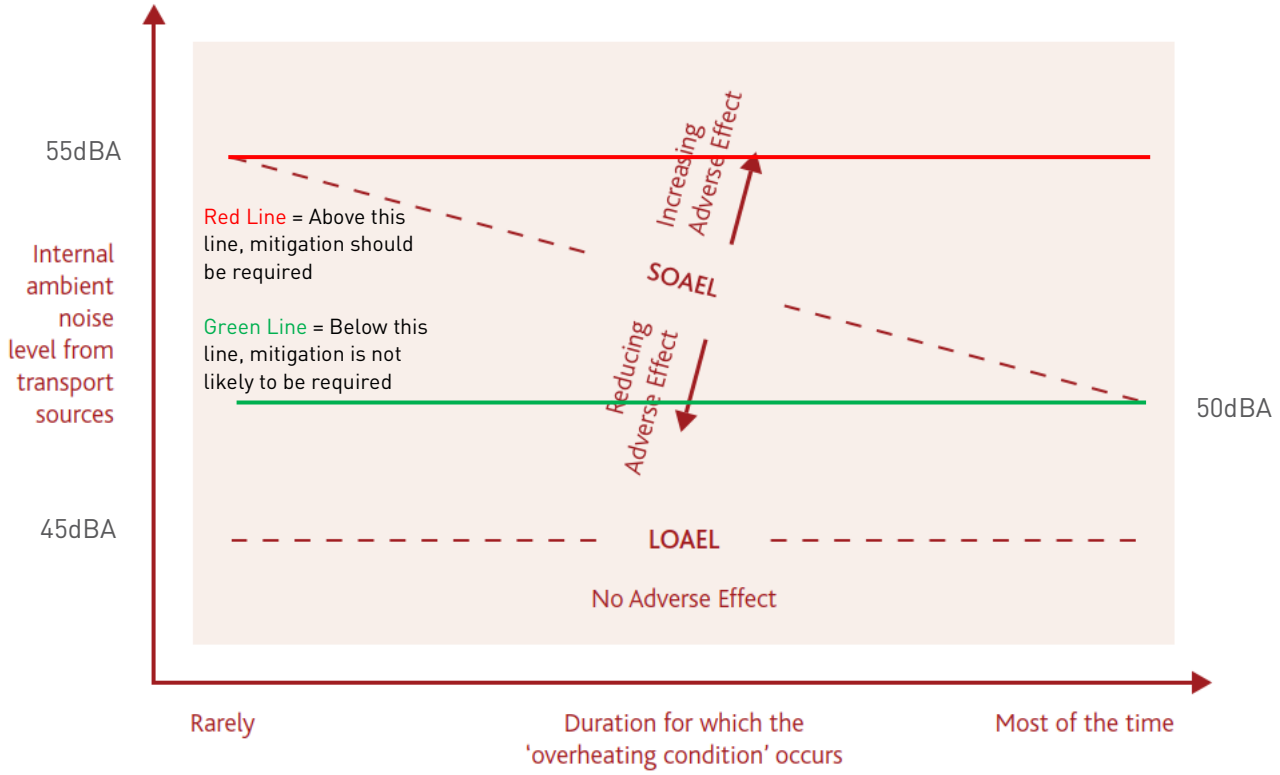


Figure 8 – Level 2 Assessment – Night-time L_{AFmax}

9.2 Discussion

With reference to Section 9.1 of the Waterstone Design Overheating Report presented within Appendix G, then calculated as per Section 8.0, quantified within the following table:

Table 13 – Predicted Internal Noise Levels with 'Overheating Condition' Duration

Façade	Predicted Internal Daytime L_{Aeq} Noise Level (dB)	Predicted Internal Night-time L_{Aeq} Noise Level (dB)	Predicted Internal Typical Night-Time L_{AFmax} (dB)	'Overheating Condition' Classification
Zone 1	46	39	55	Rarely
Zone 2	50	40	55	Rarely
Zone 3	47	40	55	Rarely
Zone 4	42	39	54	Rarely

The predicted internal noise levels with passive ventilation within each zone are highly likely to be below SOAEL given that the overheating condition rarely occurs.

10. EXTERNAL BUILDING FABRIC ASSESSMENT

10.1 Background

Analyses of the external building fabric have been undertaken in order to ascertain the required acoustic performance of the glazing and other external fabric elements to achieve the project criteria.

10.2 Assumptions

Our external building fabric analyses have assumed the following:

10.2.1 Drawings

The assessment has been based on the information provided in the following drawings:

Drawing Number	Revision	Description	Date
17100-HGP-P3-00-D-A-1004	P01	Block Plan - Ground	24 July 2026
17100-HGP-P3-00-D-A-1005	P01	Block Plan – First	24 July 2026
17100-HGP-P3-00-D-A-1006	P01	Block Plan - Second	24 July 2026
17100-HGP-P3-00-D-A-1007	P01	Block Plan – Third	24 July 2026

10.2.2 Noise Levels

The assessment has been based on the measured noise levels as detailed in 7.4.

10.2.3 Room Absorption

The calculations assume that bedrooms are acoustically 'soft' with carpets, curtains and other soft furnishings. The living rooms are assumed to be less acoustically absorptive (with a hard floor finish, although with furnishings).

Details of the absorption coefficients assumed in the calculations are provided in Appendix C.

10.2.4 External Wall

External non-glazed areas are to comprise the following:

- Brickwork
- Thermal insulation and cavity
- Metsec type frame with mineral wool in void
- 2No. layers 15 mm dense plasterboard (min 12.5 kg/m^2 per board)

As such, RBA have assumed the following sound reduction indices (equating to an overall R_w of 58 dB) for all non-glazed façade areas:

Table 14 – Assumed Sound Reduction Indices of Non-Glazed Elements

Assumed Minimum Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
35	42	48	53	63	70	74	74

Should the proposals for non-glazed areas change, it is critical RBA are informed at the earliest opportunity as this could have a significant impact on the sound insulation performance requirements of the glazing systems.

10.2.5 Ventilation

It is understood that mechanical ventilation systems are to be installed in line with Part F regulations to all dwellings and therefore trickle ventilators are required. Apartment bedrooms are to be provided with MVHR.

10.3 Specification & Guidance Constructions

Appendix D details the sound reduction performance specification for the ventilators and glazed elements of the external building fabric.

The glazing performance specifications apply to the glazing package as a whole - inclusive of glazing, louvres, spandrel panels, framing, opening lights, doors, seals, etc. The performance of the glazing system will depend on many factors such as the glazing configuration, size of window panels, quality of framing, quality of sealing, etc.

Please note – The glazing configurations described in Table 10 and ventilator types described in Table 11are given for costing purposes only. All window systems should be capable of meeting the performance specifications shown in Appendix D, with laboratory test certificates being made available in support of the quoted performance. Glazing proposals which simply reflect the guidance constructions indicated in this report will not, in isolation, be sufficient evidence that a window configuration will meet the performance specification.

For guidance purposes RBA would typically expect the following glazing configurations to prove commensurate with achieving the sound insulation performance specifications detailed within Appendix D.

Table 15 – Guidance on Glazing Constructions

Glazing Type	Example Glazing Configuration	Façade
G1	Standard thermal double glazing of differing pane thicknesses e.g., 4 mm glass / 12 mm air gap / 6 mm glass	All

For guidance purposes RBA would typically expect the following trickle ventilator types to prove commensurate with achieving the sound insulation performance specifications detailed within Appendix D.

Table 16 – Guidance on Trickle Ventilators

Ventilator Type	Example Ventilator Type	Façade
V1	'Hit-and-miss' trickle ventilator	All

11. POST CONSTRUCTION COMMISSIONING METHODOLOGY

In order to validate the internal ambient noise levels within finished dwellings, monitoring of a full 24-hour period should be undertaken of a sample of at least one dwelling within each façade zone, in order to capture the differing noise climate at each zone. The positions will be selected so as to represent the worst-case dwelling within each zone.

Measurements should be undertaken in general accordance with ANC Guidelines – Measurement of Sound Levels in Buildings. The results will be corrected for the expected reverberation time as necessary according to the state of furnishings at the time of commissioning.

12. CONCLUSION

RBA Acoustics has undertaken an assessment of the external noise levels affecting future residential dwellings at the Former Novartis Site, Horsham Development with regards to the risk of overheating.

Noise levels measured at the site location are presented within this report and used in order to determine the risk to the development of opening windows during the night-time to alleviate overheating and the resultant impact on internal noise levels within future dwellings.

An assessment has been undertaken of the predicted internal noise levels. This assessment indicates that some restriction to the level of window opening at the worst-affected facades will be required to achieve suitable internal noise levels.

Additionally, an assessment of the glazing requirements to ensure suitable internal noise levels are achieved at the proposed development with reference to BS 8233:2014 and WHO Guidelines has been undertaken.

