

Report VA4746.230718.NIA1.2

7-9 Fish Row, Salisbury

Noise Impact Assessment

18 July 2023

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VA4746/SP1	Indicative Site Plan
VA4746/TH1-TH14	Environmental Noise Time Histories
Appendix A	Acoustic Terminology
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1. Introduction

It is proposed to convert the upper floors at 7-9 Fish Row, Salisbury into residential apartments.

Venta Acoustics has been commissioned by Ameera Properties LLP to undertake an assessment of the current environmental noise impact on the site and provide recommendations of acoustic mitigation, where required, in support of an application for planning permission.

These levels were then used to undertake an assessment of the likely impact with reference to the methodology / guidance in BS4142:2014+A1:2014 *Methods for rating and assessing industrial and commercial sound* and BS8233: 2014 *Guidance on sound insulation and noise reduction for buildings*. This report also compares the measured levels with the aims and intents of the National Planning Policy Framework (2021), Noise Policy Statement for England (2010), Planning Policy Guidance and the World Health Organisation Guidelines for Community Noise (1999).

All staff at Venta Acoustics are fully qualified and members of the Institute of Acoustics, the recognised UK professional body for acoustics, noise and vibration professionals and are fully competent to undertake BS4142 assessments.

Outline mitigation measures are considered and an appraisal of the requirements of external building fabric elements is provided, as appropriate.

2. Guidance and Legislation

2.1 The National Planning Policy Framework (2021)

The revised *National Planning Policy Framework* (NPPF), published in July 2021, sets out the Government's planning policies for England, superseding all previous planning policy statements and guidance.

In respect of noise, the NPPF states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing developments from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution.

Hence, Paragraph 185 states that *planning policies and decisions should also ensure 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 and amenity value for this reason*

In regards to the term adverse impact, reference is made to the Noise Policy for England:

2.2 Noise Policy Statement for England (2010)

The Noise Policy Statement for England (NPSE) sets out the long term vision of Government noise policy: 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 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.*

The terms “significant adverse” and “adverse” are related to the following concepts:

- No Observed Effect Level (NOEL) - the level below which no effect on health and quality of life can be detected.
- Lowest Observed Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected.
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

The guidance acknowledges that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations, but will be different for different noise sources, receptors and times.

In order to enable assessment of impacts in line with these requirements, reference should be made to other currently available guidance.

2.3 WHO Guidelines for Community Noise (1999)

The guidance in this document details suitable noise levels for various activities within residential and commercial buildings.

The relevant sections of this document are shown in Table 2.1.

Criterion	Environment	Design range $L_{Aeq,T}$ dB
Maintain speech intelligibility and avoid moderate annoyance, daytime and evening	Living Room	35 dB
Prevent sleep disturbance, night time	Bedrooms	30 dB

Table 2.1 – Excerpt from WHO

[dB ref. 20µPa]

This guidance also states:

For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times a night (Vallet & Vernet 1991).

For sleep disturbance, i.e. in bedrooms at night, the NOEL can, therefore, be taken as anything below 30dB(A), whilst the onset of the LOAEL occurs at 30dB(A) and above. The SOAEL cannot be inferred from this information.

2.4 BS8233:2014

BS8233 *Guidance on sound insulation and noise reduction for buildings* provides guidance as to desirable internal ambient noise levels for different areas within residential buildings.

The relevant section of the standard is shown below in Table 2.2.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq, 16 \text{ hour}}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16 \text{ hour}}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16 \text{ hour}}$	30 dB $L_{Aeq, 8 \text{ hour}}$

Table 2.2 – Excerpt from BS8233:2014 - Indoor ambient noise levels for dwellings

[dB ref. 20 μ Pa]

2.5 Wiltshire Council Requirements

Environmental Health was consulted on planning application for the site and made the following comments and requests.

