



UNITE, PARKWAY
GATE, MANCHESTER

External Building
Fabric Assessment
Re-Fenestration

Reference: 10929.RP02.EBF.3

Prepared: 14 March 2022

Revision Number: 3

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	17 June 2021	James Melville	Alex J Wyatt
1	Block 2 wrap-around façade zoning and Ground floor included		James Melville	Alex J Wyatt
2	Ground floor plan updated	11 March 2022	James Melville	Alex J Wyatt
3	Ground floor plan updated again	14 March 2022	James Melville	Alex J Wyatt

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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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1. INTRODUCTION

The existing façade constructions at Parkway Gate, Manchester are to be removed and replaced with a new construction and glazing due to water damage to the existing SIPs panels. Therefore, the design team have requested that a new environmental noise survey and assessment of the required external building fabric be completed, as historic data and reports cannot be located.

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

This report details the results of the noise survey and sets out the acoustic performance requirements of the external building fabric elements.

A summary of acoustic terminology is included in Appendix A attached.

2. SITE DESCRIPTION

The site is shown in relation to its surroundings in the attached Site Plan in Figure 1 of Appendix F.

The existing tower buildings are located on a plot of land south of Manchester City centre. Block 1 is the largest block and is located in the east of the site overlooking Wilmott Street. Block 2 is located on the southern border of the site with the south façade overlooking both the A5103 (at low level) and the A635(M) & A57(M) Ring Road known as Mancunian Way (elevated). Block 3 is located in the north-west of the site and overlooks Newcastle Street and Chester Street.

3. ENVIRONMENTAL NOISE SURVEY

3.1 Survey Methodology

Monitoring of the prevailing background noise was undertaken over two consecutive 24-hour periods:

10:00 hours Wednesday 19 May to 12:00 hours Thursday 20 May 2021

10:00 hours Thursday 20 May to 12:00 hours Friday 21 May 2021

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, although periods of rainfall did occur.

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

3.2 Measurement Locations

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

Measurement Position 1 – Block 3, Level 12, West Façade

Measurement Position 2 – Block 1, Level 16, West Façade

Measurement Position 3 – Block 1, Level 16, East Façade

Measurement Position 4 – Block 2, Level 14, North Façade

Measurement Position 5 – Block 2, Level 14, South Façade
 Measurement Position 6 – Block 2, Level 6, South Façade
 Measurement Position 7 – Block 2, Level 1, South Façade
 Measurement Position 8 – Block 3, Level 3, West Façade
 Measurement Position 9 – Block 1, Level 3, East Façade

The microphones were suspended 1m outside the existing windows and are therefore subject to façade reflections. The noise climate at all positions was dominated by road traffic noise associated with both the A5103 and the A635(M)/A57(M)/Ring Road/Mancunian Way and the other surrounding road networks.

The measurement positions are also illustrated on the Site Plan attached in Figure 1 in Appendix F.

3.3 Instrumentation

For information regarding the equipment used for the measurements please refer to Appendix D attached. The sound level meters were calibrated both prior to and on completion of the surveys with no significant calibration drifts observed.

3.4 Results

The measured L_{Aeq} , L_{A90} and $L_{Amax,f}$ 15-minute period levels are shown as time-histories on the attached Graphs 1-18 in Appendix F. The averaged daytime and night-time L_{Aeq} noise levels are summarised in Table 1 below. Also shown are the typical $L_{Amax,f}$ noise levels, based upon the 90th percentile of 5-minute intervals during the night-time periods, for each measurement position. The typical-lowest L_{A90} (15 minute) background sound level can be determined statistically as the lowest $L_{A90,15mins}$ level which is exceeded for 90% of the assessment period, or alternatively termed the 10th percentile of the measured $L_{A90,15mins}$ levels. The typical-lowest background noise levels ($L_{A90, 15mins}$) at each measurement position are also summarised in Table 1 below. This data can be used to set plant noise emission criteria for use in the assessment of noise emissions from any proposed plant at the development, if applicable.

Table 1 – Measured Levels

Measurement Position	Measurement Period	Typical $L_{A90,15min}$ (dB)	L_{Aeq} (dB)	Typical $L_{AFmax,5min}$ (dB)
Position 1	Daytime (07:00 – 23:00)	75	80	N/A
	Night-time (23:00 – 07:00)	60	76	86
Position 2 *	Daytime (07:00 – 23:00)	72	75	N/A
	Night-time (23:00 – 07:00)	-	-	-
Position 3	Daytime (07:00 – 23:00)	69	76	N/A
	Night-time (23:00 – 07:00)	56	72	82
Position 4	Daytime (07:00 – 23:00)	69	74	N/A
	Night-time (23:00 – 07:00)	56	70	79
Position 5	Daytime (07:00 – 23:00)	71	78	N/A
	Night-time (23:00 – 07:00)	54	74	84

Measurement Position	Measurement Period	Typical $L_{A90,15min}$ (dB)	L_{Aeq} (dB)	Typical $L_{AFmax,5min}$ (dB)
Position 6	Daytime (07:00 – 23:00)	73	76	N/A
	Night-time (23:00 – 07:00)	52	71	85
Position 7	Daytime (07:00 – 23:00)	75	84	N/A
	Night-time (23:00 – 07:00)	54	79	91
Position 8	Daytime (07:00 – 23:00)	67	70	N/A
	Night-time (23:00 – 07:00)	54	64	84
Position 9++	Daytime (07:00 – 23:00)	76	72	N/A
	Night-time (23:00 – 07:00)	-	-	-

* Noise levels recorded at Measurement Position 2 were affected by rain ingress to the microphone casing and therefore the levels stated above in Table 1 only include the initial part of the survey up to 18:30 hours.

** Due to a data logging error, noise level data was not recorded past 19:00 hours at Position 9.

Averaged measured spectral noise levels are graphically represented on the attached Graphs 19-27.

Due to the proximity of the microphone positions to the façade, the above L_{eq} and L_{max} results should be corrected by - 3dB to account for reflections to obtain free-field levels.

4. EXTERNAL BUILDING FABRIC CRITERIA

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

4.1 Local Authority Criteria

We understand that Manchester City Council's typical criteria for noise ingress into residential properties is as follows:

Anonymous Noise Sources

Manchester City Council's requirements with regards to noise ingress into residential developments from anonymous noise sources (e.g. road and railway noise) are outlined within Section 3.6.1.1 of Manchester City Council's Noise and Planning Guidance document dated December 2015, which states the following criteria:

- *Bedrooms (night-time - 23:00 – 07:00)* *30dB L_{Aeq}*
Individual noise events should not normally exceed 45dB $L_{Amax,f}$ by more than 15 times
- *Living Rooms (daytime - 07:00 – 23:00)* *35dB L_{Aeq}*

4.2 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 2.

Table 2 – BS 8233:2014 Residential Criteria

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

Although generally no specific numerical requirement is set in terms of an L_{Amax} noise level, BS 8233:2014 does provide the following guidance with regards individual noise events:

Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,f}$ depending on the character and number of events per night. Sporadic noise events could require separate values.

Guidance provided in the World Health Organisation's Guidelines for Community Noise further refines the requirements for individual noise events as outlined below in Section 4.3. However, for reference, Table H.3 of BS 8233:2014 does state a range of 45-55dB L_{Amax} for hotel bedrooms during the night-time period.

4.3 World Health Organisation 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)	$L_{Amax,f}$ (dB)
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-times	30	8	45

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 45dB 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 45dB. Ten to 15 of these events during an 8-hour night-time implies a $L_{Aeq, 8h}$ of 20-25dB. This is 10-15dB below the $L_{Aeq, 8h}$ or 30dB 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.

4.4 Summary

The project criteria adopted are therefore as follows:

Studios/Bedrooms	Night-time (23:00-07:00)	30dB L_{Aeq} & typically <45dB $L_{Amax,f}$ *
Studios/Bedrooms	Daytime (07:00-23:00)	35dB L_{Aeq}
Living Room/Kitchens	Daytime (07:00-23:00)	35dB L_{Aeq}

* Under WHO, 10-15 occurrences during the night-time in excess of 45dBA are “allowable”. The new 2014 version of BS 8233 states L_{max} levels in the region of 45-55dBA could be considered acceptable.

5. EXTERNAL BUILDING FABRIC ASSESSMENT

5.1 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.

5.2 Assumptions

Our external building fabric analyses have assumed the following:

(a) Drawings

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

- 20091-HCD-A1-017-DR-A-PL-01-117 – Block 1, Proposed GA Floor Plan, Level 17
- 20091-HCD-A1-ZZ-DR-A-PL-01-152 – Block 1, Proposed GA Elevations, North & East
- 20091-HCD-A1-ZZ-DR-A-PL-01-153 – Block 1, Proposed GA Elevations, South & West
- 20091-HCD-A2-015-DR-A-PL-02-115 – Block 2, Proposed GA Floor Plan, Level 15
- 20091-HCD-A2-ZZ-DR-A-PL-02-152 – Block 2, Proposed GA Elevations, South & East
- 20091-HCD-A2-ZZ-DR-A-PL-02-153 – Block 2, Proposed GA Elevations, North & West
- 20091-HCD-A3-013-DR-A-PL-03-113 – Block 3, Proposed GA Floor Plan, Level 13
- 20091-HCD-A3-ZZ-DR-A-PL-03-152 – Block 3, Proposed GA Elevations, South & West
- 20091-HCD-A3-ZZ-DR-A-PL-03-153 – Block 3, Proposed GA Elevations, North & East

(b) Noise Levels

The assessment has been based on the measured noise levels as detailed in Section 3.4.

(c) Room Absorption

The calculations assume that Studios/Bedrooms are acoustically 'soft' with vinyl, curtains and other soft furnishings. Details of the absorption coefficients assumed in the calculations are provided in Appendix B attached.

(d) External Wall

We have assumed other external non-glazed areas of the building will comprise the following, based on previous UNITE projects:

- Outer leaf lightweight cladding
- Thermal insulation and cavity
- Minimum 12mm Cement Particle Board (sheathing)
- Metsec type metal framing or similar, e.g. SFS, etc.
- Mineral or Rock wool infill between studs
- 2 x 12.5mm dense plasterboard, e.g. BG SoundBloc or similar, internally

As such, we have assumed the following sound reduction indices (equating to an overall R_w of 53dB) for all non-glazed façade areas comprising the above construction:

Table 4 – Sound Reduction Indices of Non-Glazed Elements

Assumed Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
21	32	45	55	55	55	55	55

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

(e) Ventilation

A “whole-house” mechanical ventilation (WHMV – Approved Document F System 4) system is proposed to be installed throughout the development. Such a system is likely to be similar to the Villavent or Vent Axia systems used on other UNITE projects. This comprises a low-speed encased fan within a fully ducted system with fresh air supply to bedrooms and extract from kitchens and toilets/bathrooms. It is typical for the WHMV system to also have heat recovery (i.e. MVHR) capabilities for increased SAP ratings. We have assumed that external noise break-in to the bedrooms and living rooms via the ventilation system will be negligible (when compared to the glazing) due to the fully ducted nature of the system.

It should be noted the WHMV provides background trickle ventilation only and that side opening lights are to generally be openable to provide rapid or purge ventilation. During those periods where they are opened for purge/rapid ventilation, noise levels will naturally be increased internally.

5.3 Specification & Guidance Constructions

Appendix C details the sound reduction performance specification for the 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 5 are given for costing purposes only. All window systems should be capable of meeting the performance specifications shown in Appendix C, 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 C attached.

Table 5 – Guidance Glazing Constructions

Glazing Type	Example Glazing Configuration
G1A	High specification laminated double glazing, i.e. 10 / 12 / 8.4 PVB acoustic laminate
G1	Medium specification double glazing, i.e. 10 / 12 / 6
G2	Low specification thermal double glazing with panes of differing thickness, i.e. 4 / 12 / 6

5.4 Applicable Zoning

Due to the differences in the prevailing noise climate around the site, three primary glazing zones have been defined, as indicated on the façade zoning plans provided in Figures 2 & 3 in Appendix F attached.

- (i) Zone 1A – Glazing Type: G1A
- (ii) Zone 1 – Glazing Type: G1
- (iii) Zone 2 – Glazing Type: G2

5.5 Flanking Specification

We understand there are continuous glazing systems, i.e. curtain walling, etc., proposed as part of the re-fenestration works. We advise on the flanking specification for any such systems as follows.

Flanking Performance Specification

The previous Sections are in relation to external noise intrusion through any curtain walling systems to internal areas. Separating wall and floor sound insulation performance can often be compromised by curtain walling systems. It is thus important that an additional specification for the curtain walling package be introduced, which will limit the amount of sound transfer across separating wall and floor lines through the curtain walling system. A flanking performance specification is attached within Appendix C – Section 2.0.

Achievement of the specification can be demonstrated by laboratory acoustic testing in general accordance with BS EN ISO 10848-2:2006. This is admittedly a complex and costly testing procedure and therefore the supplier may – following tender reviews – be allowed to demonstrate by other means that the specification can be achieved. This is reflected in the specification wording. The specification should also be incorporated within any other packages, which could affect the transmission of flanking sound at separating wall and floor lines.

It is likely insulated double/split mullions and transoms will be required in order to achieve the attached flanking specification. This obviously has a large impact on the design and style of any curtain walling system and should be investigated at the earliest opportunity to ensure the specification is achieved.

6. CONCLUSION

RBA Acoustics have undertaken noise monitoring at the Parkway Gate, Manchester site. The measured noise levels are presented within this report. The resultant noise levels have been used in the assessment of the glazing requirements to ensure suitable internal noise levels are achieved within the proposed rooms at the development (following entire block re-fenestration) with reference to BS 8233:2014, WHO Guidelines and Local Authority requirements.

Target specifications for glazing are included in Appendix C attached to this report.

To summarise there are three glazing zones required. Zone 1A is specifically required for rooms on levels 3-12, Block 2, South Façade overlooking Mancunian Way. Zone 1 is medium performance and affects the lower and upper façades overlooking Mancunian Way and the West façade of Block 3. Zone 2 is lower performance and affects the elevations overlooking the internal courtyard and side roads.

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.
R_w	A single number quantity which characterises the airborne sound insulation of a material or building element in a laboratory test.

Appendix B – Room Absorption Coefficients

For the purposes of the analyses RBA have assumed the absorption coefficients detailed in Table B1 for Studios/Bedrooms.

Table B1 – Studio/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

For the purposes of the analyses RBA have assumed the absorption coefficients detailed in Table B2 for Living Room / Kitchens

Table B2 – Living Room/Kitchen 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 C – 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 10140-2:2010:

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	
G1A	31	28	30	39	44	49	56	56	42
G1	22	26	27	34	40	38	46	46	38
G2	17	21	20	27	37	36	41	41	32

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

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 representative samples of all glazing systems shall be submitted to RBA Acoustics for approval to demonstrate compliance with the above performance specifications.

2.0 Acoustic Flanking Specification

Extent

There is potential for any curtain walling or continuous system to transmit sound across the separating floors and walls, and to thus result in future sound insulation problems.

The following specification should therefore be introduced within the tender documentation in order to ensure the system components are adequately designed.

The following specifications apply to all curtain walling or continuous elements between residential units and, if applicable, between residential units and commercial areas. Between non-residential areas (e.g. commercial to commercial, etc.) it is standard practice to relax the specification to a value of 50dB $D_{n,f,w}$.

With regard to potential flanking through the panels, the specification is commensurate with relatively high sound insulation levels. Achievement of this specification will require careful consideration of the panel design, in particular the insulation type and construction make-up of the panel skin. In addition, it is likely to be necessary to design the cladding such that double/twin insulated mullions and transoms are included.

Horizontal Flanking at Separating Wall Lines

The curtain walling/continuous system shall achieve a horizontal weighted normalised flanking level difference of 60dB $D_{n,f,w}$ when tested in general accordance with BS EN ISO 10848-2:2006 [previously BS EN 20140-9:1994] (the methodology amended accordingly).

The supplier shall demonstrate by the provision of previous test reports (and comparative calculations if required) that the specification can be achieved. The Client, however, reserve the right to insist on laboratory acoustic testing if any doubts remain in relation to the flanking performance of the system.

The curtain walling system shall provide suitable surfaces against which a good acoustic seal can be made with future separating walls.

Vertical Flanking at Separating Floor Lines

The curtain walling system shall achieve a vertical weighted normalised flanking level difference of 60dB $D_{n,f,w}$ when tested in general accordance with BS EN ISO 10848-2:2006 [previously BS EN 20140-9:1994] (the methodology amended accordingly).

The supplier shall demonstrate by the provision of previous test reports (and comparative calculations if required) that the specification can be achieved. The Client, however, reserve the right to insist on laboratory acoustic testing if any doubts remain in relation to the flanking performance of the system.

The curtain walling system shall provide suitable surfaces against which a good acoustic seal can be made with future separating floors.

Appendix D – Instrumentation

The following equipment was used for the measurements.