Appendix A - Acoustic Terminology

A-weighting (e.g. dB(A))	A correction applied across the frequency bands to take into account the response of the human ear, and therefore considered to be more representative of the sound levels people hear.
DeciBel (dB)	Unit used for many different acoustic parameters. It is the logarithmic ratio of the level being assessed to a standard reference level.
$L_{eq,T}$	The level of a notional steady sound which, over a stated period of time, T, would have the same acoustic energy as the fluctuating noise measured over that period. Typically used to represent the average or ambient noise level.
$L_{Aeq,T}$	The A-weighted level of a notional steady sound which, over a stated period of time, T, would have the same acoustic energy as the fluctuating noise measured over that period. Typically used to represent the average or ambient noise level.
L_{An} (e.g. L_{A10}, L_{A90})	The sound level exceeded for n% of the time. E.g. L_{A10} is the A-weighted level exceeded for 10% of the time and as such can be used to represent a typical maximum level. Similarly, L_{A90} is the level exceeded for 90% of the measurement period, and is often used to describe the underlying background noise.
$L_{Amax,T}$	The instantaneous maximum A-weighted sound pressure level which occurred during the measurement period, T. It is commonly used to measure the effect of very short duration bursts of noise, e.g. sudden bangs, shouts, car horns, emergency sirens etc. which audibly stand out from the ambient level.
Octave band	A frequency band in which the upper limit of the band is twice the frequency of the lower limit.
1/3 Octave band	A frequency band which is one-third of an octave band.

Appendix B - Instrumentation

The following equipment was used for the acoustic measurements.

Table B1 - Equipment Calibration Details

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Expiry Date
Norsonic Type 1 Sound Level Meter	Nor140	1407962	UCRT24/1149	24 January 2026
Norsonic Pre Amplifier	1209	23790		
Norsonic ½" Microphone	1225	496129		
Norsonic Sound Calibrator	1255	125526426	UCRT24/1140	24 January 2026
Norsonic Type 1 Sound Level Meter	Nor140	1407961	477987612	8 May 2025
Norsonic Pre Amplifier	1209	23789		
Norsonic ½" Microphone	1225	496124		
Norsonic Sound Calibrator	1255	125526425	Cal 022-2023-17161	5 May 2025
Norsonic Type 1 Sound Level Meter	Nor140	1406262	U44036	18 April 2025
Norsonic Pre Amplifier	1209	20487		
Norsonic ½" Microphone	1225	469005	44035	18 April 2025
Norsonic Sound Calibrator	1251	34429	U44034	18 April 2025
Norsonic Type 1 Sound Level Meter	Nor140	1403127	U43500	28 February 2025
Norsonic Pre Amplifier	1209A	12071		
Norsonic ½" Microphone	1225	41473	43499	28 February 2025
Norsonic Sound Calibrator	1251	31986	U43498	28 February 2025
Norsonic Type 1 Sound Level Meter	Nor140	1407795	U45897	7 November 2025
Norsonic Pre Amplifier	1209	23230		
Norsonic ½" Microphone	1225	468969	45896	7 November 2025
Norsonic Sound Calibrator	1255	125525755	U45674	19 October 2025

Appendix C – Absorption Coefficients

For the purpose of the analyses RBA Acoustics have assumed the absorption coefficients detailed in Table B1 for Bedrooms and Table B2 for living rooms.

Table B2 – Bedroom Absorption Coefficients

Absorption Coefficient (α) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
0.15	0.18	0.25	0.27	0.31	0.32	0.32	0.32

Table B3 – Living Room Absorption Coefficients

Absorption Coefficient (α) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
0.15	0.18	0.20	0.22	0.22	0.22	0.23	0.27

Appendix D – External Building Fabric Acoustic Specification

External facade constructions and components, such as brise soleil, grilles, ventilators, curtain walling systems or other architectural features, are not to give rise to intrusive whistling, creaking, rattling or other noises as a result of wind or other climatic effects.

The Contractor shall take reasonable precautions to avoid unwanted noise including creaking, rattling and whistling being generated by the Contractors works when subject to environmental conditions (including wind) and thermal expansion over the life of the façade.

1.0 Window Sound Insulation Performance

Glazed units (inclusive of glazing, louvres, timber panels, spandrel panels, infill panels, framing, opening lights, balcony/terrace doors, seals, etc. as appropriate) should achieve the following minimum sound reduction indices as tested in general accordance with BS EN ISO 10140-2:2021:

Table C1 – Window Sound Insulation Performance Specification

Type	Minimum Recommended Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)								R_w (dB)
	63	125	250	500	1k	2k	4k	8k	
G1	19	23	24	27	38	40	41	41	33

Note: R_w is the "overall weighted sound reduction index" tested in a laboratory.

N.B. as the internal noise criteria is expressed in overall terms, other frequency-specific performance levels may ultimately prove acoustically acceptable. Test data for representative samples of all glazing systems shall be submitted to RBA Acoustics for approval to demonstrate compliance with the above performance specifications.

2.0 Ventilator Sound Insulation Performance

Trickle ventilators (in their open state) should achieve the following minimum element-normalised level differences as tested in accordance with BS EN 20140-10:2021:

Table C2 – Ventilator Sound Insulation Performance Specification

Type	Minimum Recommended $D_{n,e}$ (dB) at Octave Band Centre Frequency (Hz)								$D_{n,e,w}$ (dB)
	63	125	250	500	1k	2k	4k	8k	
V1	22	28	31	34	33	31	31	31	33

Note: $D_{n,e,w}$ is the "overall weighted element normalised level difference" tested in a laboratory.

Please note the above specification assumes one trickle ventilator will be installed per room, i.e. a continuous mechanical extract system (ADF System 3) will be utilised. The specification should be increased by a factor of 10Log(N) should N ventilators be required per room, i.e. increase by +3dB or +5dB respectively should two or three ventilators be required per room.

N.B. as the internal noise criteria are expressed in overall terms, other frequency specific performance levels may ultimately prove acoustically acceptable. Test data for the trickle vents in their open state shall be submitted to RBA Acoustics for approval.

Appendix E – CDM Considerations

The Likelihood (**L**) the harm will occur can be assessed by applying an indicative score (from 1 to 5) as follows:

1 – Remote (almost never)
2 – Unlikely (occurs rarely)
3 – Possible (could occur, but uncommon)
4 – Likely (recurrent but not frequent)
5 – Very likely (occurs frequently)

The Severity of harm (**S**) can be assessed by applying an indicative score (from 1 to 5) as follows:

1 – Trivial (e.g. discomfort, slight bruising, self-help recovery)
2 – Minor (e.g. small cut, abrasion, basic first aid need)
3 – Moderate (e.g. strain, sprain, incapacitation for more than 3 days)
4 – Serious (e.g. fracture, hospitalisation for more than 24 hours, incapacitation for more than 4 weeks)
5 – Fatal (single or multiple)

The rating value is obtained by multiplying the two scores and is then used to determine the course of action.

Table D1- Risk Ratings

Rating Bands (Likelihood x Severity)		
Low Risk (1 – 8)	Medium Risk (9 -12)	High Risk (15 – 25)
May be ignored but ensure controls remain effective	Continue, but implement additional reasonable practicable controls where possible	Avoidance action is required; therefore alternative design solutions must be examined. Activity must not proceed until risks are reduced to a low or medium level

The following hazards pertinent to our design input have been identified and control measures suggested:

Table D2 – Risk Assessment

Hazard	Risk Of	At Risk	Rating			Control Measures	Controlled		
			L	S	R		L	S	R
Mineral wool within drywalls and linings	Skin and respiratory irritation	Contractors	4	3	12	Wear gloves and mask	1	3	3
Glazing - weight	Strain of neck, limbs or back. Fall from height.	Contractors	3	5	15	Provide sufficient manpower, lifting gear and structural support	1	5	5