The report does not assess noise from external sources but it does assess the level of sound insulation between floors and party walls and whether it complies with Building Regulations Approved Document E. It details measurements that were taken and that the tests failed to meet the standard but the report does not suggest what work would be required for the separating floors/ceilings or party walls for them to meet the requirements. The applicant should be specifying the improvements that are required in detail so suitability can be considered by ourselves, Building Standards and the Conservation.

In addition to this it doesn't appear that sound insulation tests were carried out between the commercial units on the ground and 1st floor and 1st floor and second floor. It is vital that the separating structures between the commercial units and proposed dwellings provide sufficient sound insulation. Simply meeting Approved document E levels may not be sufficient because the level of sound insulation required is directly dependant on the types of activity that take place in the room below. When assessing sound insulation levels and recommending mitigation the assessor must consider what type of business may be able to move into the commercial units under the current planning use class.

Chick-o-Land

This fast food takeaway is open until 4am on Friday and Saturday nights. Noise from customers late at night could have an adverse impact inside the bedrooms facing in this direction.

City Centre Noise

This is an old building with ornate, likely single glazed, windows. Some sort of secondary glazing will likely be required to mitigate the anonymous city centre noise from traffic and people in the street. A Noise Impact Assessment is required to assess the internal noise levels and make recommendations for secondary glazing. Some sort of mechanical ventilation will also be required so future residents can suitably ventilate their properties without having to open their windows. However, this noise is separate to the specific commercial noise from adjacent commercial properties. Noise from specific sources cannot be mitigated through glazing, closed windows and mechanical ventilation.

2.6 BS4142:2014+A1:2019

British Standard BS4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* describes a method for rating and assessing sound of an industrial and/or commercial nature, which includes sound from fixed installations comprising mechanical and/or electrical plant and equipment;

The assessment methodology considers the Specific Sound Level, as measured or calculated at a potential noise sensitive receptor, due to the source under investigation. A correction factor is added to this level to account for the acoustic character of the sound as follows:

Tonality – A correction of up to 6dB depending on the prominence of tones;

Impulsivity - A correction of up to 9dB depending on the prominence of impulsivity;

Other sound characteristics - A 3dB correction may be applied where a distinctive acoustic character is present that is neither tonal nor impulsive;

Intermittency - A 3dB correction may be applied where the specific sound has identifiable on/off conditions.

An estimate of the impact of the source is obtained by subtracting the typical background noise level from the corrected Specific Sound Level.

- Typically, the greater this difference, the greater the magnitude of the impact.
- 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 could be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that there will be an adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound having a low impact, depending on the context.

3. Site Description

As illustrated on attached site plan VA4746/SP1, the building is located on the corner of Fish Row and a pedestrian alleyway leading to New Canal. The building overlooks both Fish Row and New Canal, and has commercial premises at ground and first floor level to the western side of the site, a neighbouring fast food takeaway, Click-O-Land to the south east, and another commercial premises to the east.

The dominant noise sources expected to affect the site are road traffic noise, and potentially night-time noise associated with Chick-O-Land.

4. Environmental Noise Survey

4.1 Survey Procedure & Equipment

In order to establish the existing noise levels at the site, a noise survey was carried out between Thursday 8th and Thursday 15th June 2023 at the locations shown in site plan VA4746/SP1. These locations were chosen to be representative of the noise levels incident upon the new noise sensitive receivers.

Continuous 5-minute samples of the L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} sound pressure levels were undertaken at each of the measurement locations.

The weather during the survey period was generally dry with light winds. The background noise data is not considered to have been compromised by these conditions.

Measurements were made generally in accordance with ISO 1996 2:2017 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of sound pressure levels*.