Table D1 – Equipment Calibration Details

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Valid Until
Norsonic Type 1 Sound Level Meter	Nor140	1405945	U35072	29 June 2022
Norsonic Pre Amplifier	1209	15800		
Norsonic ½" Microphone	1225	208218	35071	29 June 2022
Norsonic Sound Calibrator	1251	34057	U35070	29 June 2022
Norsonic Type 1 Sound Level Meter	Nor140	1406007	U35075	29 June 2022
Norsonic Pre Amplifier	1209	20043		
Norsonic ½" Microphone	1225	208146	35074	29 June 2022
Norsonic Sound Calibrator	1251	34127	U35073	29 June 2022
Norsonic Type 1 Sound Level Meter	Nor140	1406407	U32897	20 September 2021
Norsonic Pre Amplifier	1209	20688		
Norsonic ½" Microphone	1225	226839	32896	20 September 2021
Norsonic Sound Calibrator	1251	34482	U32896	20 September 2021
Norsonic Type 1 Sound Level Meter	Nor140	1403226	U36698	5 January 2023
Norsonic Pre Amplifier	1209	12556	U36695	4 January 2023
Norsonic ½" Microphone	1225	25179		
Norsonic Sound Calibrator	1251	31988	U36696	4 January 2023
Norsonic Type 1 Sound Level Meter	Nor140	1407477	473910908	10 October 2021
Norsonic Pre Amplifier	1209	22341		
Norsonic ½" Microphone	1225	358196		
Norsonic Sound Calibrator	1255	125525259	Cal 022-2019-11496	27 September 2021

Appendix E – CDM Considerations

The likelihood 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 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 E1 – Risk Ratings

Rating Bands (Severity x Likelihood)		
Low Risk (1 – 8)	Medium Risk (9 -12)	High Risk (15 – 25)
May be ignored but ensure controls remain effective	Continue, but implement additional reasonably 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 E2 – Risk Assessment

Hazard	Risk Of	At Risk	Rating			Control Measures	Controlled		
			L	S	R		L	S	R
Acoustic 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 Figures

Parkway Gate, Manchester

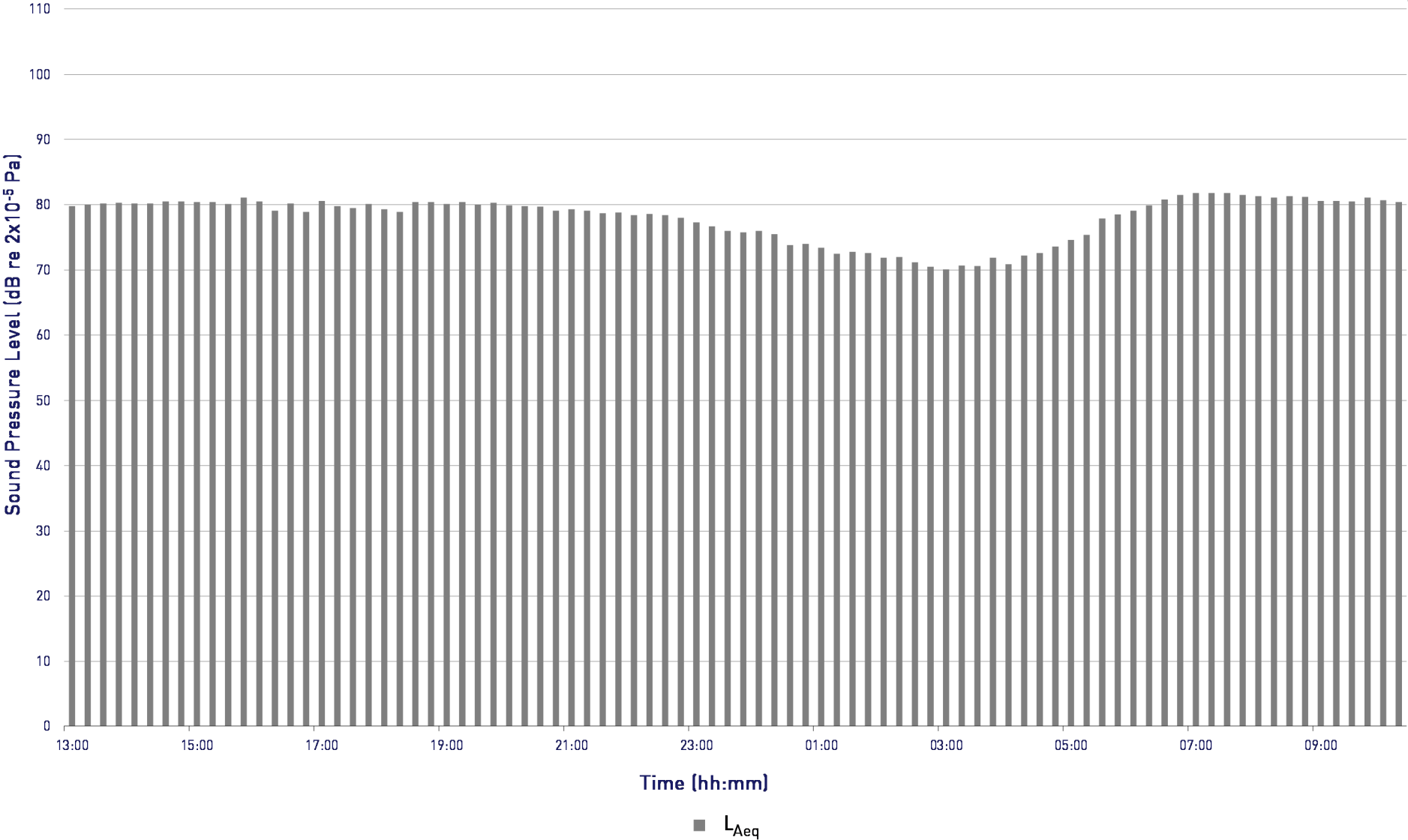
L_{Aeq} Time History

Measurement Position 1



Project: 10929

Graph 1



Parkway Gate, Manchester

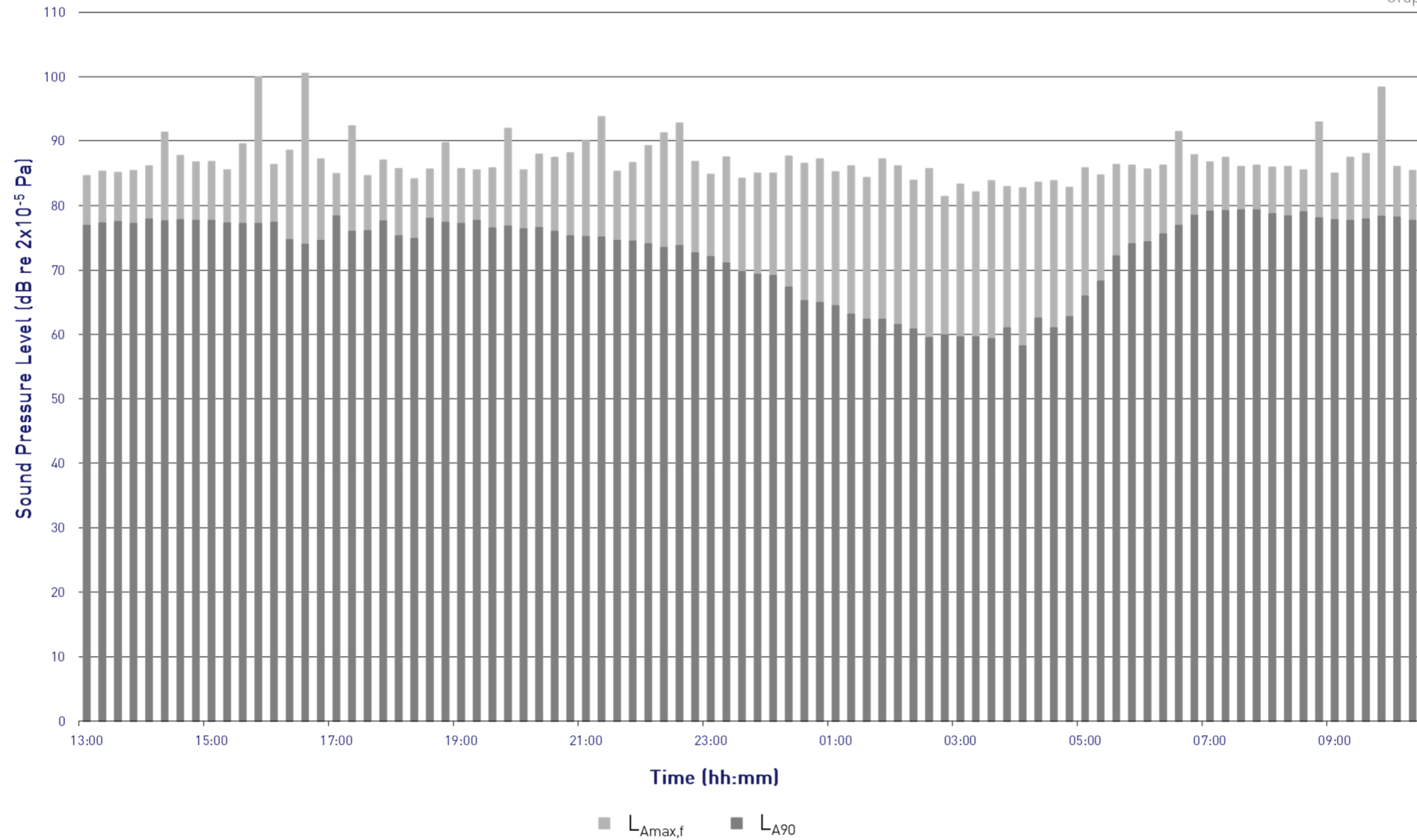
$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 1



Project: 10929

Graph 2



Parkway Gate, Manchester

L_{Aeq} Time History

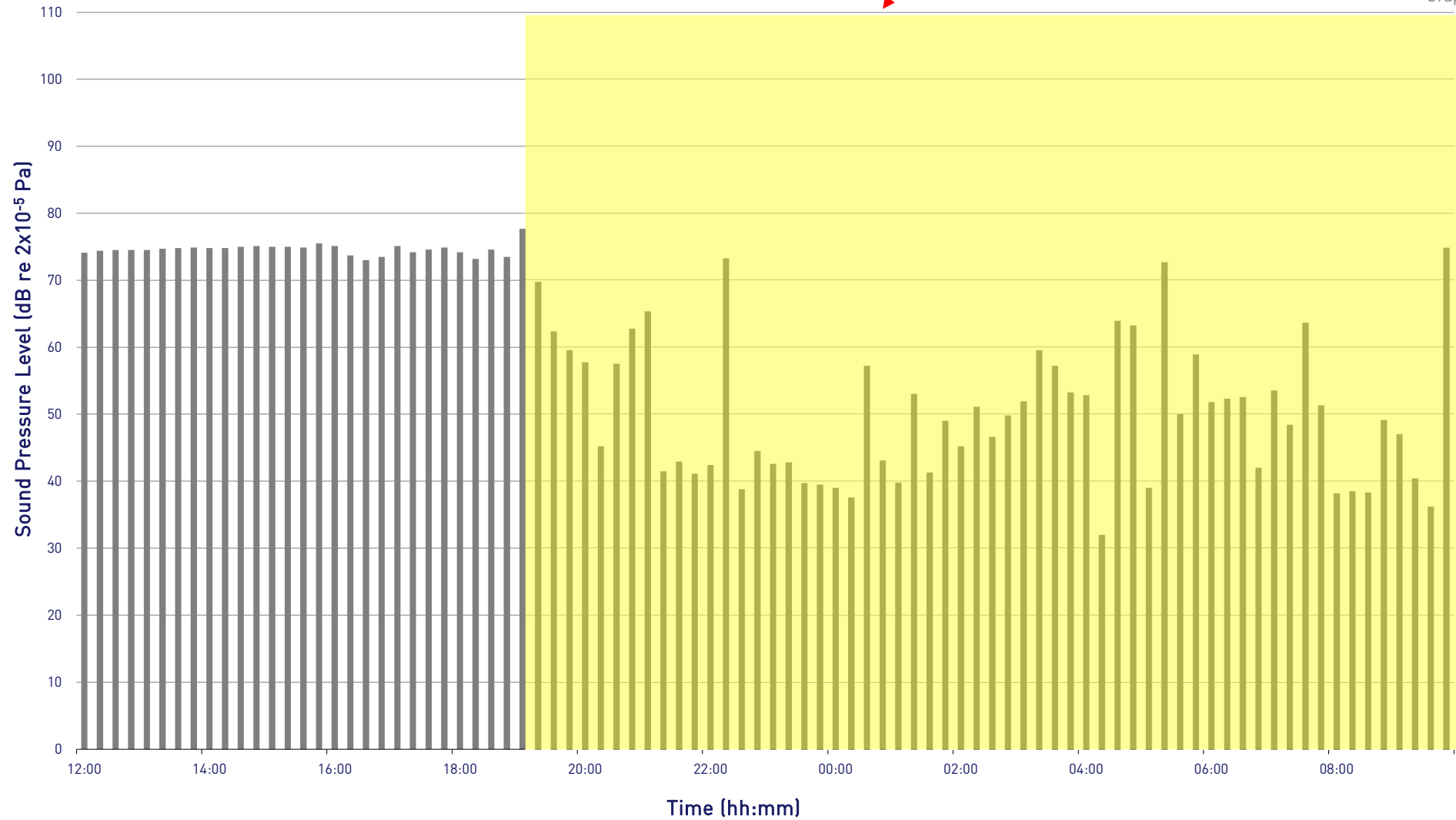
Measurement Position 2



Project: 10929

Graph 3

Excluded due to moisture ingress.



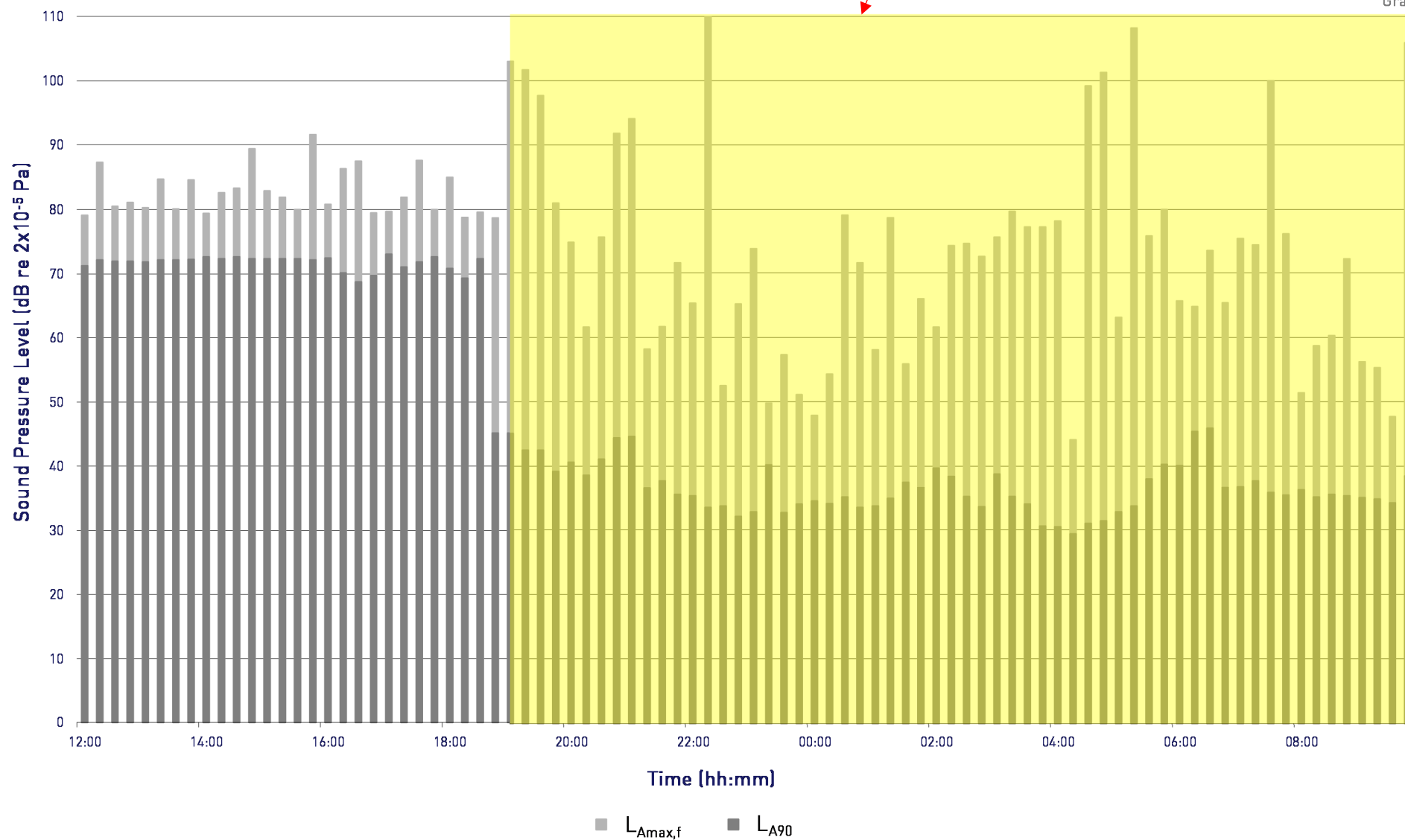
■ L_{Aeq}

Parkway Gate, Manchester
 $L_{Amax,f}$ and L_{A90} Time History
Measurement Position 2