L: Likelihood S: Severity R: Rating

Appendix F - Graphs and Site Plans

Novartis Site, Horsham - Phase 3

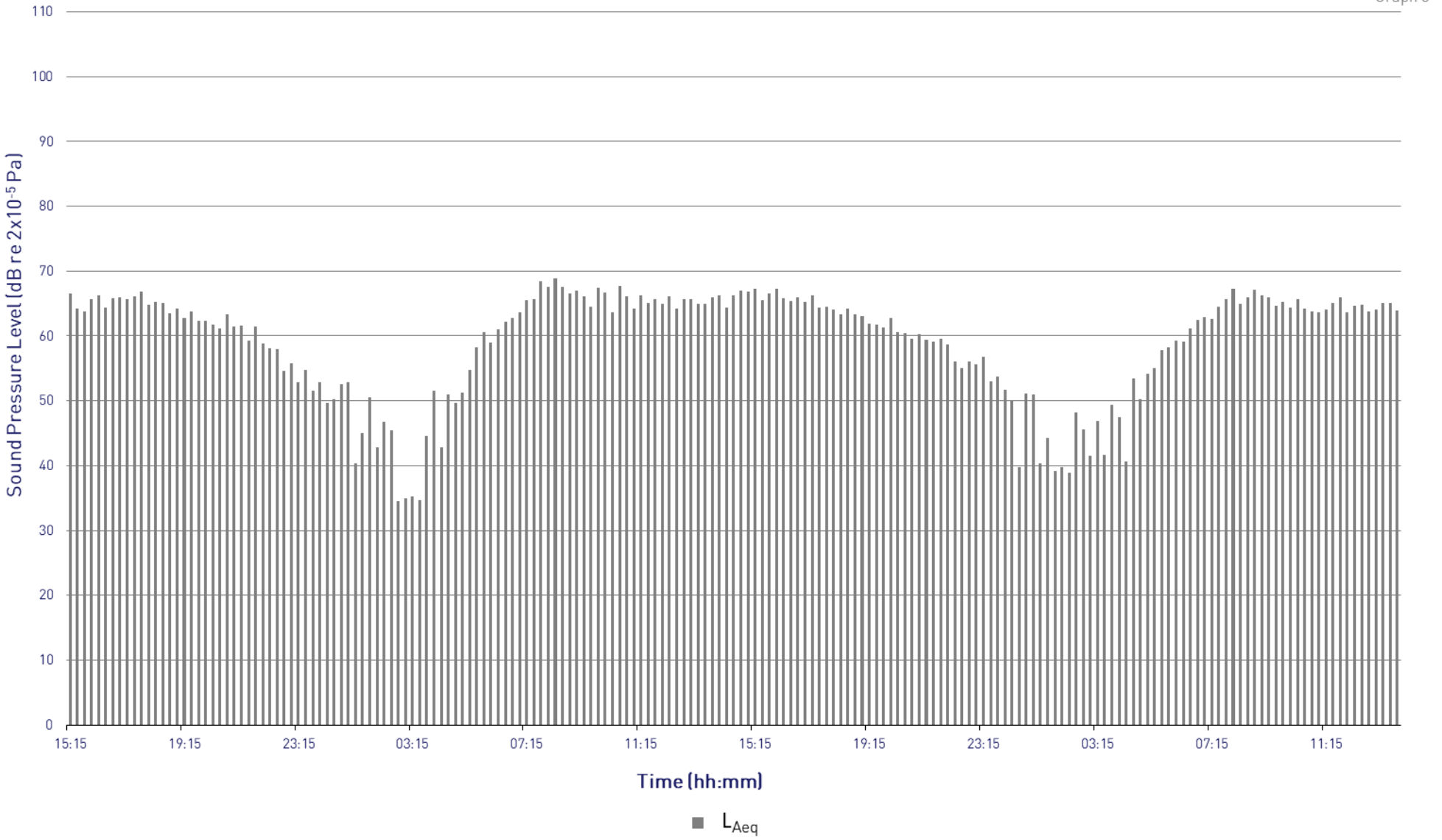
L_{Aeq} Time History

Measurement Position 1 - Parsonage Road

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Project: 14076

Graph 5



Novartis Site, Horsham - Phase 3

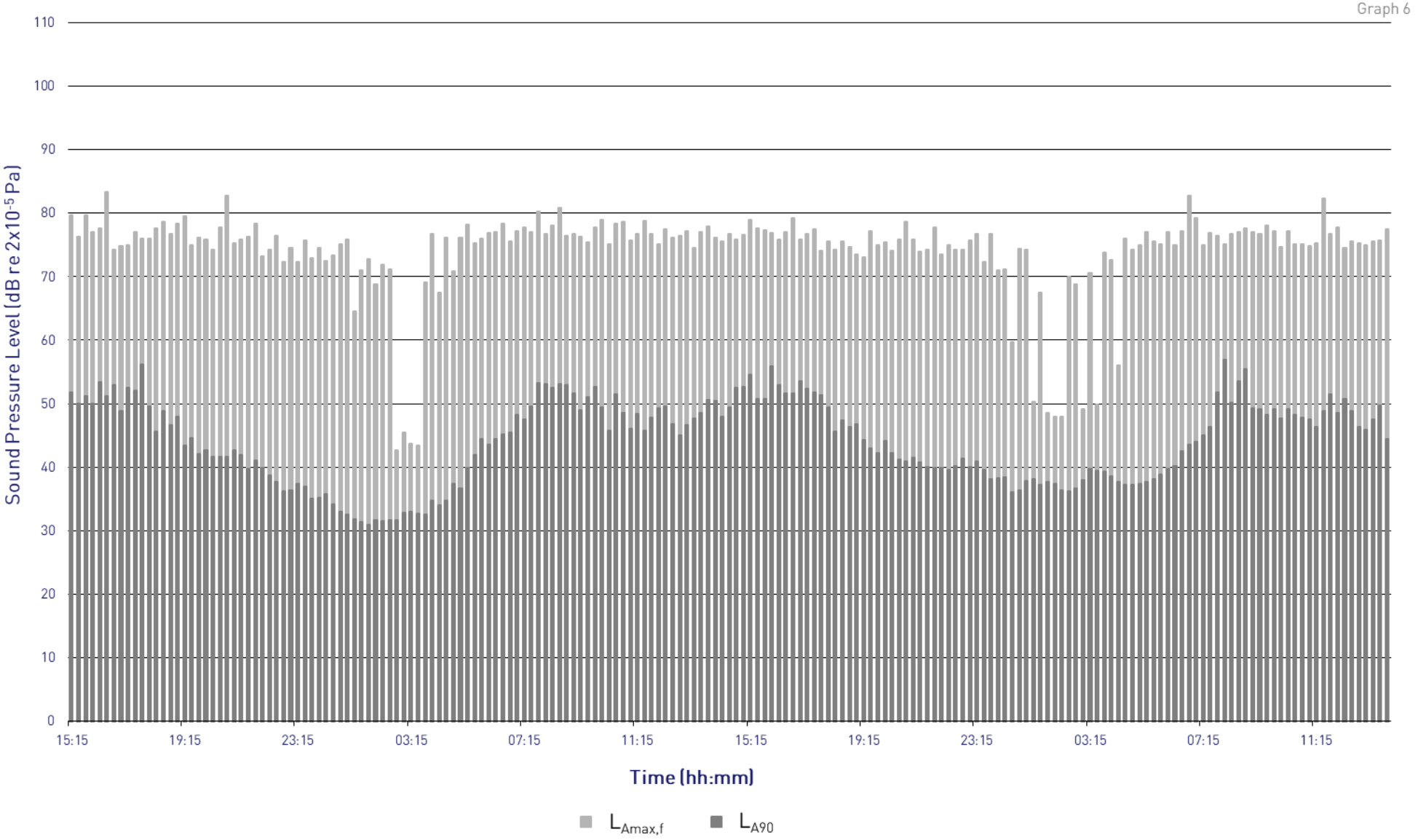
$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 1 - Parsonage Road