The following equipment was used in the course of the survey:

Manufacturer	Model Type	Serial No	Calibration	
			Certificate No.	Date
NTi Class 1 Integrating SLM	XL2	A2A-12202-E0	UCRT23/1146	1/2/23
NTi Class 1 Integrating SLM	XL2	A2A-15993-E0	1504971-2	28/3/23
NTi Class 1 Integrating SLM	XL2	A2A-15892-E0	150497-1	28/3/23
Larson Davis calibrator	CAL200	13049	1504971-3	28/3/23

Table 4.1 – Equipment used for the survey

The calibration of the sound level meters was verified before and after use with no significant calibration drift observed.

4.2 Results

The measured sound levels are shown as time-history plots on the attached charts VA4746/TH1-7 for position 1 and VA4746/TH8-14 for position 2.

The noise levels for the Daytime and Night-time periods, as measured at the automated monitoring positions were:

Monitoring Period, T	L _{Aeq,T}		Typical ¹ L _{A90,5min}	
	Position 1 (Fish Row)	Position 2 (New Canal)	Position 1 (Fish Row)	Position 2 (New Canal)
07:00 – 23:00	59 dB	67 dB	47 dB	46 dB
23:00 – 07:00	53 dB	58 dB	34 dB	32 dB

Table 4.2 – Average ambient and typical background noise levels

¹ The typical L_{A90} value is taken as the 10th percentile of all L_{A90} values measured during the relevant period.

The typical night time L_{Amax} events were recorded to be in the order of 73dB L_{Amax,fast} on Fish Row and 79dB L_{Amax,fast} on New Canal.

A finer analysis of the maximum events on the Friday and Saturday nights indicated that the maximum events were higher on these nights, due to noise associated with the night-time economy, with levels of 79dB L_{Amax,fast} on Fish Row and 81dB L_{Amax,fast} on New Canal.

In addition to the above, there is a single side window at second floor level overlooking the rear lightwell behind Chick-O-Land, where a noise monitor was located for the duration of the survey. This showed that the noise level outside the window was 67dB(A) due to plant associated with the restaurant, which operates virtually continuously, with very brief interludes with the plant running at a lower duty.

5. BS4142 Noise Impact Assessment

5.1 Source Noise Levels

Observations on site confirmed that noise from Chick-O-Land's plant affects a single window at second floor level on the east side of the building. Sound levels emitted from the plant were measured throughout the survey, which are summarised in Table 5.1.

Noise Source	Measurement Location	Measured L_{Aeq}	Notes
Chick-O-Land plant	Outside 2 nd floor window	67dB	Operates continuously with changes in duty levels noted

Table 5.1 – Measured noise sources used for assessment

5.2 Acoustic Character Correction

The subjective method of allocating corrections to the sound source has been used following the methodology provided in BS4142:2014 and summarised in section 2.6.

Noise Source	Subjective Description	Allocated Corrections
Plant Noise	Plant operates continuously, with ramping up and down of duty, slightly tonal in character. Short periods when plant ramped down briefly.	Tonality: +4dB Impulsivity: 0dB Intermittency: +3dB

Table 5.2 – Acoustic character corrections

These penalties are applied to the specific noise level in section 5.3 to obtain the rating noise level.

5.3 Rating Noise Level and Assessment

The rating noise levels at the assessment locations are compared against the relevant background noise levels to assess the notional significance of the noise impact as follows.

Table 5.3 shows the assessment on the most affected façade of the new development.

Results		Relevant Clause	Commentary
Specific Sound Level	L_{Aeq} 67dB	7.3.4	As measured on site
Assume 100% on time	0dB	7.2	
Acoustic feature correction	+7 dB	9.2	+4 dB for tonality, +3dB for intermittency
Rating level	L_{Ar} 74 dB	9.2	
Night-time background sound level	L_{A90} 32 dB	8	
Excess of rating over background sound level	+42 dB	11	
Assessment indicates significant adverse impact		11	Depending on context

Table 5.3 – BS4142 Assessment

5.4 Context

The site is located in a mixed commercial and residential area.

Within this context, the estimated impact of the sound sources is expected to remain valid or be slightly reduced.