Project: 10929

Graph 4



Parkway Gate Manchester

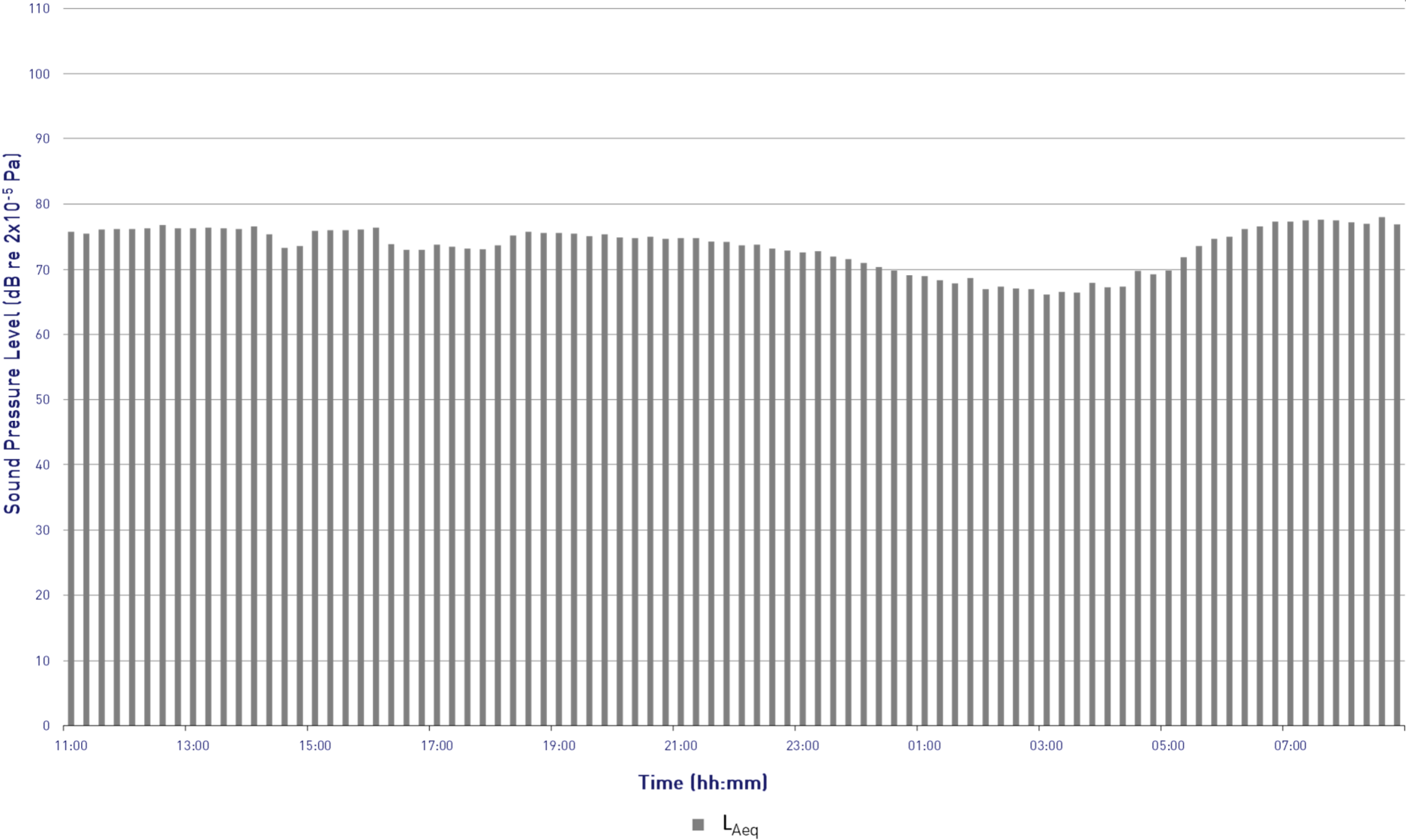
L_{Aeq} Time History

Measurement Position 3



Project: 10929

Graph 5

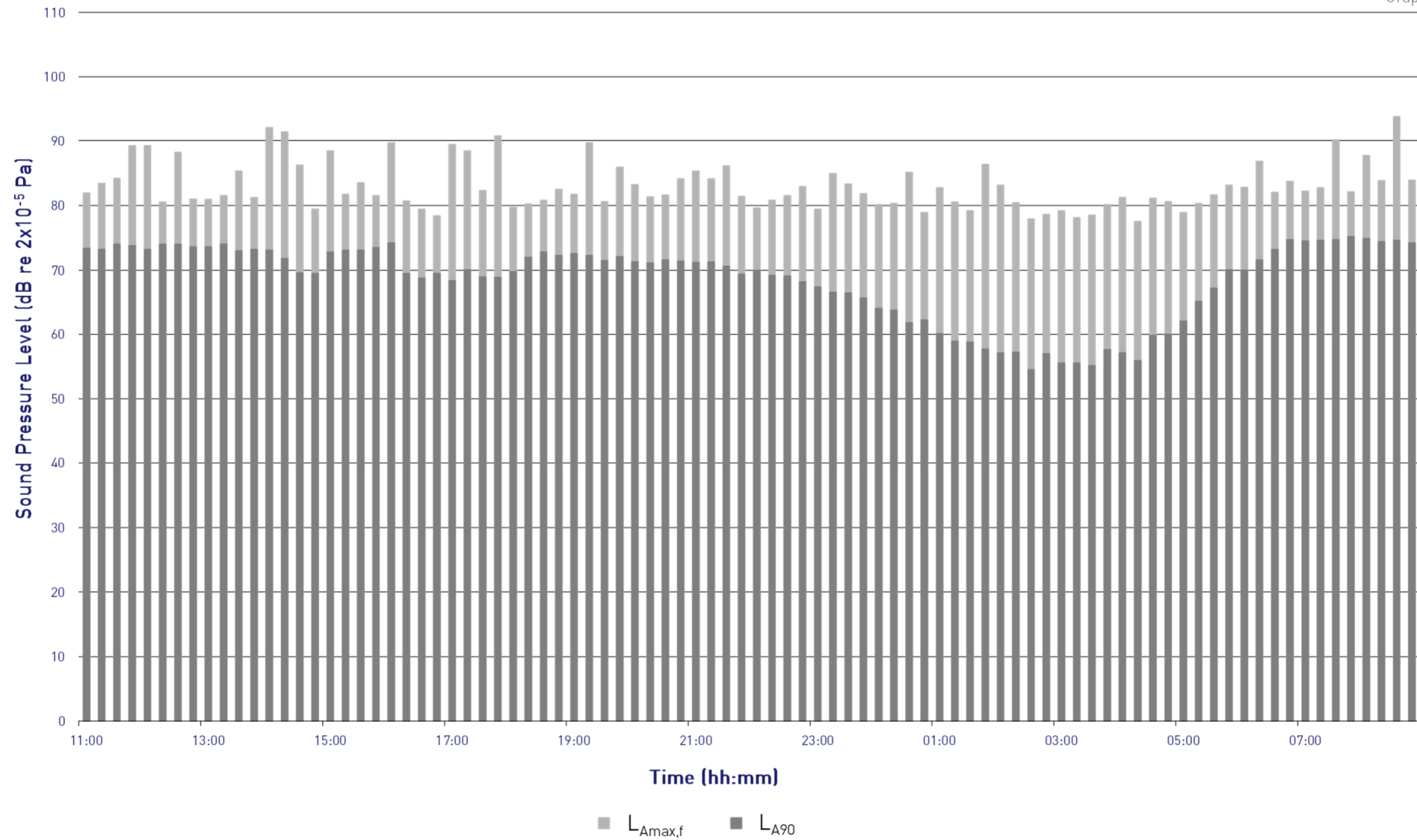


Parkway Gate Manchester
 $L_{Amax,f}$ and L_{A90} Time History
Measurement Position 3



Project: 10929

Graph 6



Parkway Gate, Manchester

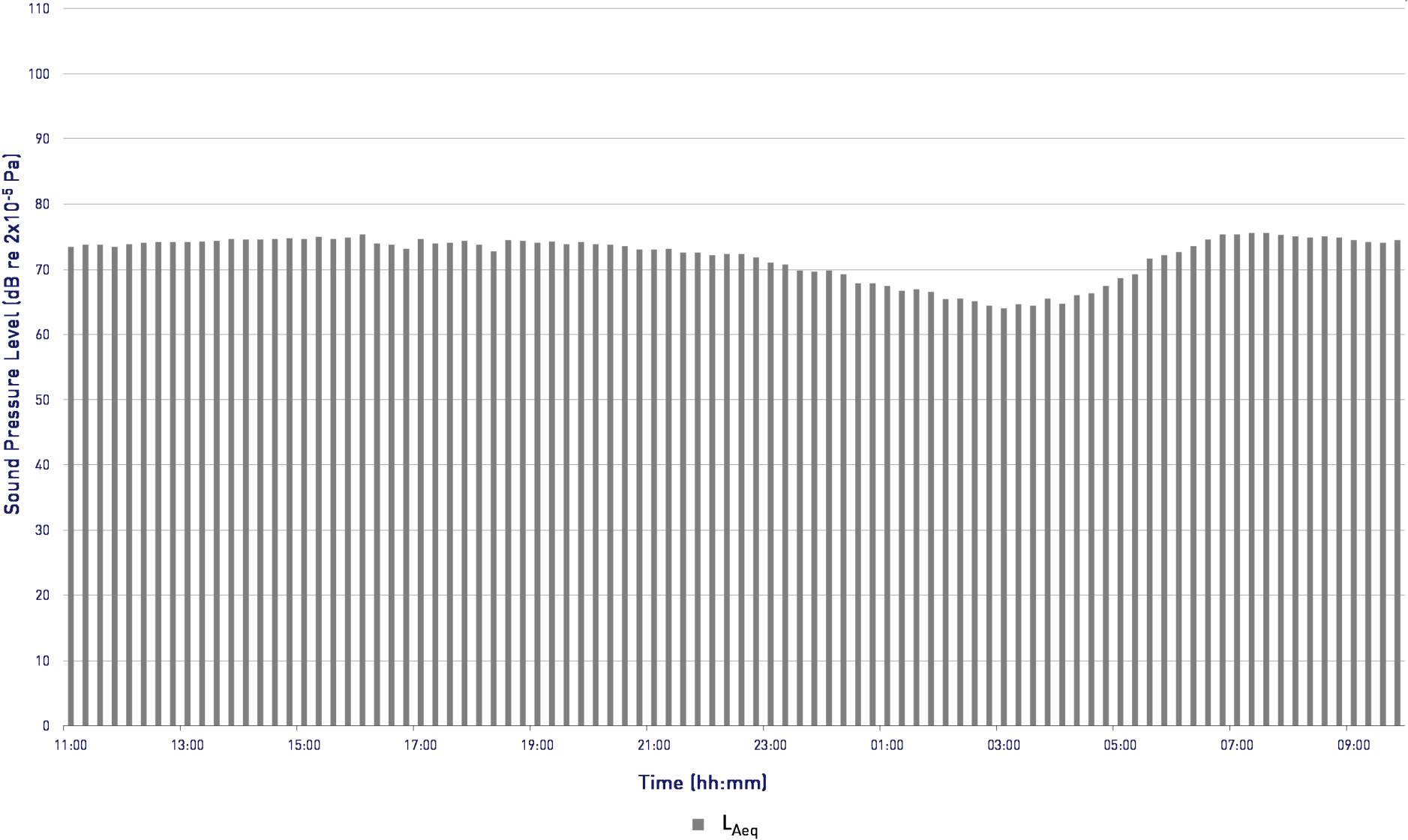
L_{Aeq} Time History

Measurement Position 4



Project: 10929

Graph 7



Parkway Gate, Manchester

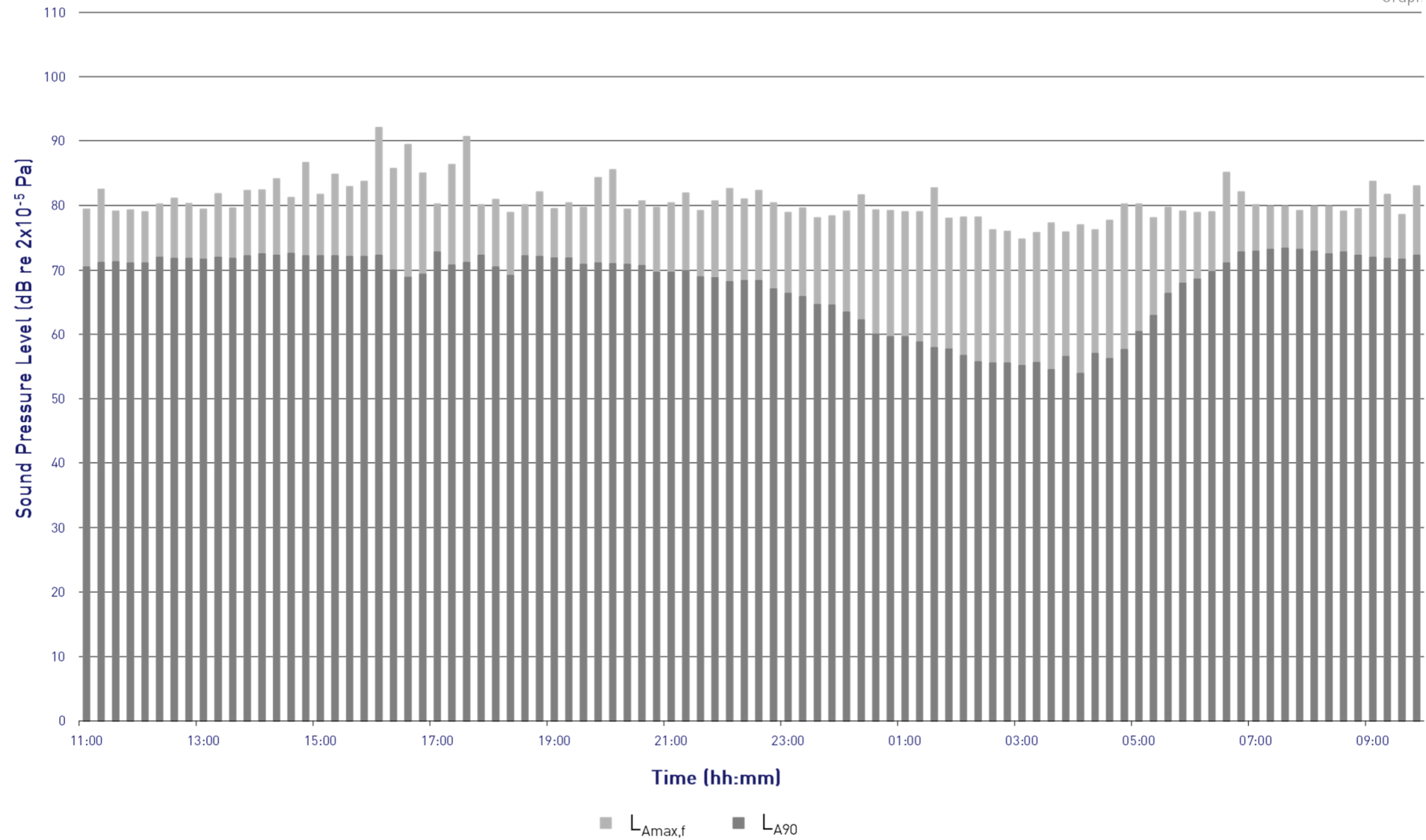
$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 4