RBA ACOUSTICS

Project: 14076

Graph 6



Novartis Site, Horsham - Phase 3

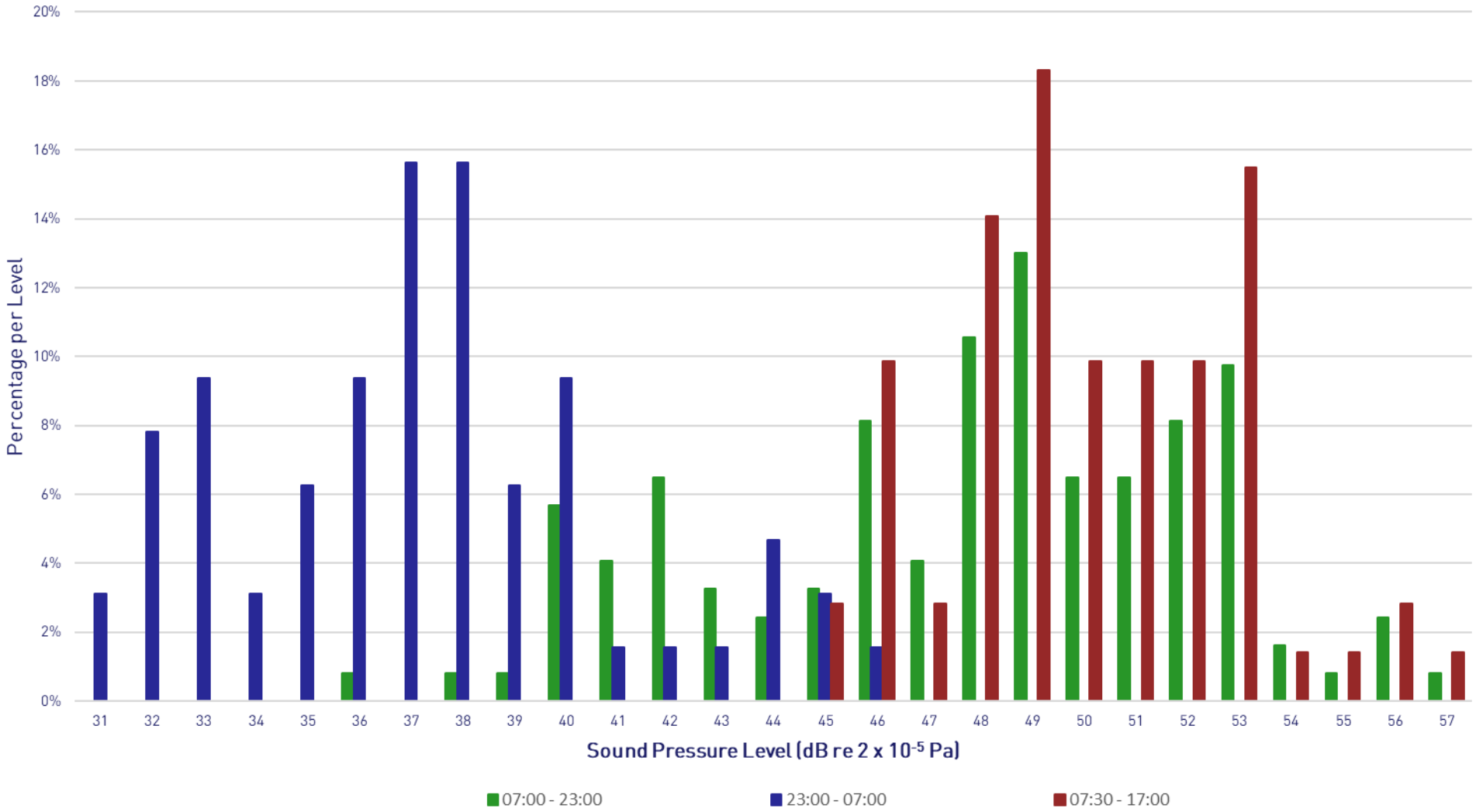
$L_{A90,15\ minutes}$ Histogram

Measurement Position 1 - Parsonage Road

RBA ACOUSTICS

Project: 14076

Graph 7



Novartis Site, Horsham - Phase 3

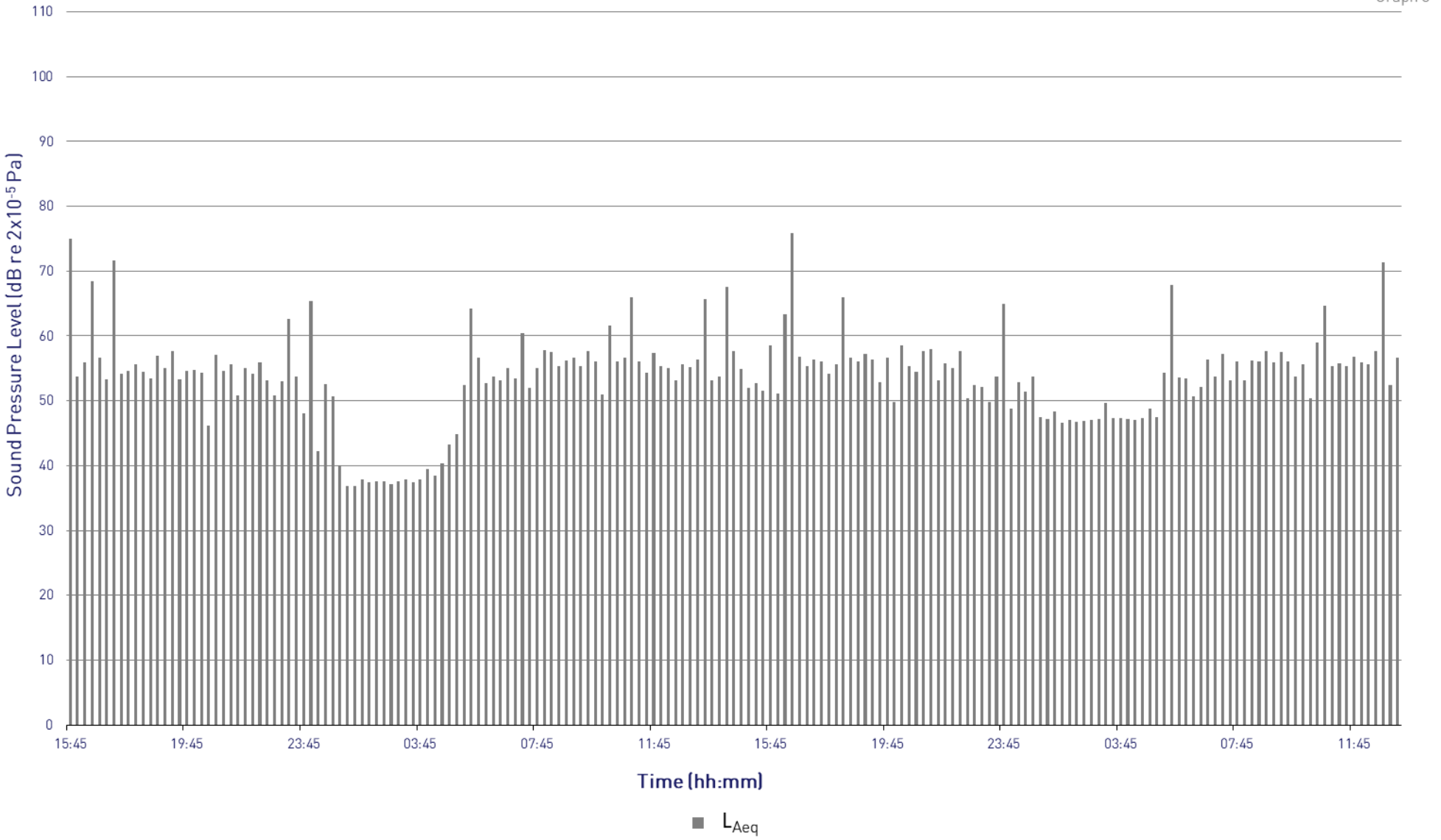
L_{Aeq} Time History

Measurement Position 2 - East Railway Line

RBA ACOUSTICS

Project: 14076

Graph 8



Novartis Site, Horsham - Phase 3

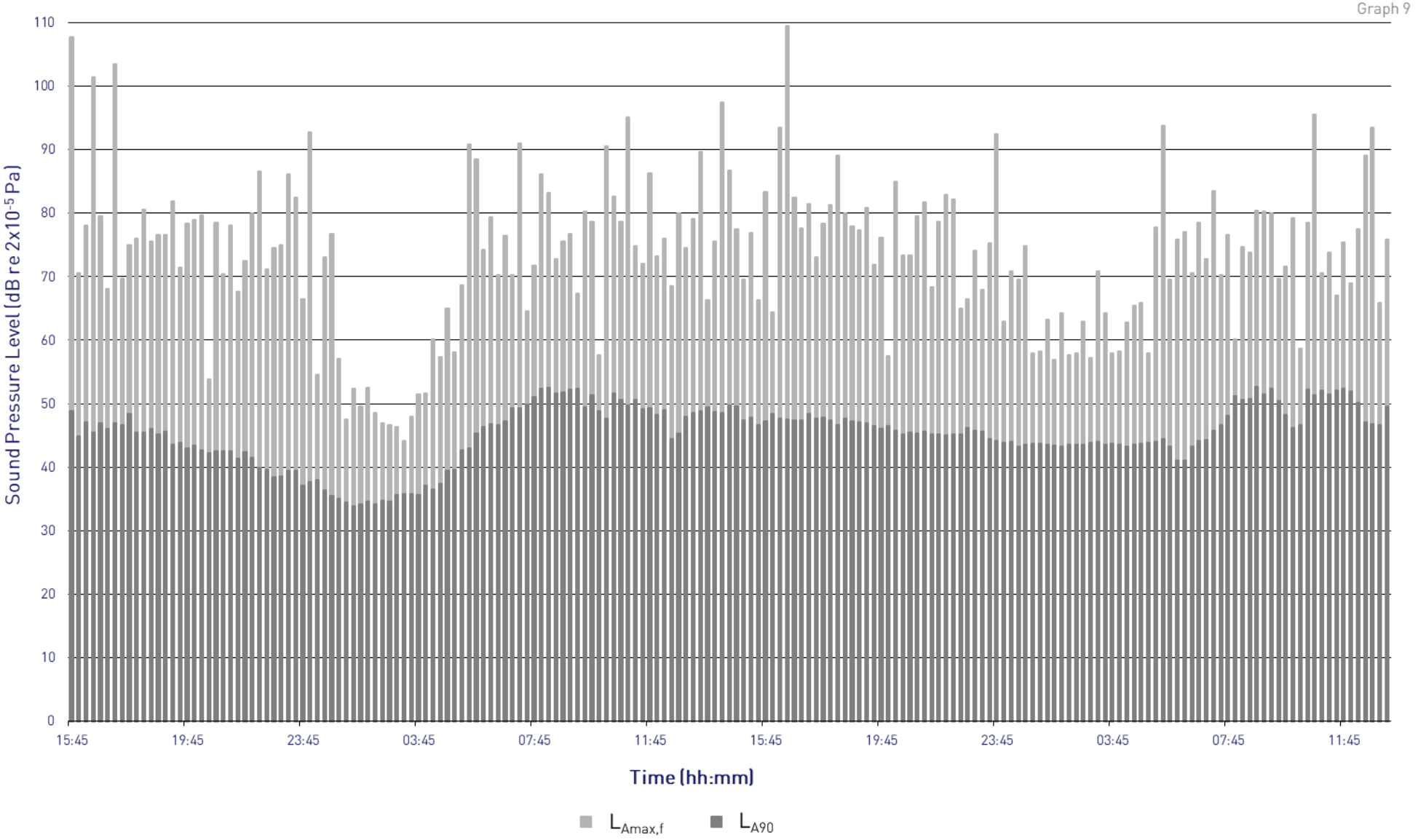
$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 2 - East Railway Line