The BS4142 standard aims to cover a wide variety of situations under the same base assessment methodology and so has some inherent shortcomings. To allow for this, the guidance encourages consideration of the site context as a means of adapting the base assessment to specific scenarios.

The base assessment methodology is considered to be weighted towards the more sensitive case of assessing industrial noise upon an existing residential receiver. The introduction of a new residential use to an area with existing sources of commercial noise provides an opportunity to provide appropriate mitigation against the noise sources.

Mitigation at the source or along the propagation path for the noise sources would not be achievable in this situation. However, the redevelopment of the site provides an opportunity to provide mitigation in the form of appropriately specified external building fabric elements. This would allow appropriate internal noise levels to be achieved such that the commercial noise source is not considered to be disruptive.

This allows the impact to be significantly reduced for occupants within the dwellings and is considered in section 6. The new dwellings are not proposed to have any external amenity areas and hence internal noise levels are how future residents would experience the noise.

5.5 Uncertainty

This section considers the variable in the assessment that may cause variations within the final results and describes how these have been addressed.

- Use of a Class 1 sound level meter is considered to reduce instrument error to insignificant levels as compared with environmental variations. The calibration of the instrumentation was confirmed before and after the noise surveys.
- The background measurements were undertaken under suitable weather conditions over a period designed to include reasonable temporal variations in background noise levels, including a weekend period. Two monitoring locations were selected to minimise local acoustic phenomenon that may affect a single measurement location, including the noise from the nearby road site. These measurement locations were selected to be representative of the background noise levels expected to be experienced by the proposed dwellings without being unduly influenced by extraneous noise sources.
- Source data was of particular noise sources was measured on site at the receiver, where possible. These measurements were undertaken in a manner that best represented noise emissions from the source to the assessment locations without being unduly influenced by extraneous noise sources. This methodology minimised the uncertainty introduced in sound propagation calculations.

Overall, the uncertainty is considered to have been minimised to a suitable range so as not to risk significant variations in the impact assessment of typical operations.

6. Internal Noise Assessment

To control sound from the plant noise, the sound insulation performance of the building glazing to the second floor bedroom will be specified to control the Rating noise level (including BS4142 penalties) to below the recommended values in BS8233. This hybrid approach of assessing commercial noise with a BS4142 penalty against the BS8233 criteria (over a shortened assessment period) is endorsed in the ProPG (Professional Practice Guidance on Planning and Noise prepared by the Institute of Acoustics, the Chartered Institute of Environmental Health and the Association of Noise Consultants).

Elsewhere, a review of the architectural drawings for the proposed scheme has been undertaken with the intent of achieving the internal noise levels stated in BS8233 and the WHO Guidelines from average and weekend maximum noise levels highlighted earlier.

Due to the age and listed nature of the building, it is understood that in many of the areas, the performance will be met through the use of secondary glazing systems, and a secondary mechanical ventilation system as required, rather than trickle vents.

6.1 Sound Reduction Performances of Building Elements

It has been assumed that all the non-glazed elements, i.e. walls and roof systems, will be capable of providing the following minimum sound insulation performance, when tested in accordance with BS EN ISO 10140-2:2010 *Acoustics - Laboratory measurement of sound insulation of building elements – Part 2: Measurement of airborne sound insulation*.

Building Element	Single figure weighted sound reduction index, dB
Masonry	R _w 51

Table 6.1 – Assumed sound reductions performances of non-glazed elements

6.2 Sound Reduction Performance of Windowsets and Vents

The monitoring data along with the architectural drawings have been used to calculate the required sound insulation performance for the windowsets (glazing and frame combination) and open ventilators for the building. These are summarised in Table 6.2 below.