Project: 10929

Graph: 8



Parkway Gate Manchester

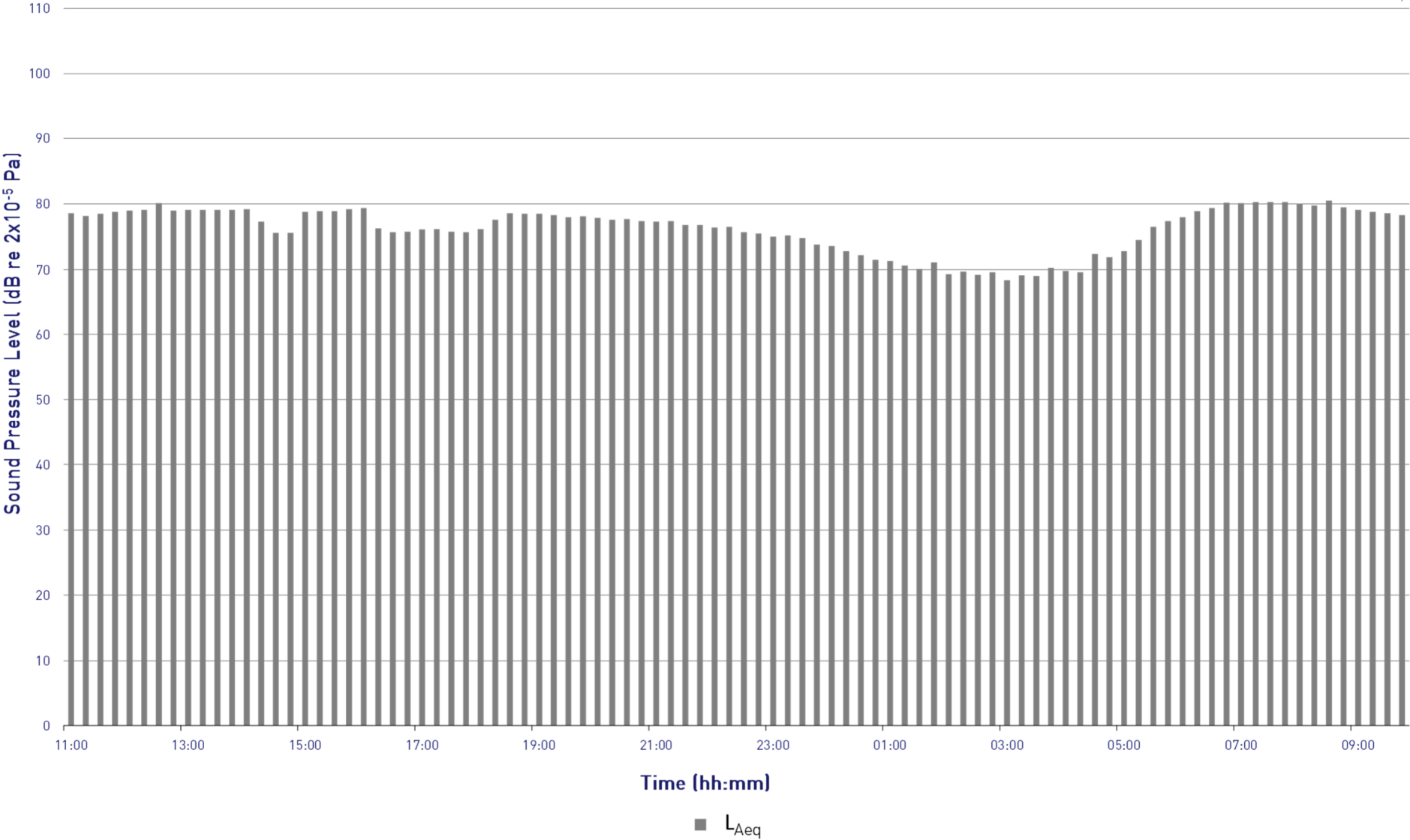
L_{Aeq} Time History

Measurement Position 5



Project: 10929

Graph 9

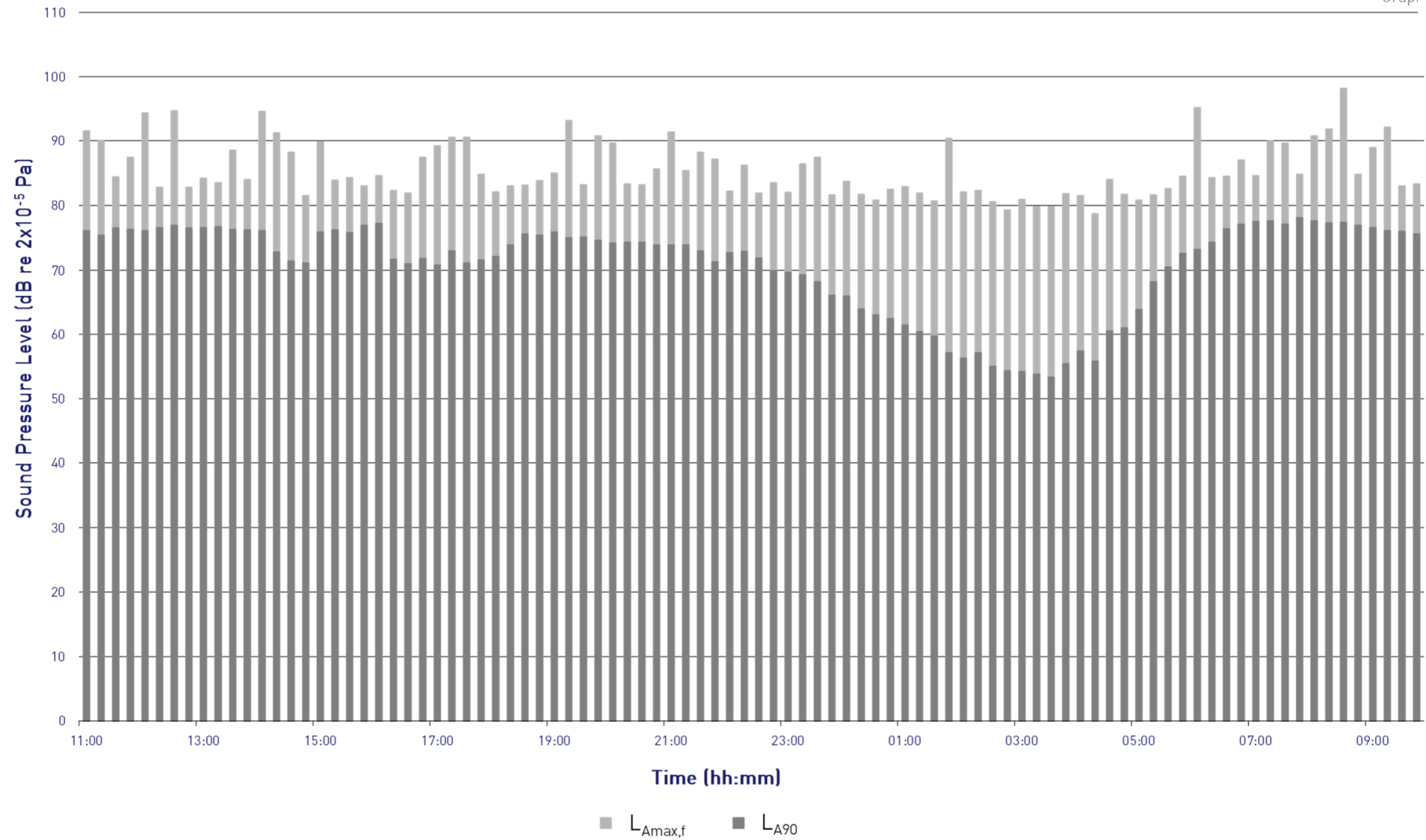


Parkway Gate Manchester
 $L_{Amax,f}$ and L_{A90} Time History
Measurement Position 5



Project: 10929

Graph 10



Parkway Gate, Manchester

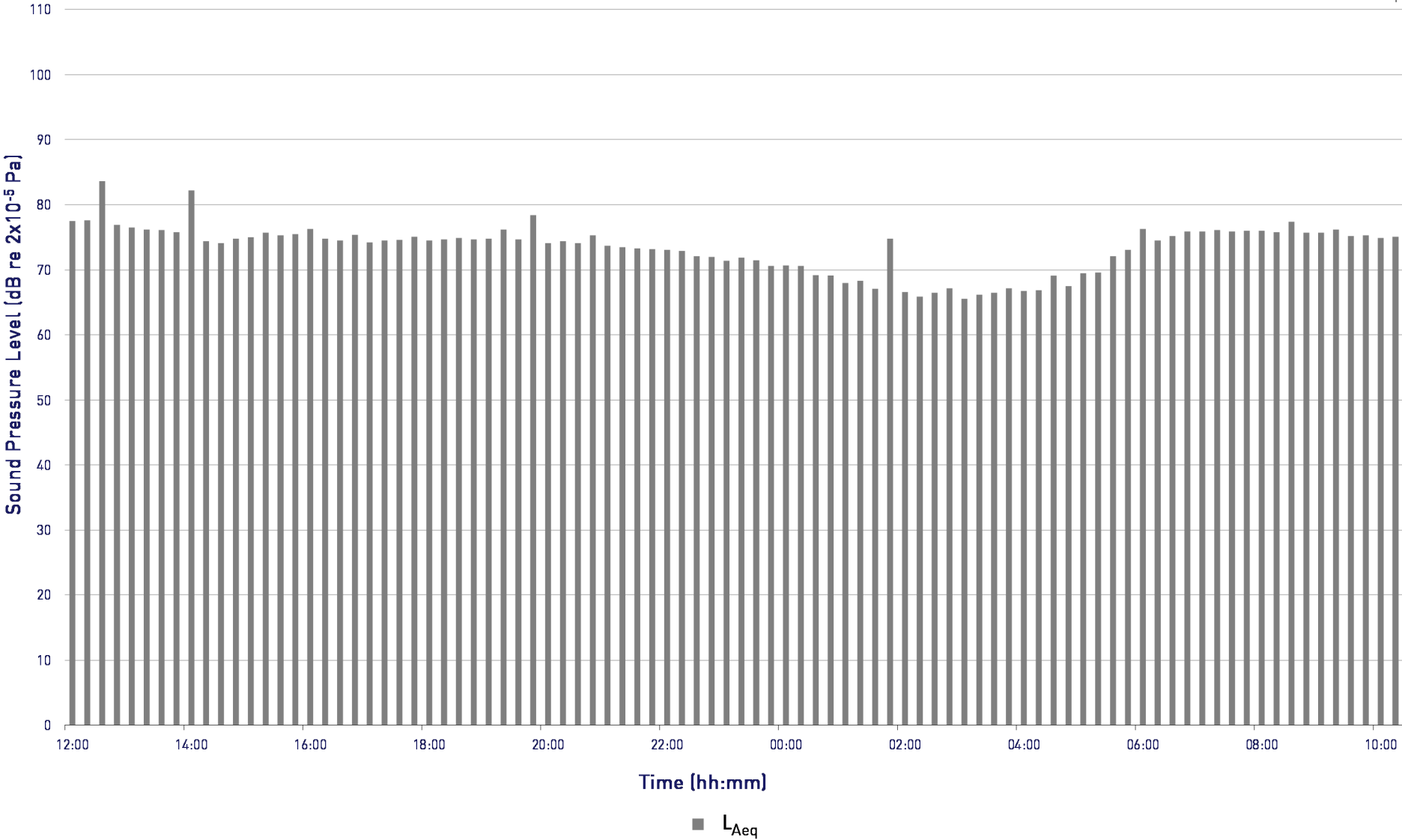
L_{Aeq} Time History

Measurement Position 6



Project: 10929

Graph 11



Parkway Gate, Manchester

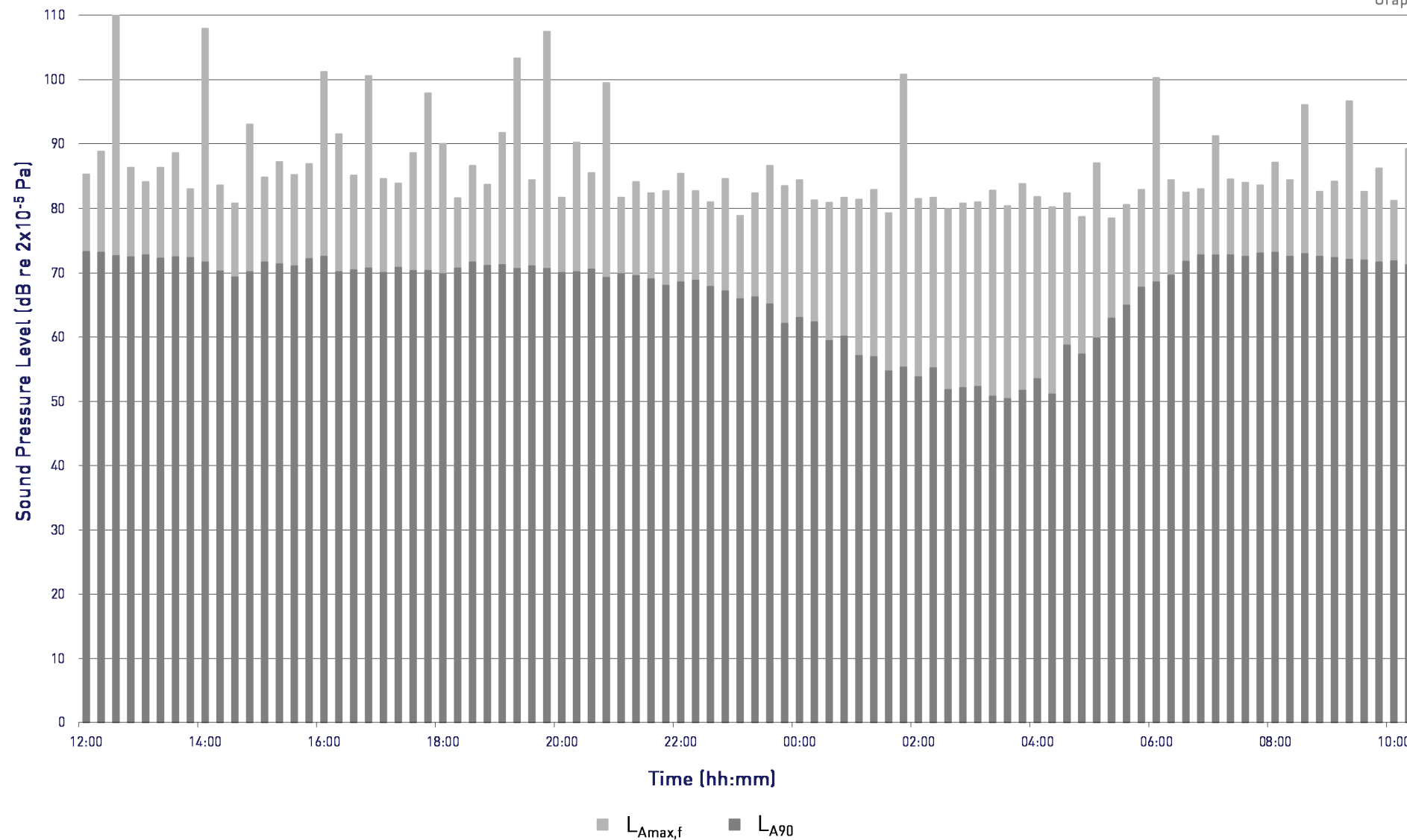
$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 6