RBA ACOUSTICS

Project: 14076

Graph 9



Novartis Site, Horsham - Phase 3

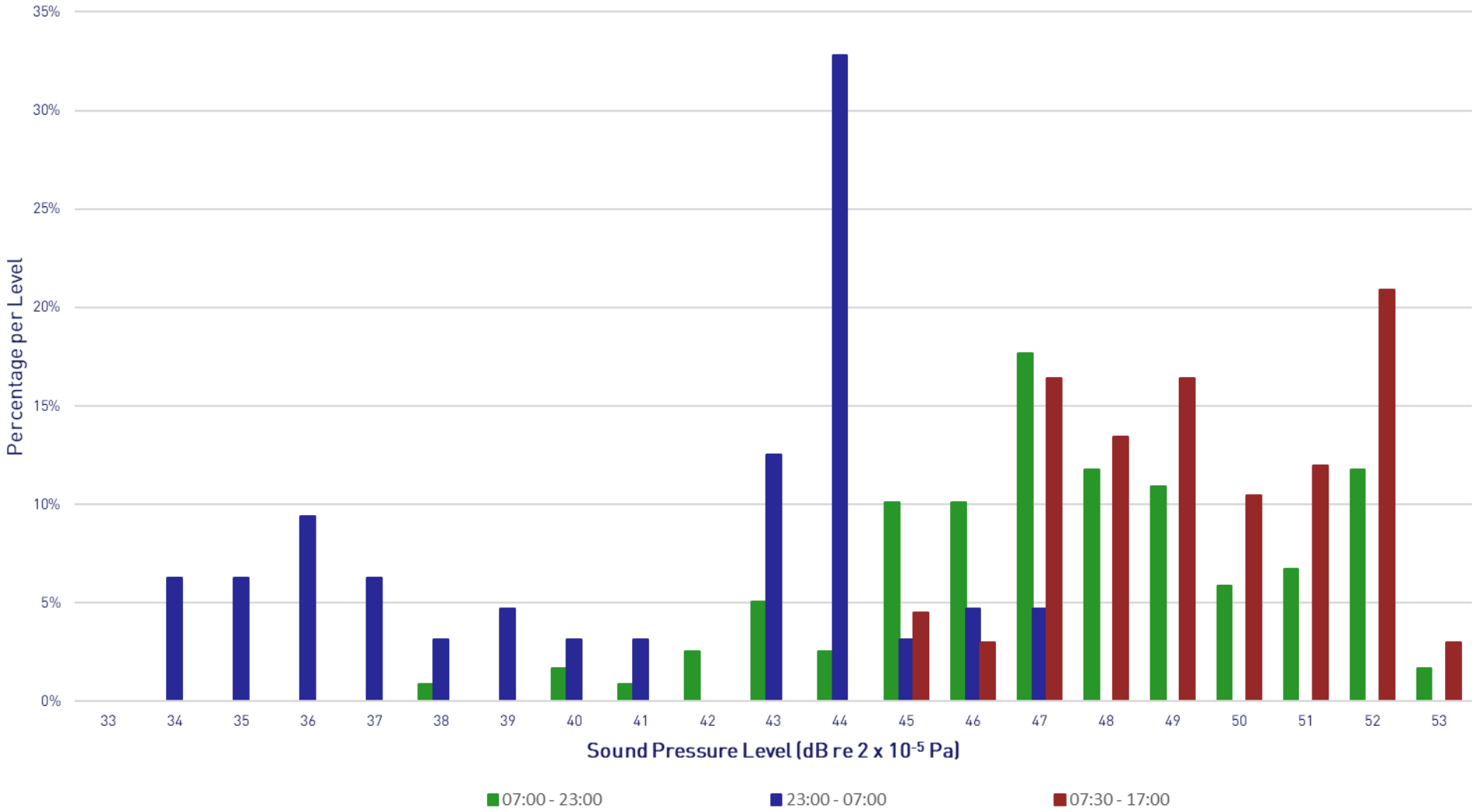
$L_{A90,15\ minutes}$ Histogram

Measurement Position 2 - East Railway Line

RBA ACOUSTICS

Project: 14076

Graph 10



Novartis Site, Horsham - Phase 3

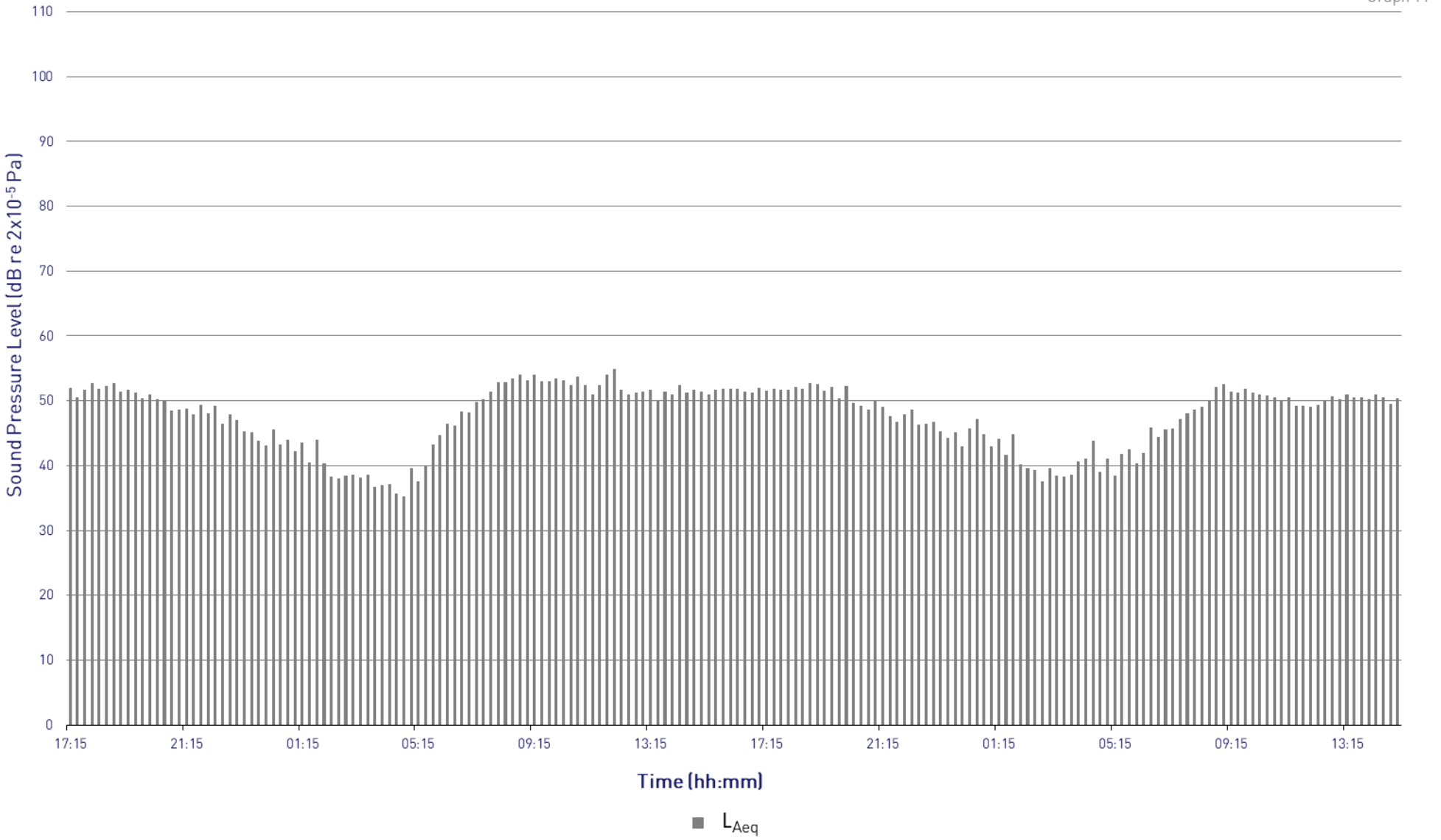
L_{Aeq} Time History

Measurement Position 3 - Centre of Site

RBA ACOUSTICS

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Graph 11



Novartis Site, Horsham - Phase 3

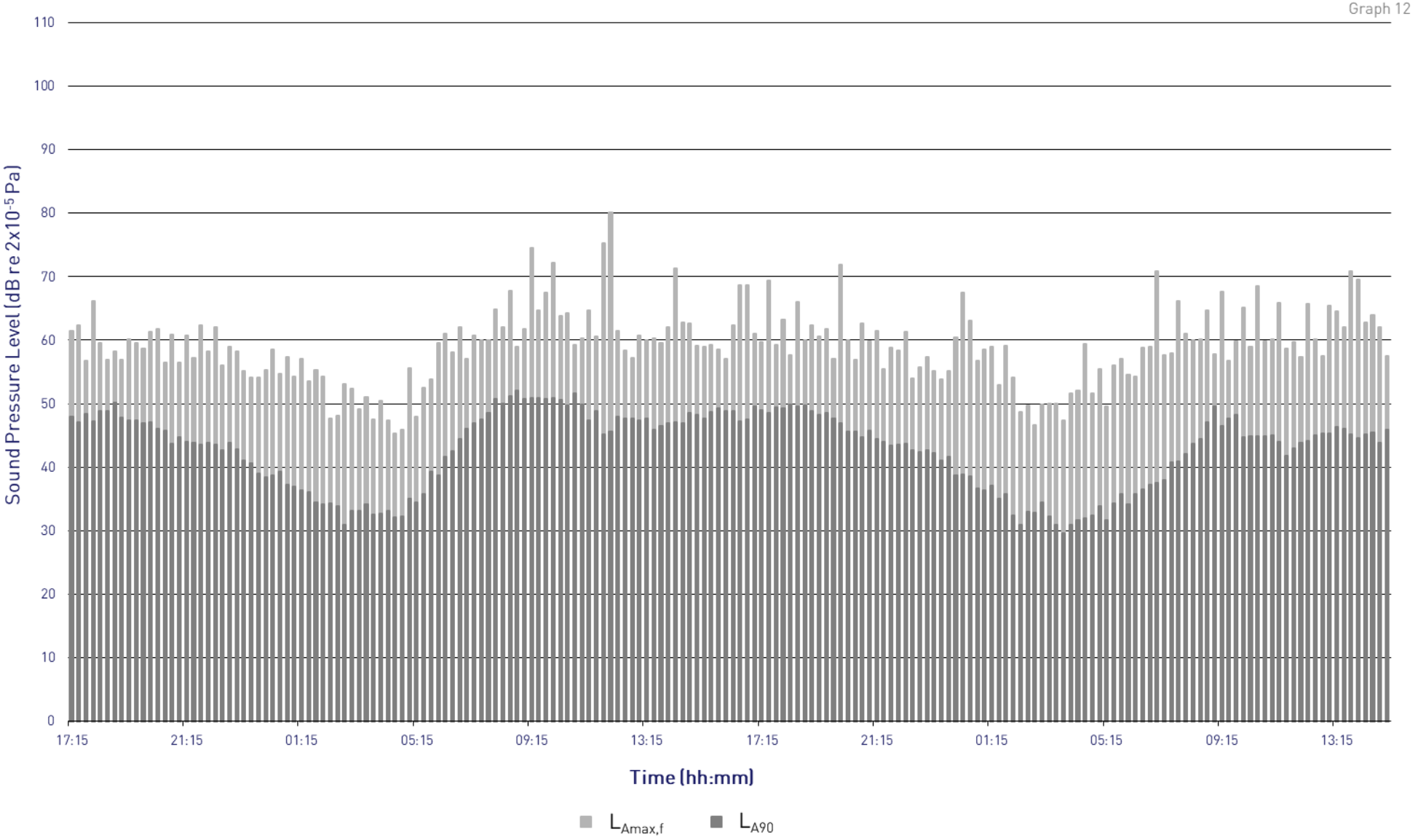
$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 3 - Centre of Site