Glazing Location	Required Glazing SRI, dB	Ventilator Performance, dB
Living Rooms, Fish Row	R _w 27	D _{n,e,w} 29
Bedrooms, Fish Row	R _w 36	D _{n,e,w} 39
Living Rooms, New Canal	R _w 34	D _{n,e,w} 36
Bedrooms, New Canal and West Façade	R _w 38	D _{n,e,w} 41
2 nd floor bedroom overlooking plant	R _w 44	No ventilator

Table 6.2 – Required minimum sound reduction indices for glazing and ventilators

If trickle vents are used the performance shown in Table 6.2 will be required. The figures stated are for a single vent per room. If multiple vents are required, then the performance requirement shown in Table 6.2 will increase by a value equal to $+10\log(N)$, with N being the total number of vents serving the room.

Due to plant noise operating constantly, it is recommended that the bedroom window overlooking the lightwell with the plant does not have a trickle vent, and should probably not be openable, with mechanical ventilation providing the required airflow.

Due to the age of the building, it is likely that for many of the windows, a secondary glazing solution may be required. Such systems are capable of providing a very high level of sound insulation in conjunction with existing glazing and would be expected to meet the above performances shown in Table 6.2.

It should be noted that elsewhere, there is no reason why windows could not be opened as a matter of personal preference or for purge ventilation.

6.2.1 Windowset Performances

It is important that the performance shown in Table 6.2 are achieved by the entire windowset including frames, ventilators, seals, etc. Glass performance alone would not be likely to show compliance with the specification as the other elements typically provide the weakest noise transmission path.

The ventilator performances provided would need to be achieved with the vents open. Should this performance not be achievable, a mechanical ventilation solution may be required.

The ventilation scheme for the dwellings should ensure that the appropriate air changes can be achieved, in line with Part F of the building regulations and with consideration of summer overheating.

Due to the listed nature of the building, it is expected that secondary glazing solutions will be required to meet the internal noise requirements.

With the above recommendations implemented, the noise levels within the proposed dwellings would be expected to be in line with recommendations given in the WHO 1999 and BS8233:2014 guidance. Internal noise levels can therefore be considered to be between the NOEL the LOAEL levels.

7. Ground Floor Retail/Commercial Unit

The retail/commercial unit at ground floor level is to be retained throughout, as are the existing first floor elements of 9 Fish Row.

Currently, there is a staircase between the ground and first floor level, which will be closed up as part of the works. As this is the case, it was not possible to undertake sound insulation tests between ground and first floor. However, sound insulation tests were carried out by Hayes McKenzie in June 2022 (report attached in Appendix B for reference) between first and second floor level, and also one of the internal walls was tested at second floor level.

It has been confirmed that the floor construction is the same for both the first and second level, and hence this has been used as the baseline for the sound insulation performance.

The previous sound insulation tests showed that the airborne performance is currently poor, achieving performances of $D_{nT,w} + C_{tr}$ 37dB for the floor and 36dB for the wall. It should be noted that the existing doors in the building are lightweight and poorly sealed, and so will limit the sound insulation performance to some degree, but the sound insulation performance of the constructions will need to be improved to meet the requirements of the Building Regulations, and also suitably protect future residents from the commercial noise.

The building is Grade II listed, which is likely to have an impact on what works are permitted to uprate the floor and walls. However, recommendations have been made to maximise the sound insulation performance within the constraints of the existing building.

7.1 Floor

It is understood that the floor build-up is a conventional joisted construction, as below:

- Floorboards (21-25mm thick)
- 330mm joists
- Lath and plaster ceiling, overall depth approximately 26mm

As previously highlighted, the above construction is insufficient to protect the residents above from noise in the space below, or between apartments. However, due to the listed nature of the building, no works to the underside of the ceilings is to be permitted, and in areas where there are historic floorboards, these must also be left in-situ.

In areas where the floor can be removed, it is recommended that the floor build-up is uprated to the following minimum construction.