Project: 10929

Graph 12



Parkway Gate, Manchester

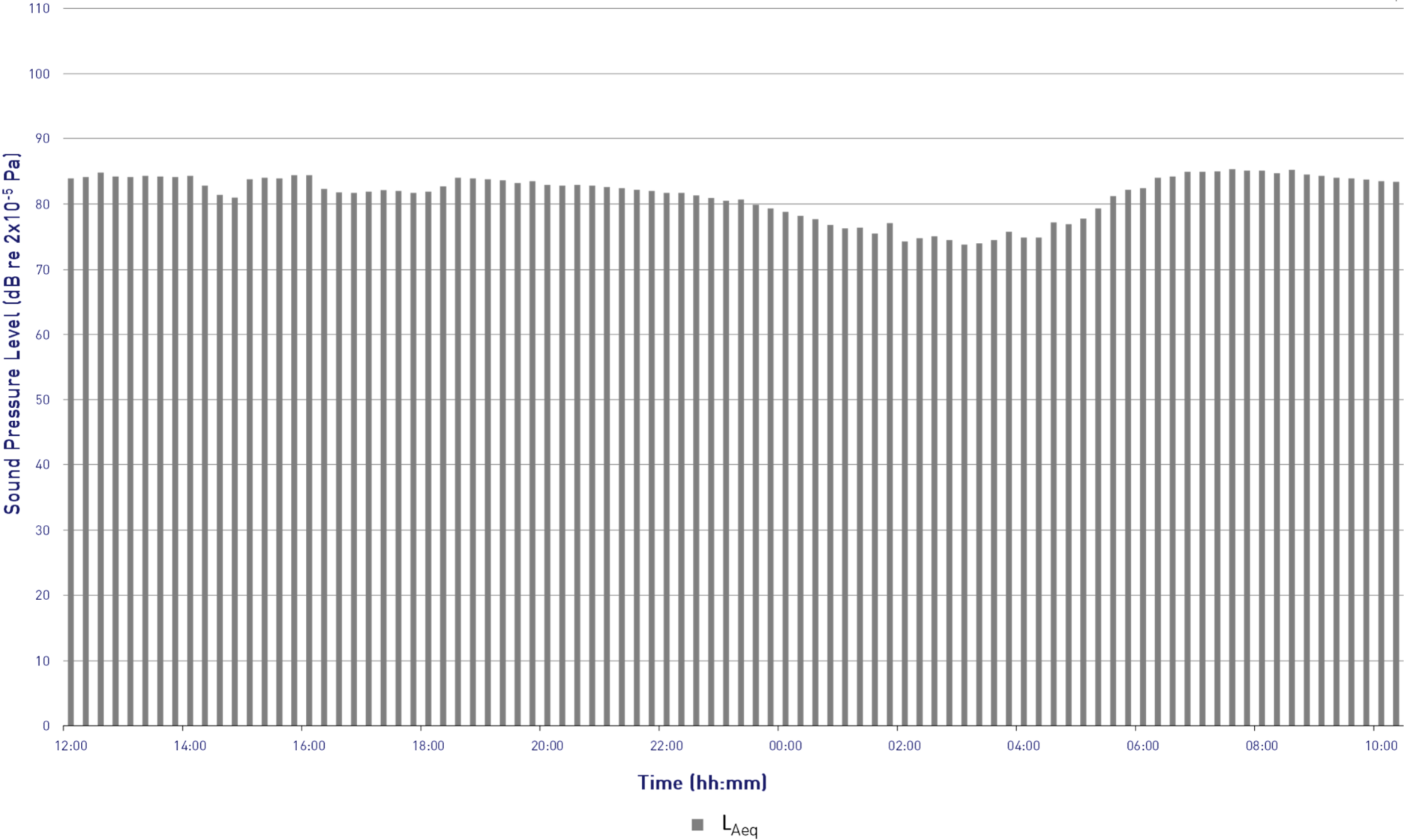
L_{Aeq} Time History

Measurement Position 7



Project: 10929

Graph 13



Parkway Gate, Manchester

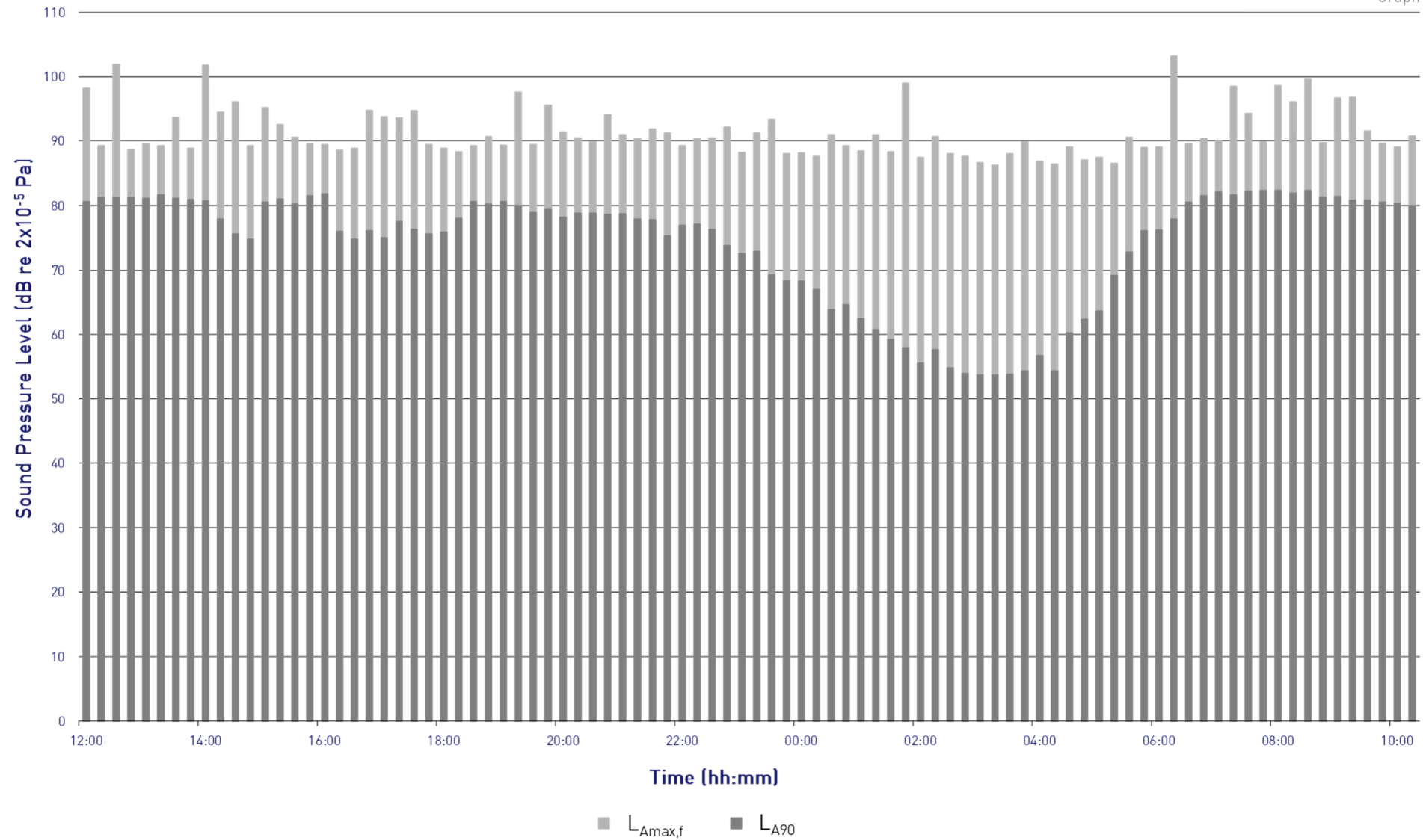
$L_{Amax,f}$ and L_{A90} Time History

Measurement Position 7



Project: 10929

Graph 14



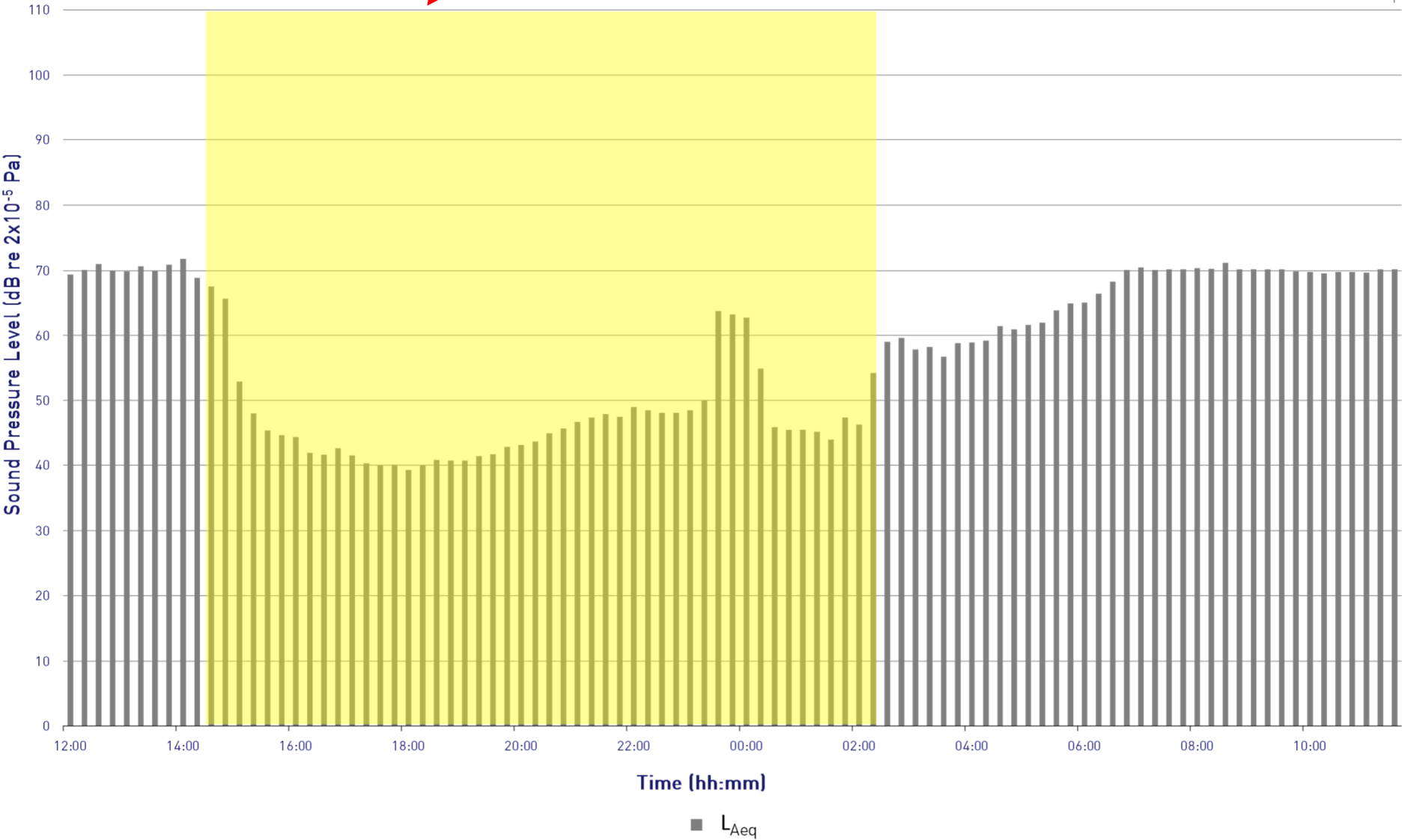
Parkway Gate Manchester
L_{Aeq} Time History
Measurement Position 8



Project: 10929

Graph 15

Measurement Range Excluded

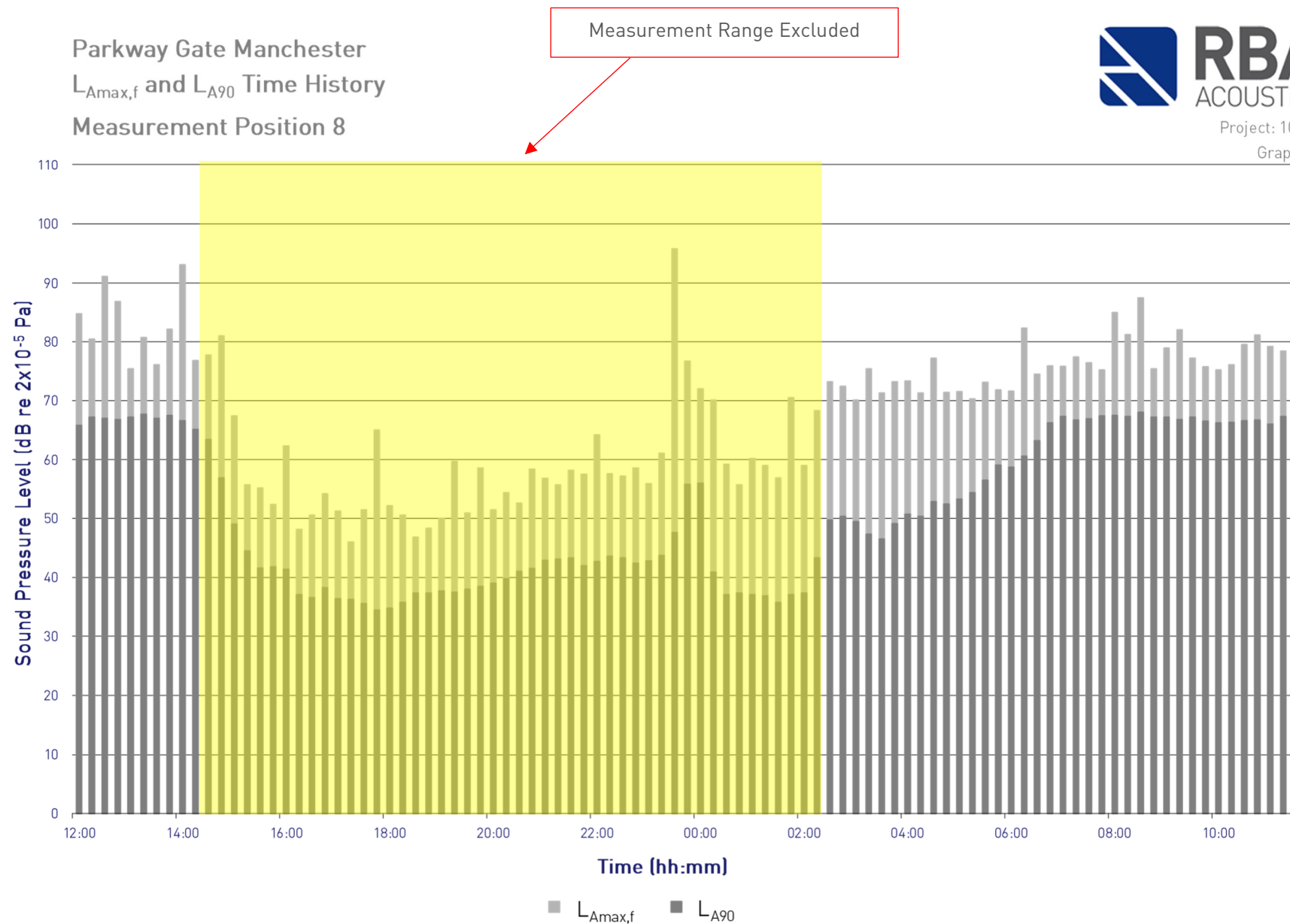


Parkway Gate Manchester
 $L_{Amax,f}$ and L_{A90} Time History
Measurement Position 8