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Graph 12



Novartis Site, Horsham - Phase 3

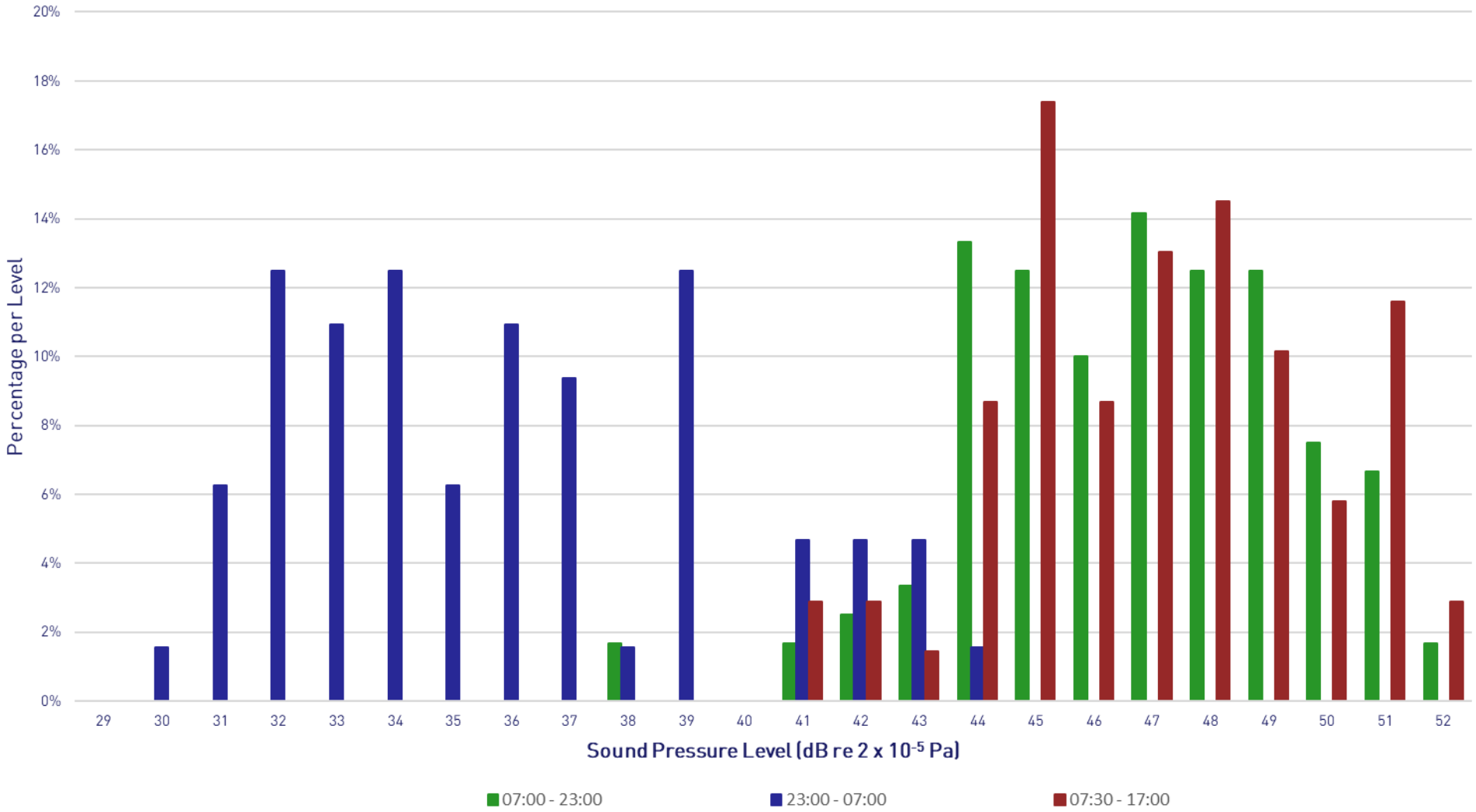
$L_{A90,15\ minutes}$ Histogram

Measurement Position 3 - Centre of Site

RBA ACOUSTICS

Project: 14076

Graph 13



Former Novartis Site - Phase 3

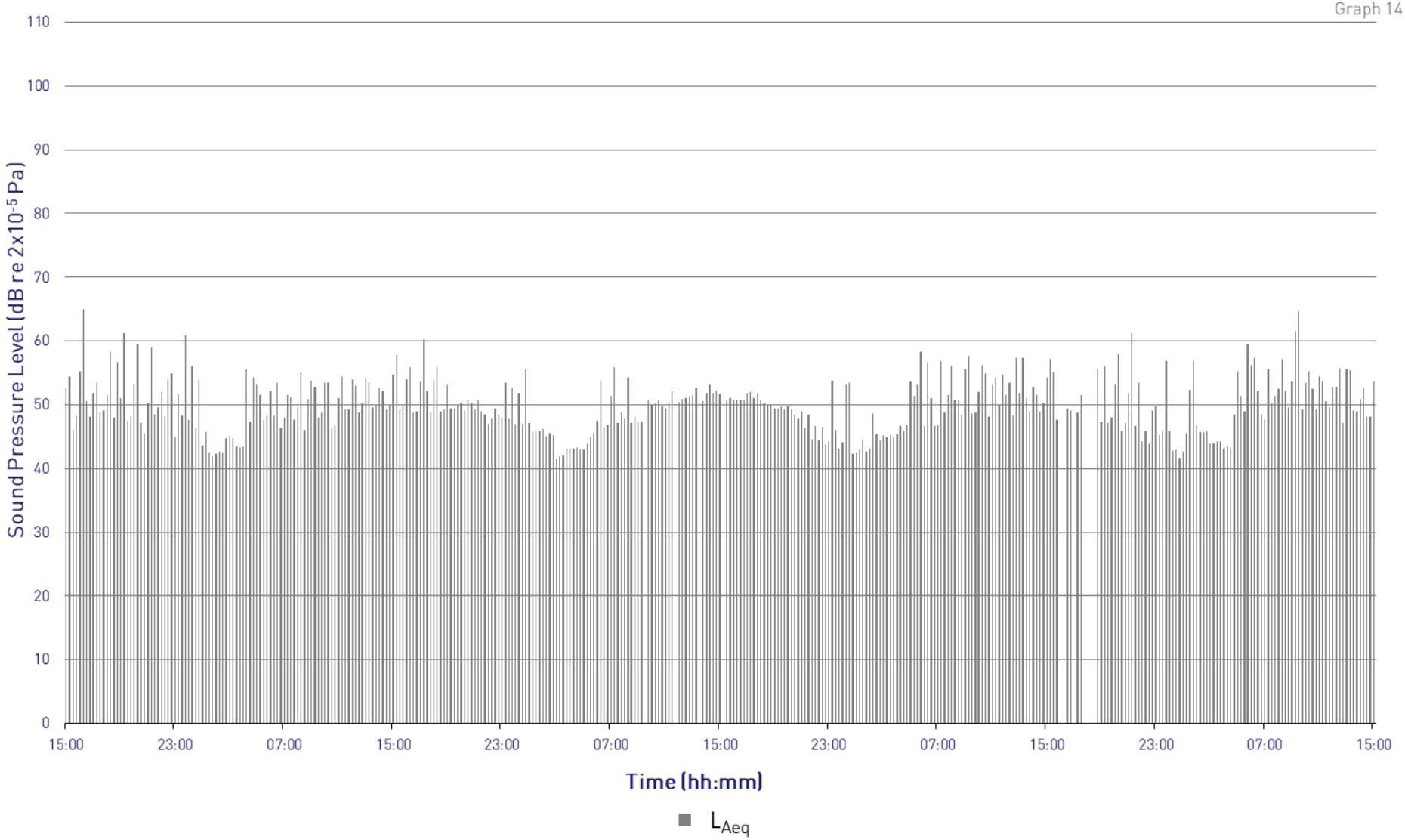
L_{Aeq} Time History

Measurement Position 4 - South Railway Line Sidings

RBA ACOUSTICS

Project: 14076

Graph 14



Former Novartis Site - Phase 3

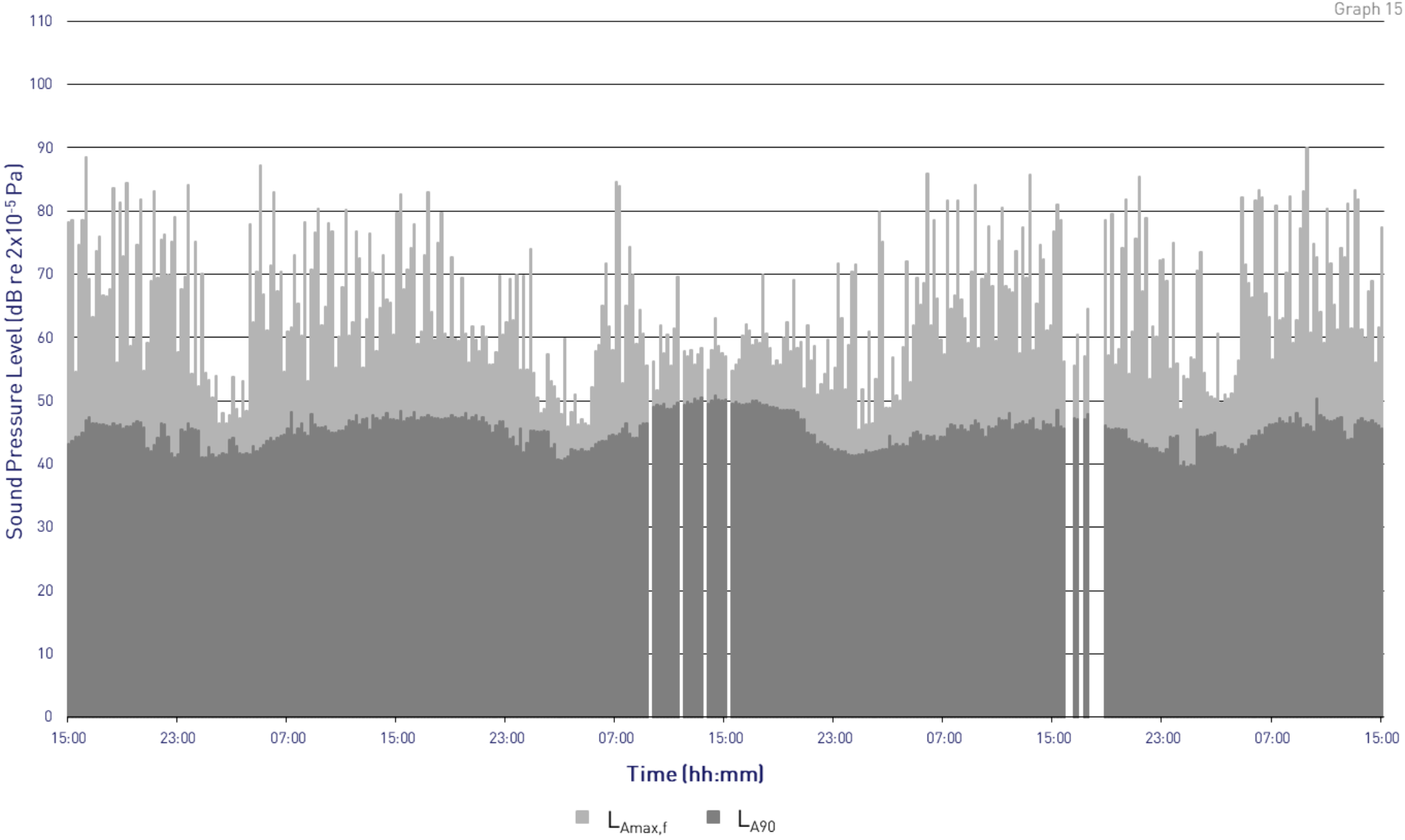
$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 4 - South Railway Line Sidings