Project: 10929

Graph 16



Parkway Gate Manchester

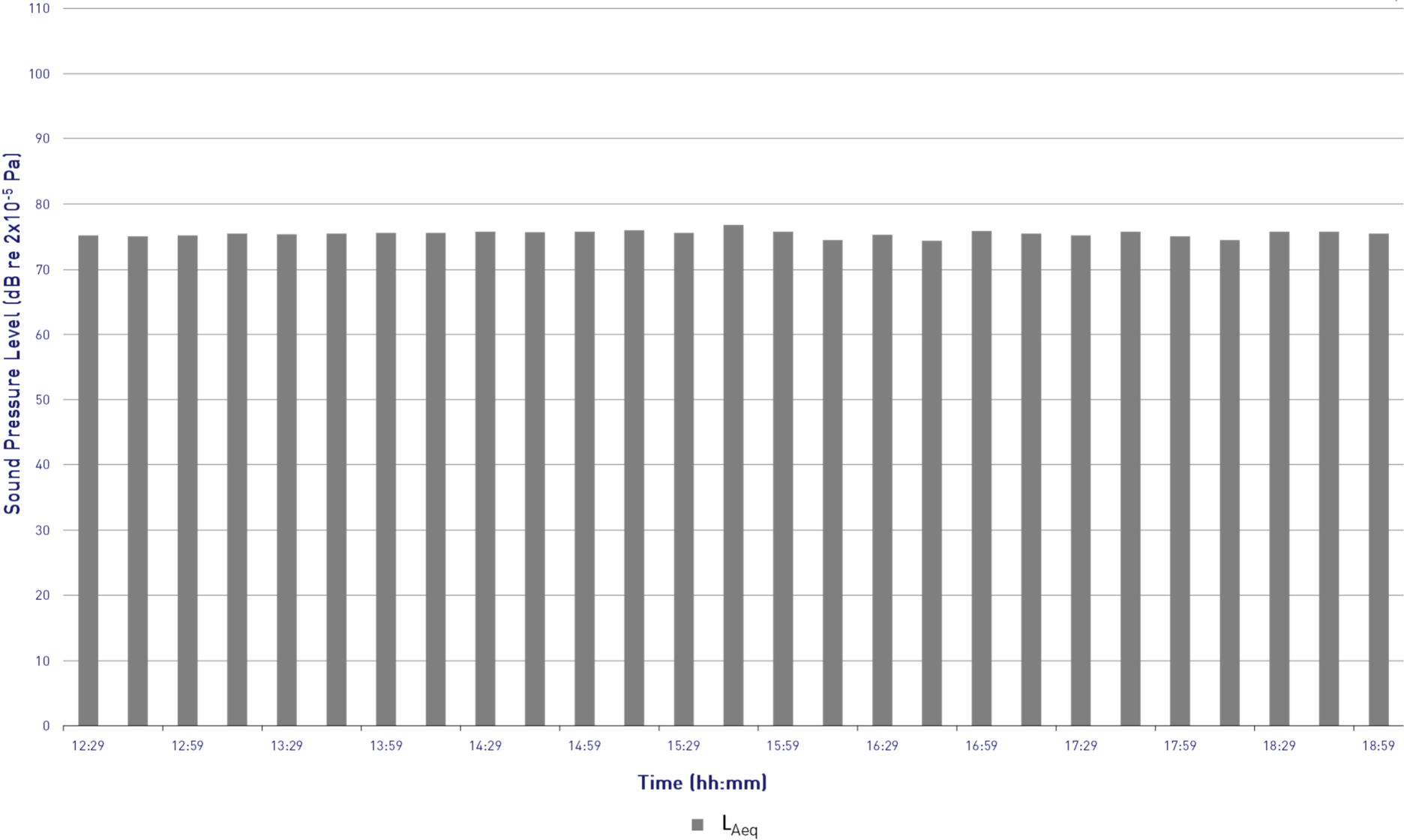
L_{Aeq} Time History

Measurement Position 9



Project: 10929

Graph 17

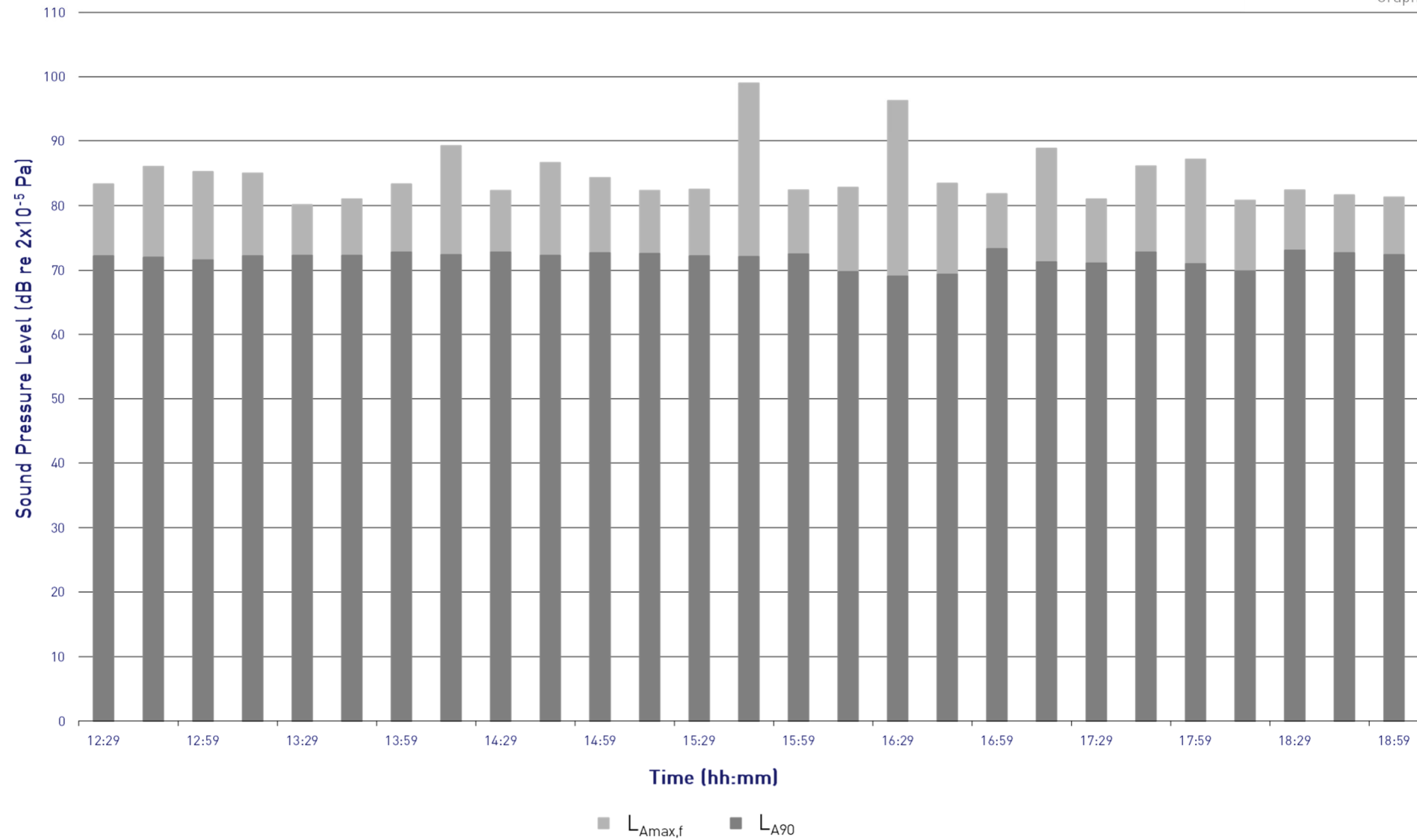


Parkway Gate Manchester
 $L_{Amax,f}$ and L_{A90} Time History
Measurement Position 9



Project: 10929

Graph 18

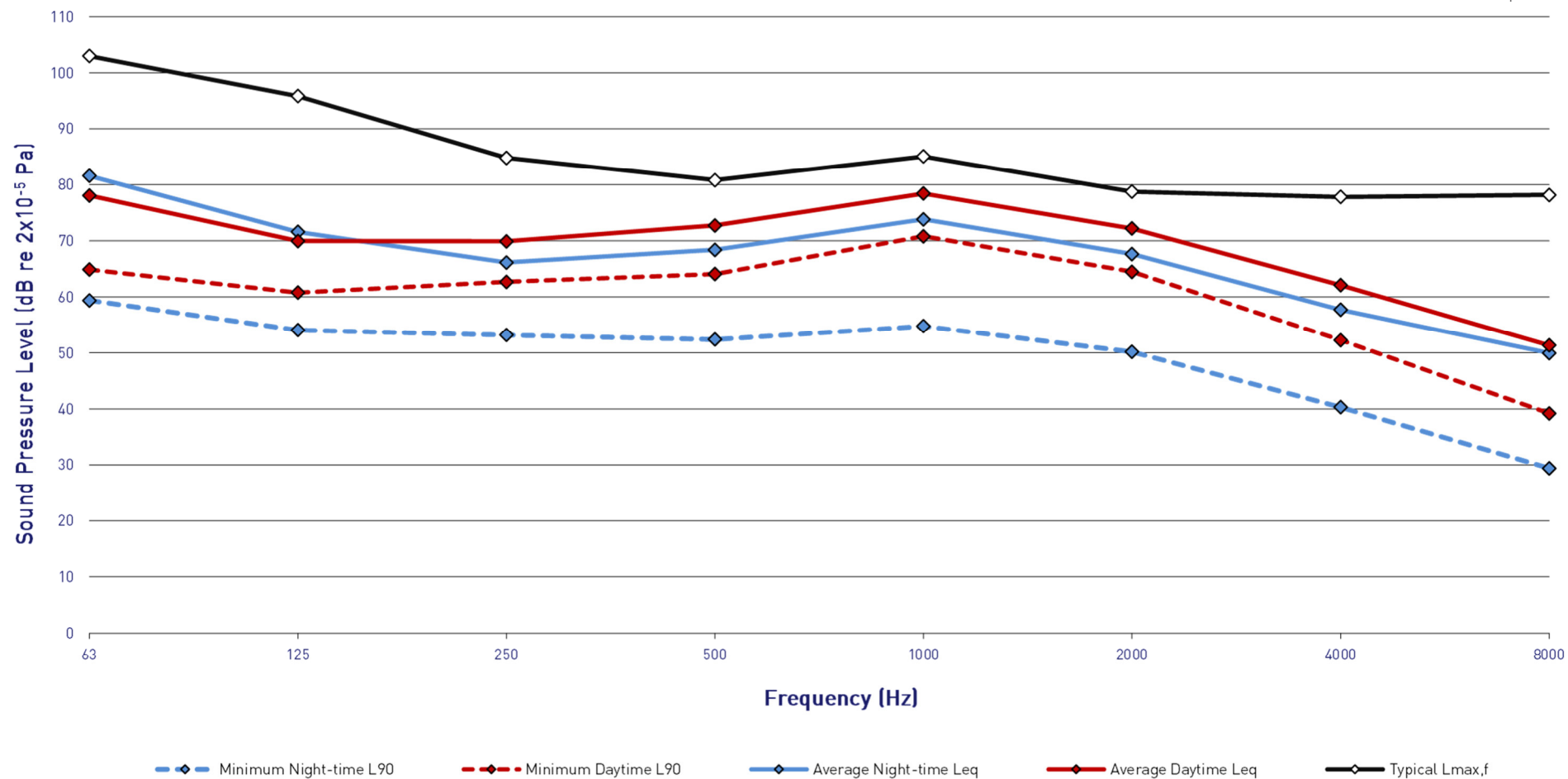


Parkway Gate, Manchester
Spectral Noise Levels
Measurement Position 1



Project: 10929

Graph 19

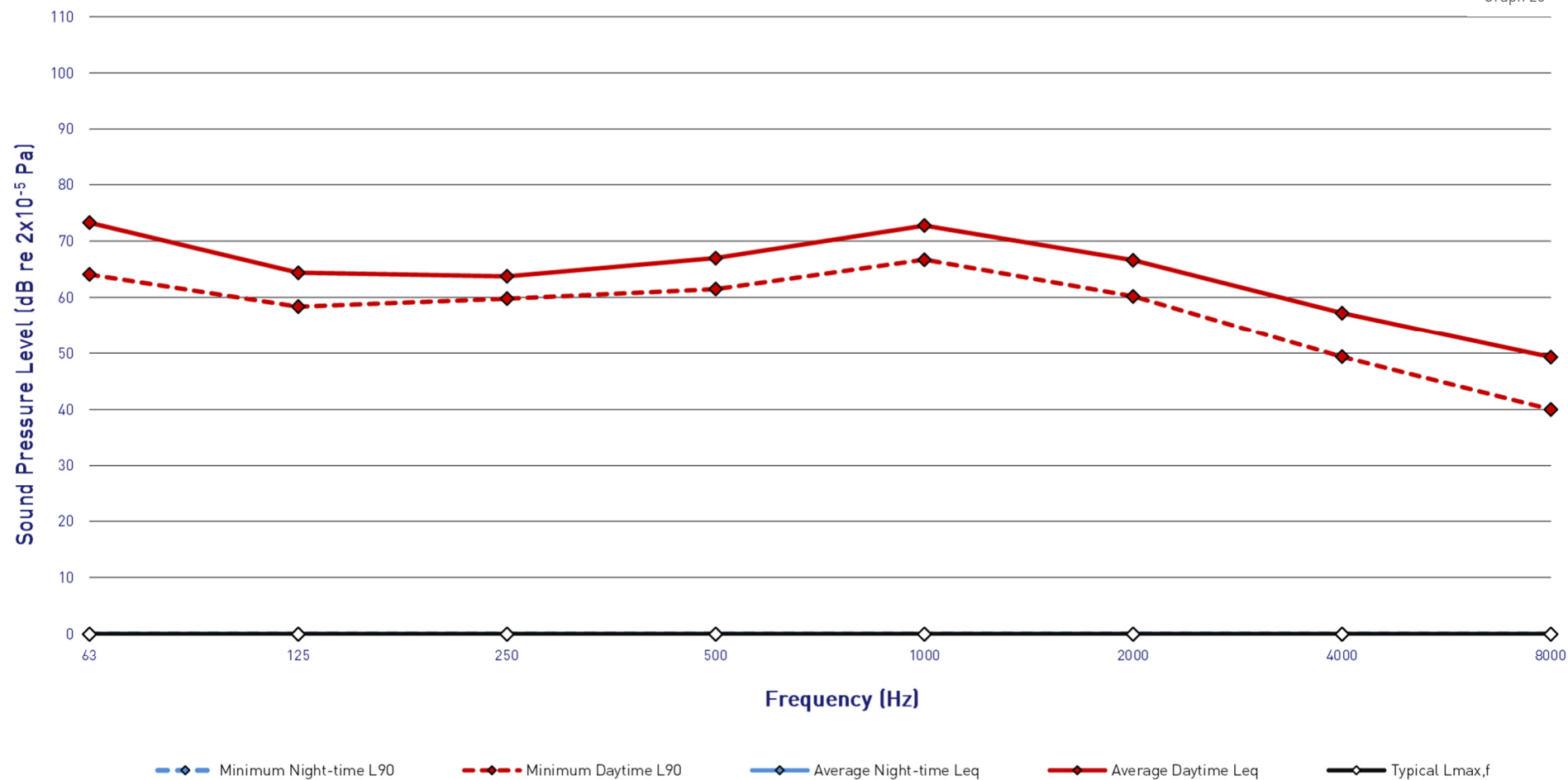


Parkway Gate, Manchester
Spectral Noise Levels
Measurement Position 2



Project: 10929

Graph 20

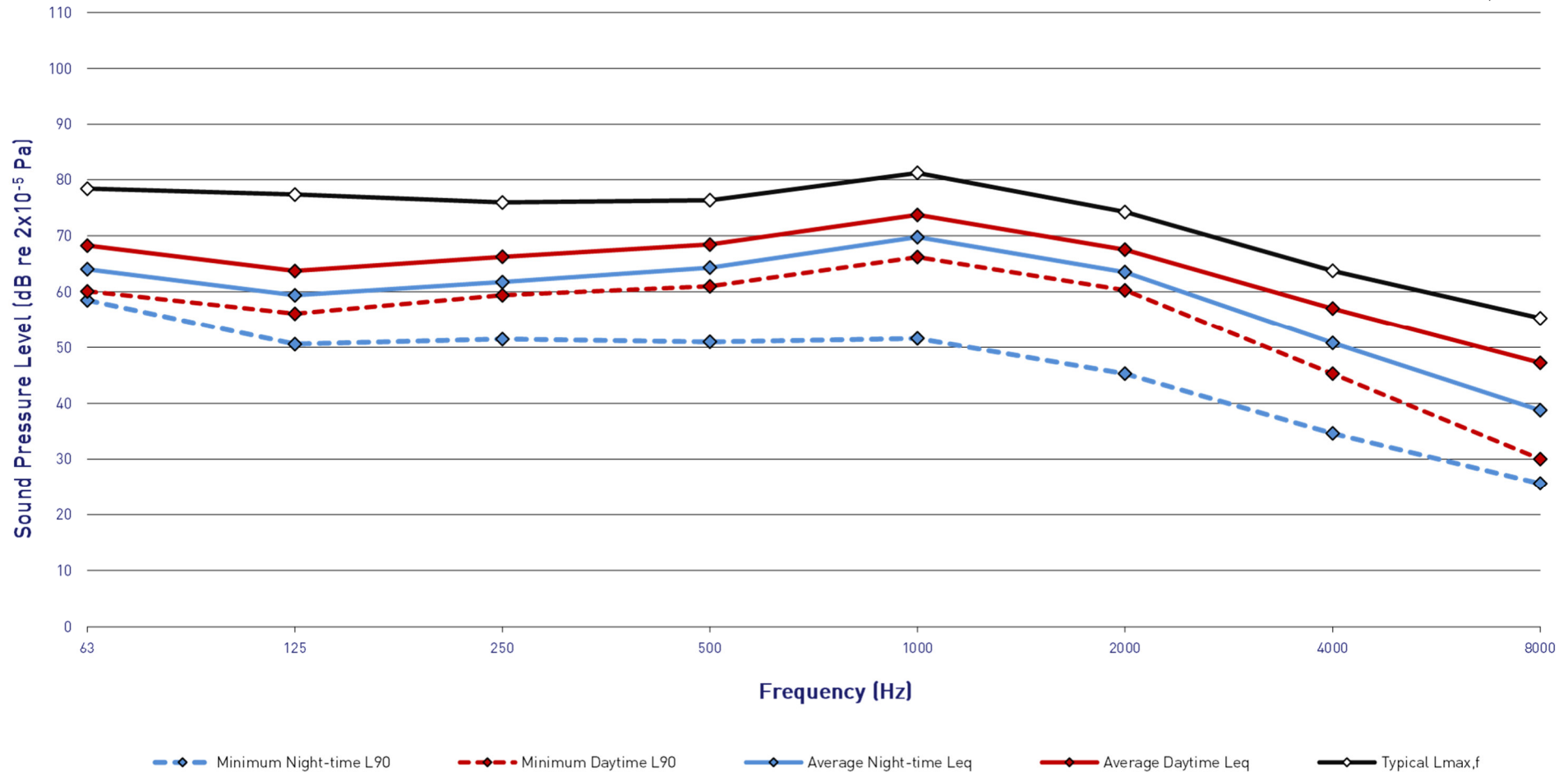


Parkway Gate Manchester
Spectral Noise Levels
Measurement Position 3



Project: 10929

Graph 21

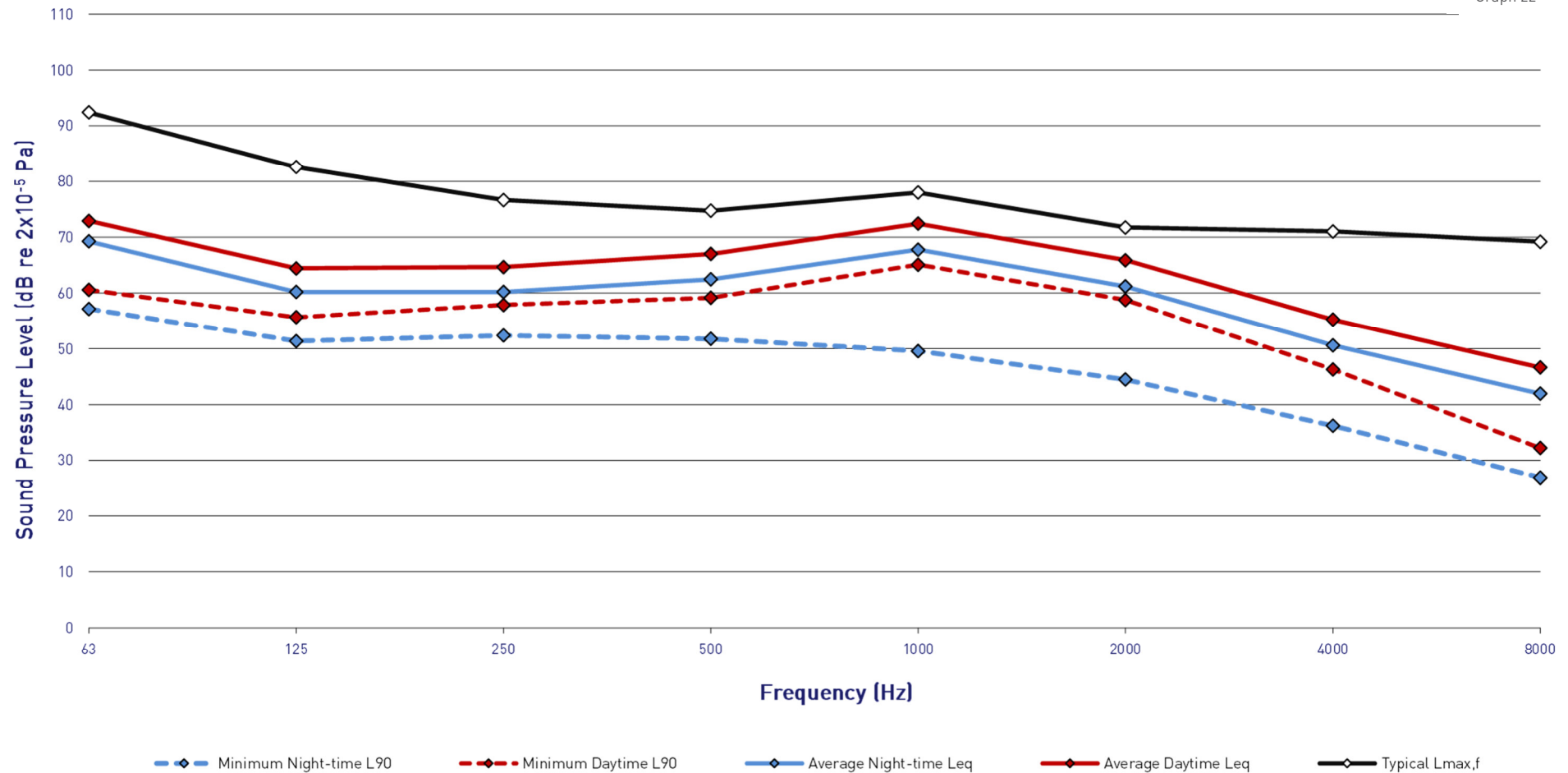


Parkway Gate, Manchester
Spectral Noise Levels
Measurement Position 4



Project: 10929

Graph 22

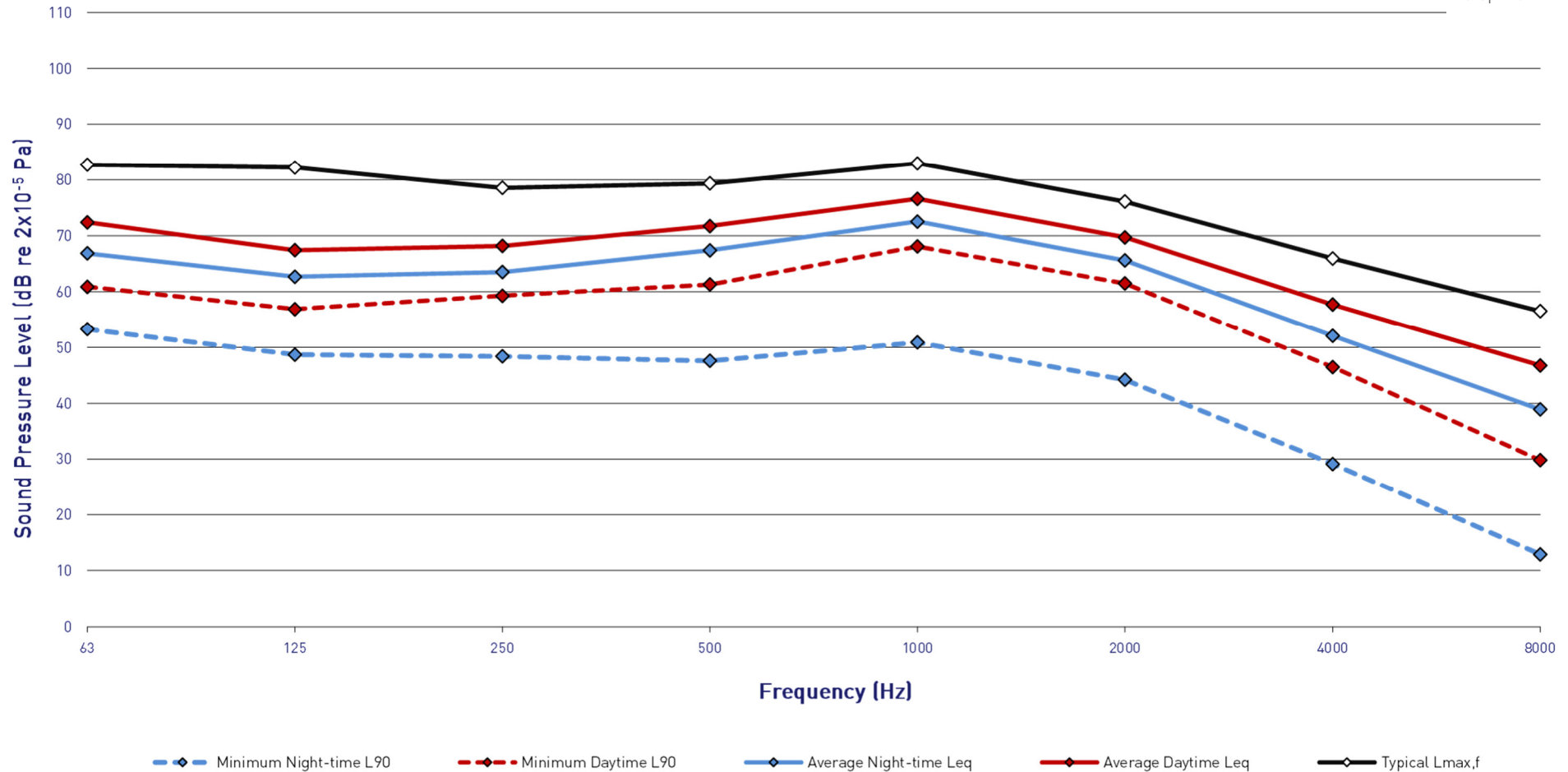


Parkway Gate Manchester
Spectral Noise Levels
Measurement Position 5



Project: 10929

Graph 23

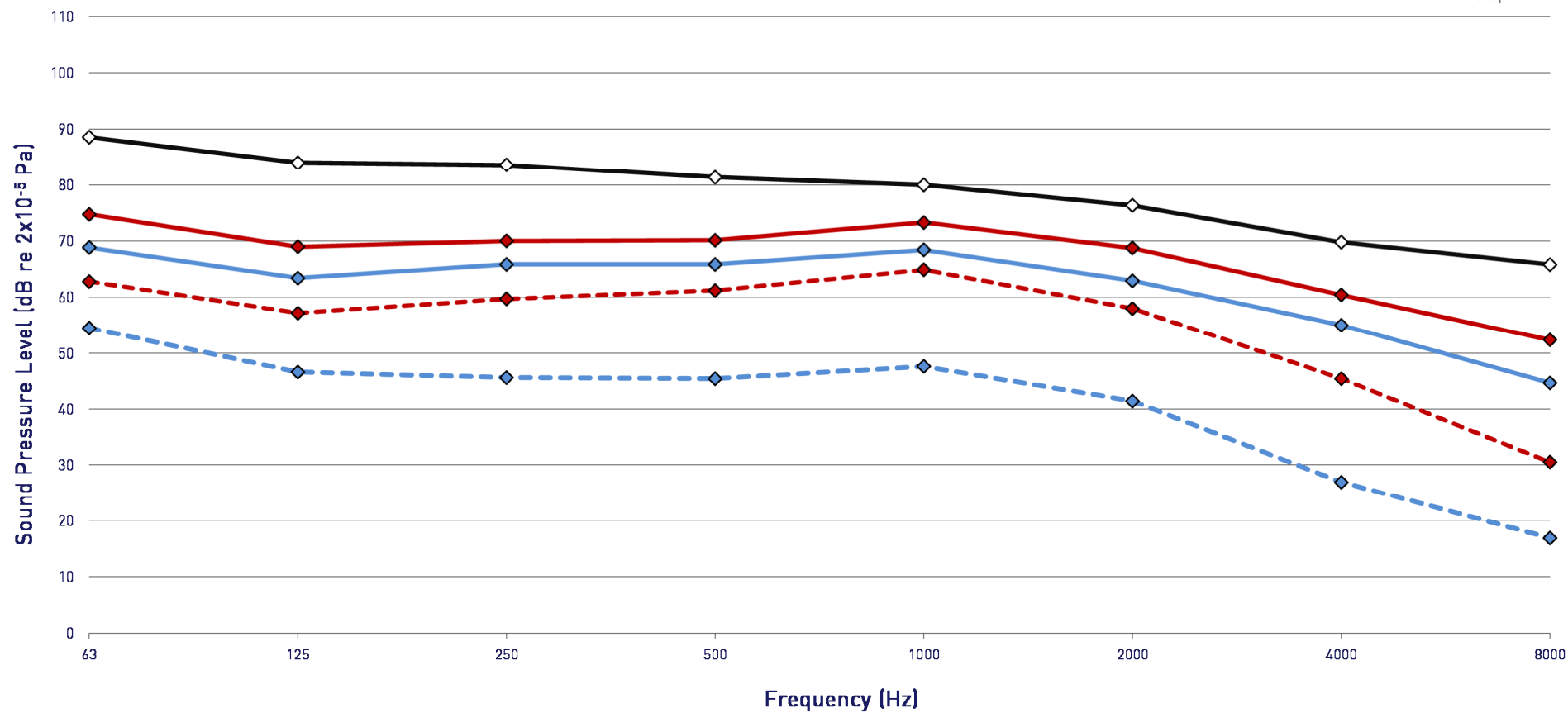


Parkway Gate, Manchester
Spectral Noise Levels
Measurement Position 6



Project: 10929

Graph 24



Minimum Night-time L90

Minimum Daytime L90

Average Night-time Leq