RBA ACOUSTICS

Project: 14076

Graph 15



Former Novartis Site - Phase 3

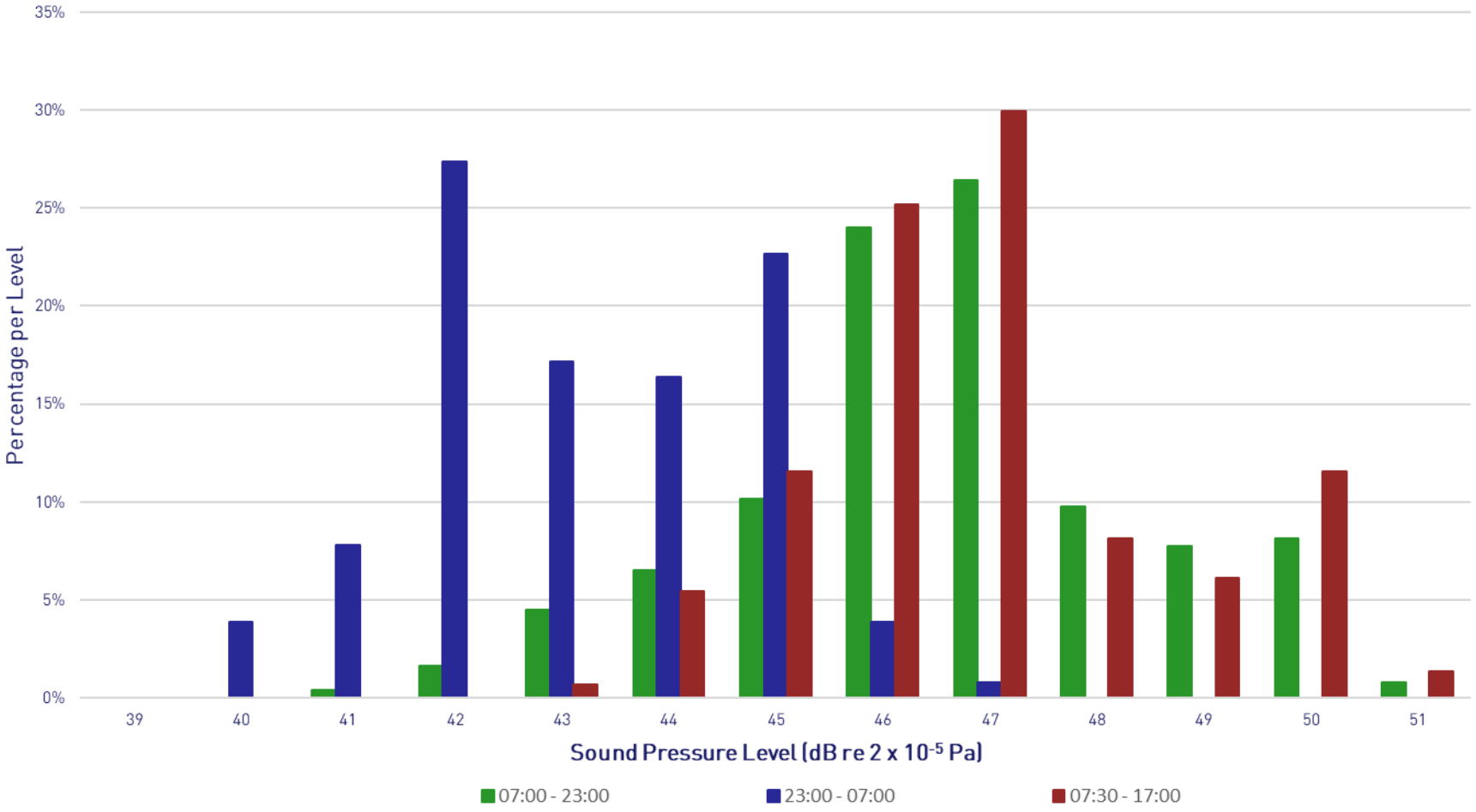
$L_{A90,15\,minutes}$ Histogram

Measurement Position 4 - South Railway Line Sidings

RBA ACOUSTICS

Project: 14076

Graph 16



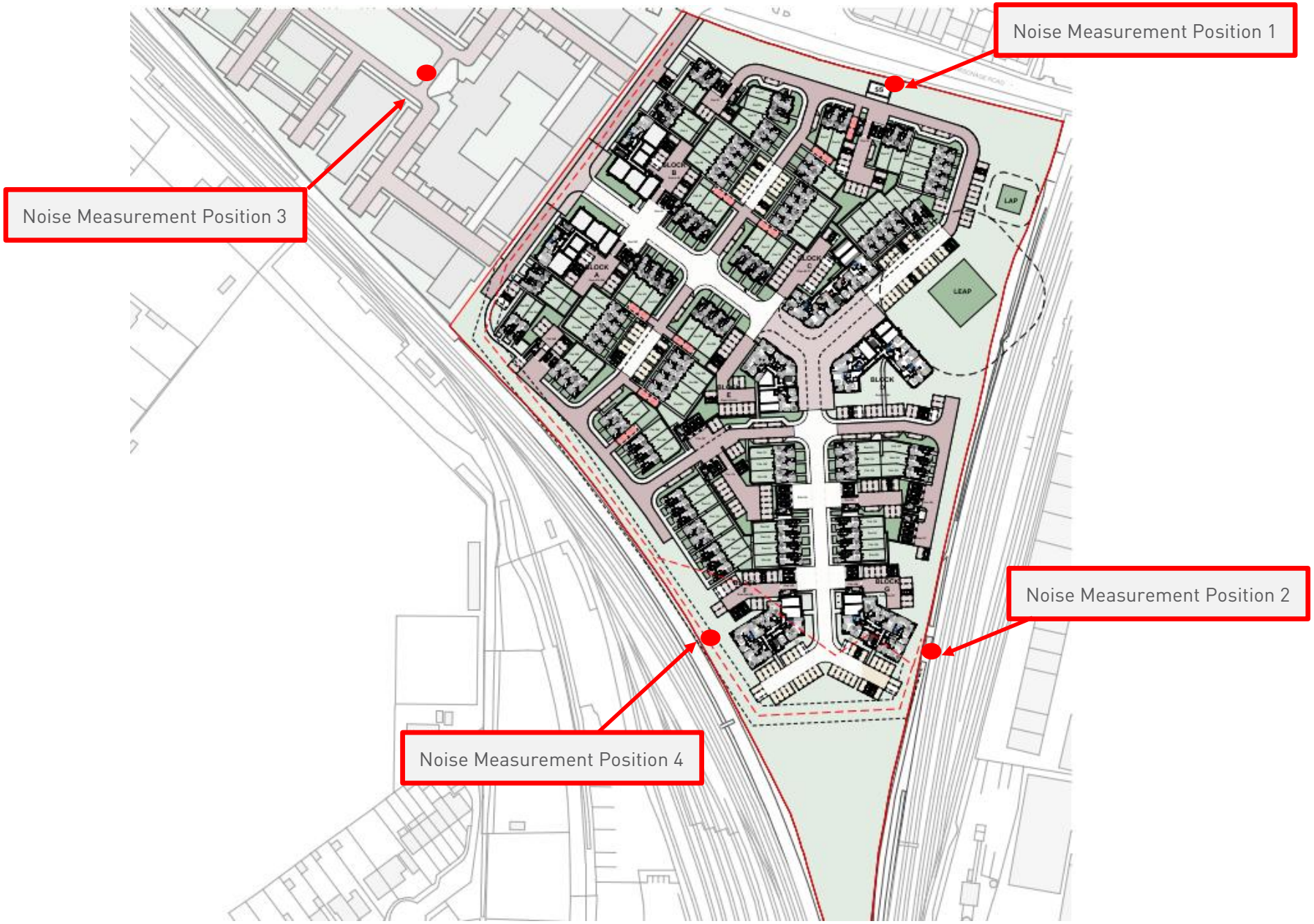


Figure 1 – Site Plan showing Measurement Locations

Former Novartis Site, Horsham – Phase 3

Project 15998

21 October 2026

Not to Scale

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Figure 2 – Photo Showing Measurement Position 1

Former Novartis Site, Horsham – Phase 3

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Not to Scale

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Figure 3 – Photo Showing Measurement Position 2

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21 October 2026