Average Daytime Leq

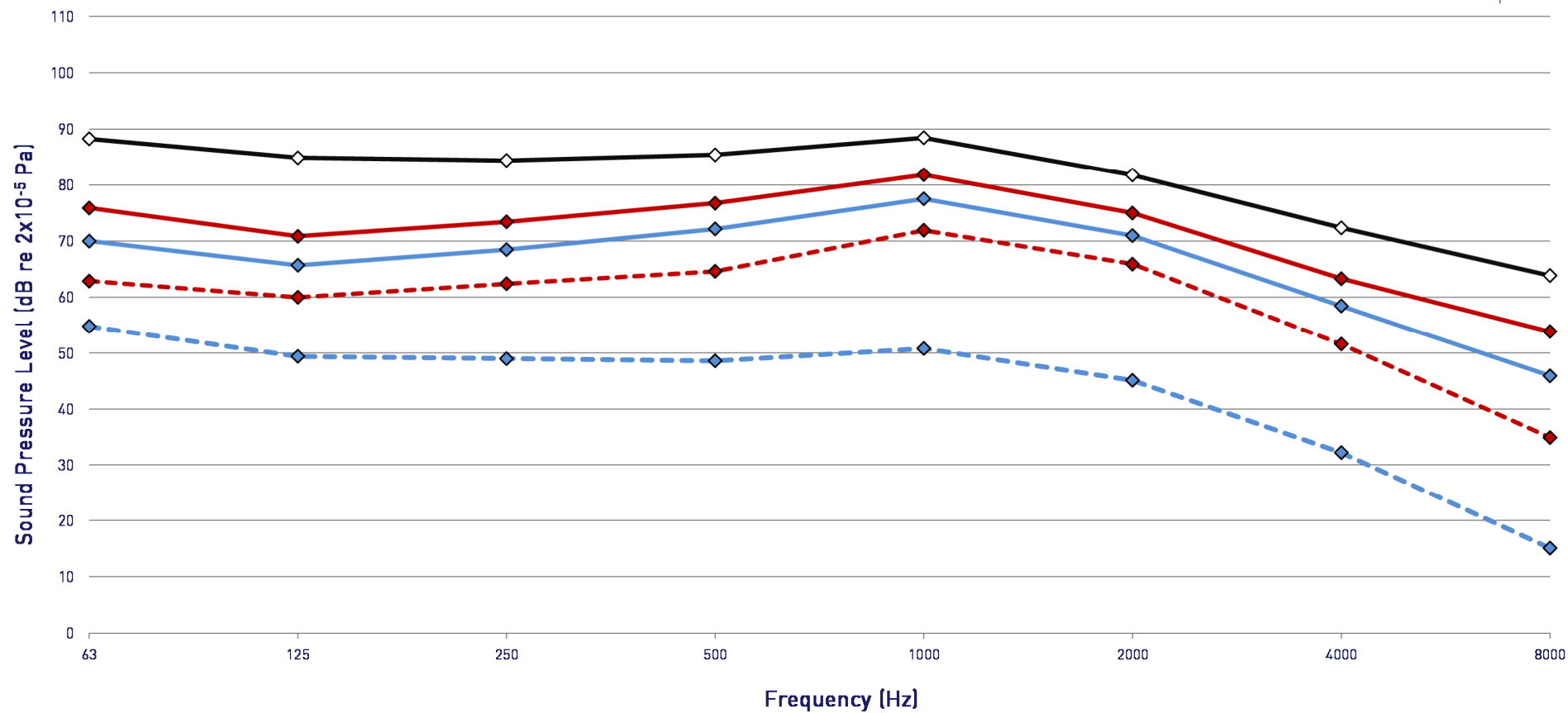
Typical Lmax,f

Parkway Gate, Manchester
Spectral Noise Levels
Measurement Position 7



Project: 10929

Graph 25



Minimum Night-time L90

Minimum Daytime L90

Average Night-time Leq

Average Daytime Leq

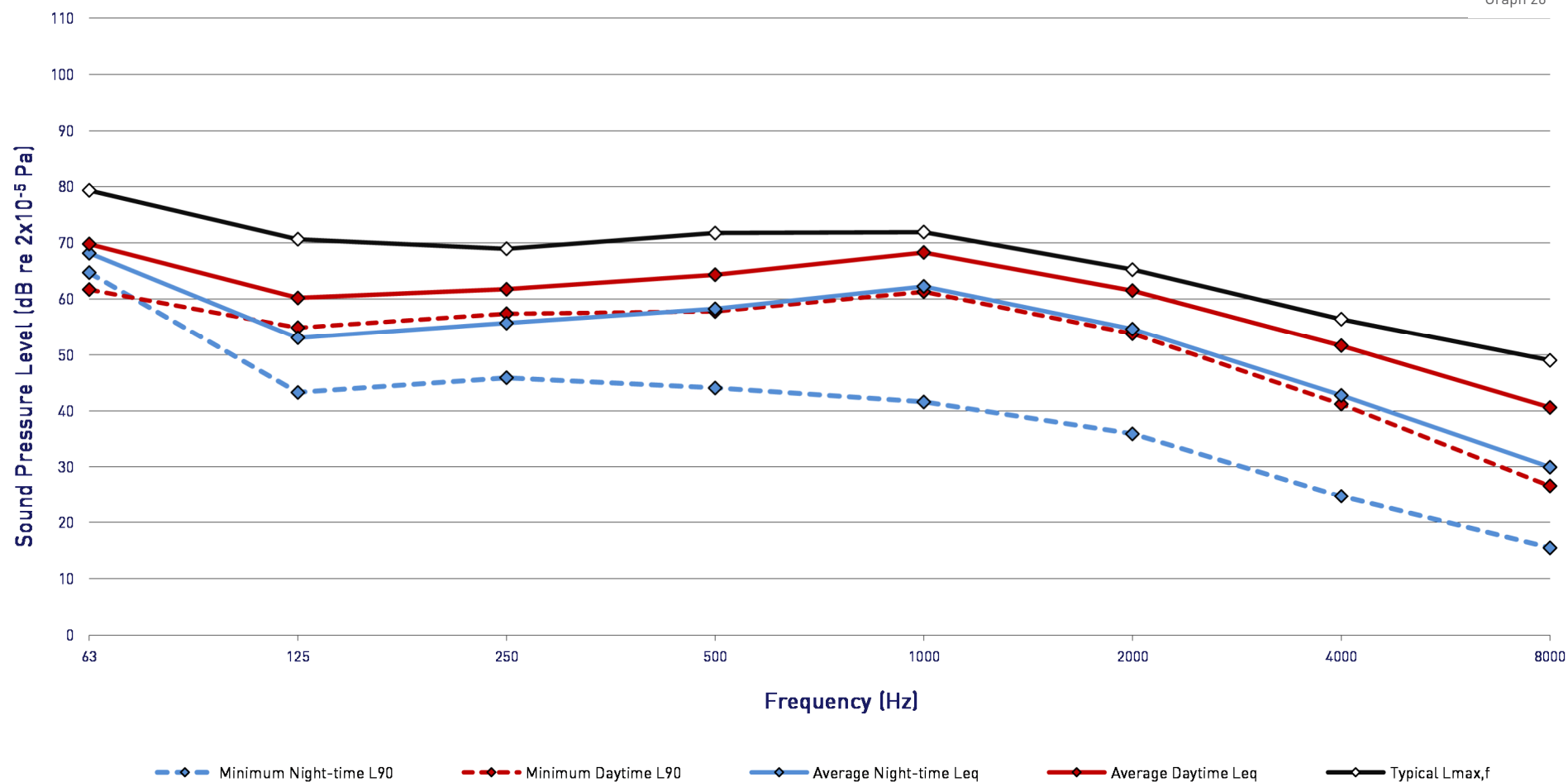
Typical Lmax,f

Parkway Gate Manchester
Spectral Noise Levels
Measurement Position 8



Project: 10929

Graph 26

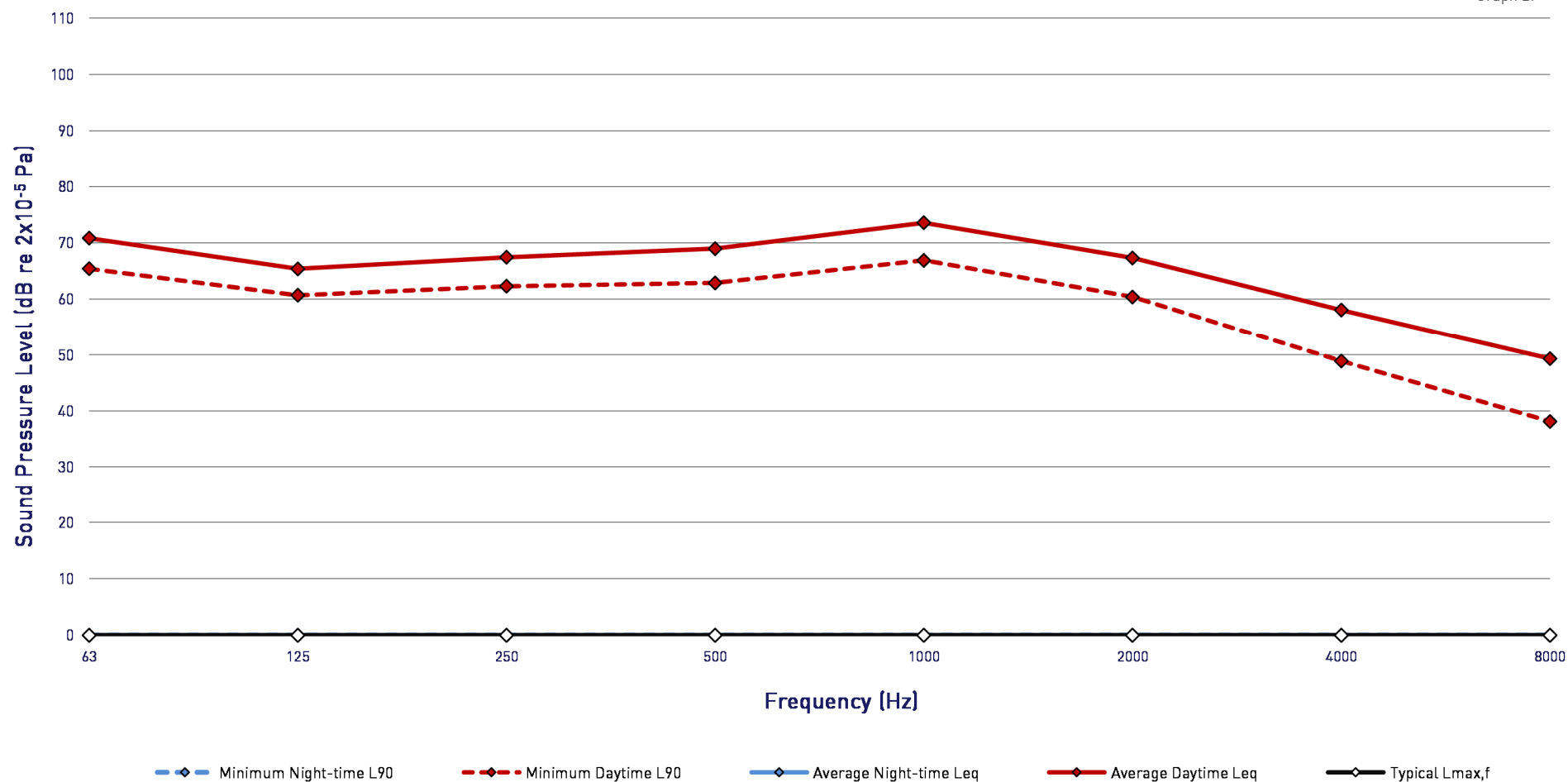


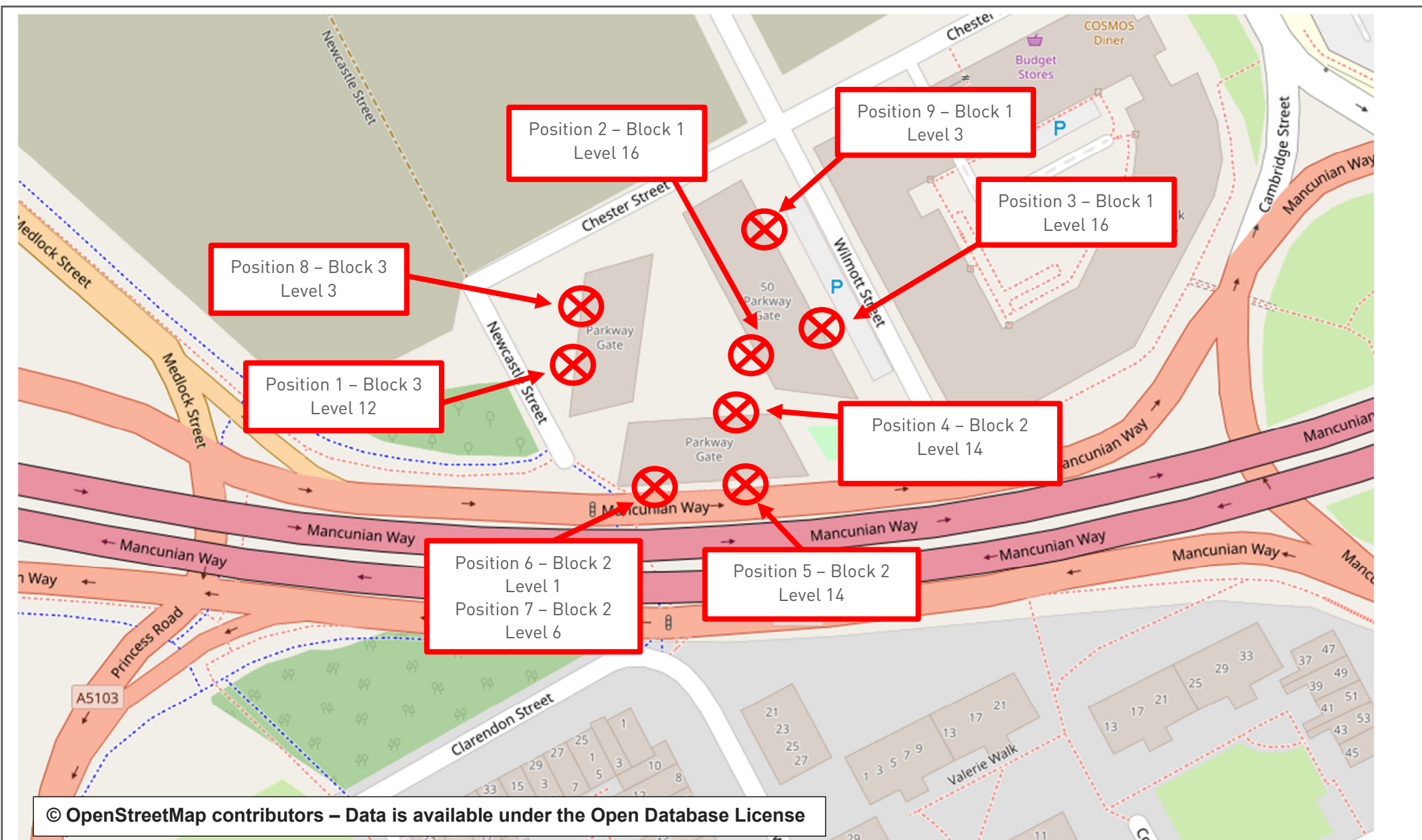
Parkway Gate Manchester
Spectral Noise Levels
Measurement Position 9



Project: 10929

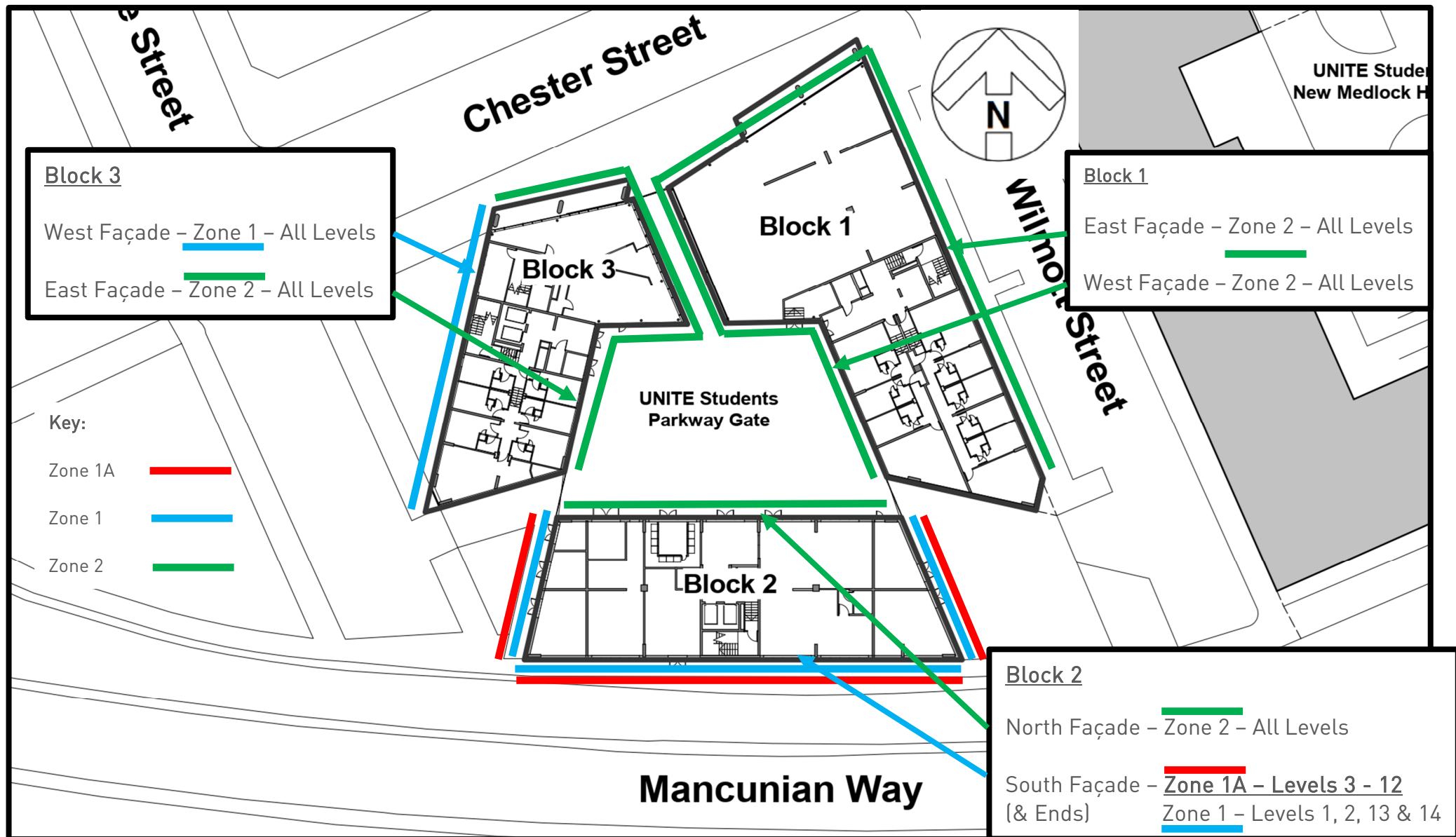
Graph 27

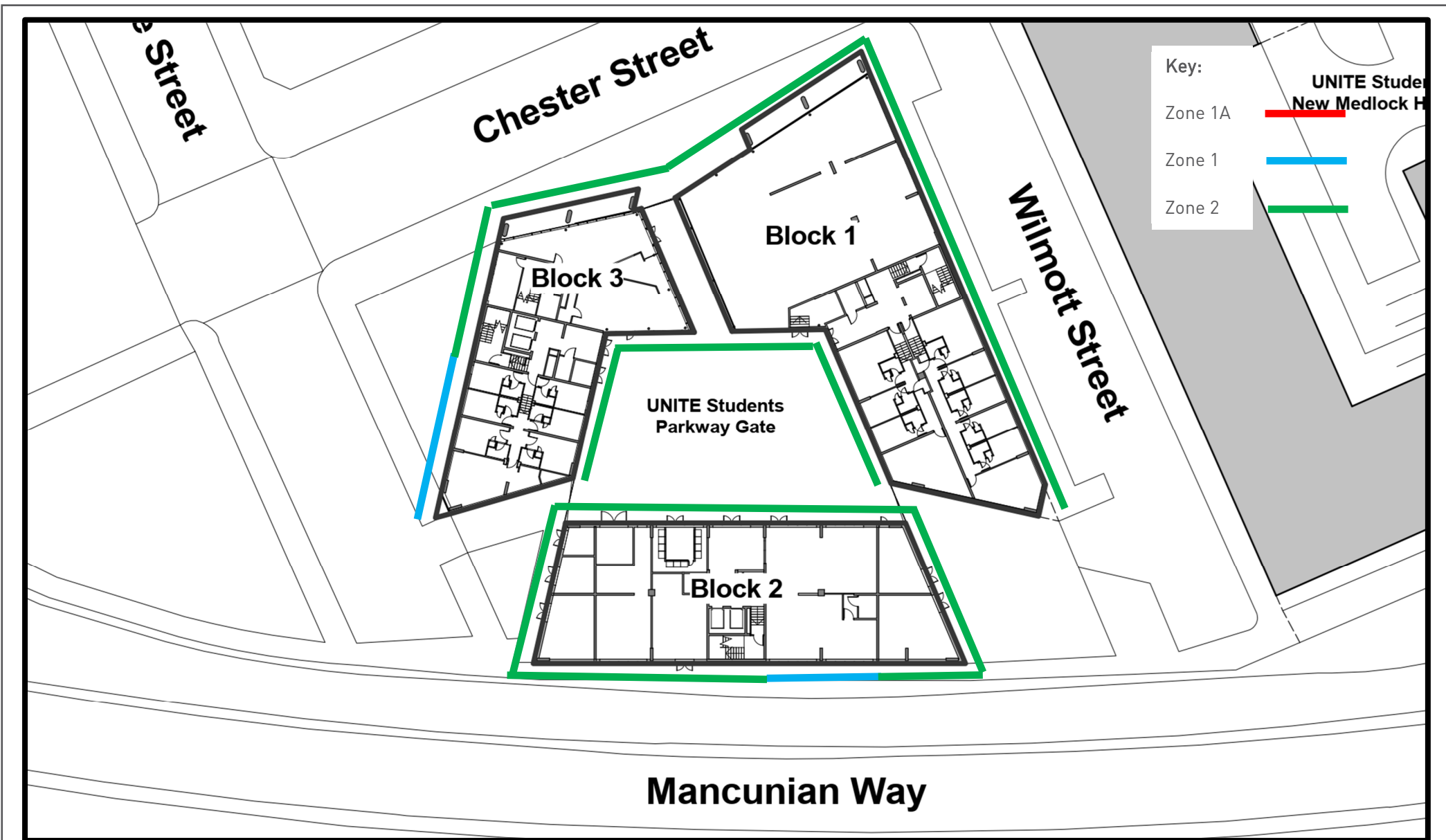




UNITE, Parkway Gate, Manchester
Site Plan
Project 10929

Figure 1
14 March 2022
Not to Scale





UNITE, Parkway Gate, Manchester
 Façade Zoning Plan – Ground Floor
 Project 10929

Figure 3
 14 March 2022
 Not to Scale

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