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Not to Scale

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Figure 4 – Photo Showing Measurement Position 3

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Not to Scale

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Figure 5 – Photo Showing Measurement Position 4

Former Novartis Site, Horsham – Phase 3

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21 October 2026

Not to Scale

RBA ACOUSTICS

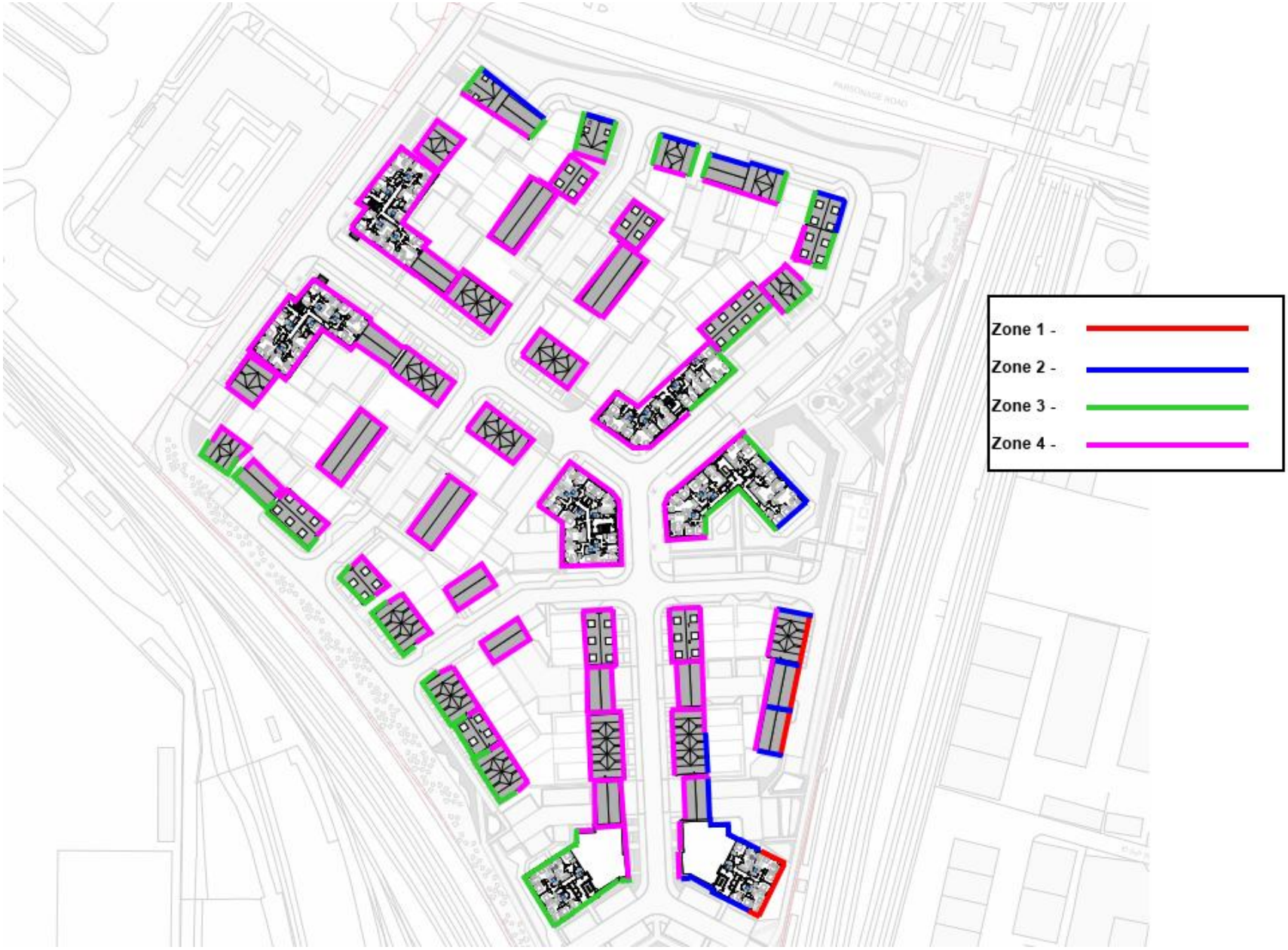


Figure 6 – Façade Zoning Plan

Former Novartis Site, Horsham – Phase 3

Project 15998

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Not to Scale

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Appendix G – Waterstone Overheating Report

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