- Remove existing floor
- Void between the joists filled with a of 100mm mineral wool (density 10-33kg/m³)
- Noggins installed between joists 110mm above ceiling
- 2 layers of 18mm cement particle board (22kg/m² per board) installed on top of noggins, perimeter sealed to joists with non hardening mastic
- 100mm mineral wool (density 10-33kg/m³)
- 18mm T+G deck
- Floating timber floor deck (18mm T+G or similar)

- Floor finish

With the above measures in place, it is expected that the floor may be improved sufficiently to meet the requirements of the Building Regulations.

In areas where the floorboards may not be disturbed, it is recommended that a mass damping layer, such as Tecsound SY70 or Acoustilay 15, with a floating floor installed above, preferably from a heavy mass board, such as structural 18mm cement particle board (26kg/m^2), and flanking strips to the perimeter. Another option may be a system such as Screedboard 28.

This would be expected to maximise the sound insulation within the constraints of the heritage constraints of the building.

7.2 Wall

Where the adjoining retail demise borders the new residential elements, the separating wall is understood to comprise a brick wall, with the external walls being brickwork with a lime plaster finish.

It is understood that these cannot be changed, or have an independent partition installed over for heritage reasons.

The new party wall at second floor level is understood to be a lath and plaster construction of a depth of approximately 100mm.

For the lath wall, the following works are understood to be acceptable in terms of heritage:

- A second studwork partition is constructed to create a cavity of at least 75mm between the existing wall and the inner face of the new partition
- 50mm mineral wool in void (min. density 10kg/m^3)
- 2 layers of 15mm Savolit wood panels
- 18mm lime plaster

7.3 Architectural Detailing

Any mechanical and electrical penetrations should be carefully detailed and well sealed.

ADE recommends that wrapping piped services (other than gas) in 25mm thick mineral wool insulation (10kg/m^3) and enclosing in two layers of plasterboard should be sufficient to maintain sound insulation and noise breakout.

It is understood that the new doors to apartments will either be replaced with modern doorsets, or upgraded with acoustic and smoke seals. The doorset will need to provide a minimum performance of R_w 29dB, or have a minimum mass per unit area of 25kg/m^2 .

7.4 Sound Insulation – Discussion

With the above works in place, the constructions would be expected to provide a sound insulation performance of approximately $D_{nT,w} + C_{tr}$ 43dB, although the performance may be less than this in areas where the floorboards cannot be removed, and flanking up the external wall is more dominant.

With overlaid carpets and resilient layers, the impact performance would also be expected to be achieved.

The above constructions would maximise the sound insulation performance from the relatively quiet uses below (ancillary/office space for the fish store, and a showroom for the Jewellery shop). Considering the opening hours of the shops which are between 08:00 and 17:00 Monday to Saturday, it is not expected that future residents would be unduly affected by noise from the uses below, especially considering the expectations of living within a city centre location.

However, it is recommended that to further control noise, future leaseholders of the ground floor would have to agree to the following conditions:

- No music louder than ambient background music ($L_{Aeq, 5mins}$ 65dB)
- No downlighters installed
- Operational hours limited to 07:00 – 19:00
- Leaseholders required to provide a noise management plan/strategy to landlord for agreement should any changes to the above be desired.

Should the incoming tenant wish to have music, the installation and location of speakers should be carefully considered, with soffit-mounting to be avoided entirely. To avoid re-radiated structureborne noise, speakers should be fitted on isolated mounts and not fixed rigidly to structural columns or walls.

It is recommended that a system of multiple smaller speakers distributed throughout the space is used to play music, rather than larger speakers. These should be directed downwards, and not towards the ceiling. This will allow users to perceive the same music noise levels whilst maintaining a lower overall noise level in the room. The use of speakers with a strong bass response or subwoofers should not be permitted, and would be considered unnecessary considering the ‘background’ nature of the music.

8. Conclusion

A baseline noise survey has been undertaken by Venta Acoustics to establish the prevailing noise climate in the locality of 7-9 Fish Row, Salisbury, in support of a planning application for the proposed development of new residential dwellings.

The measured levels have been assessed against the National Planning Policy Framework and currently available standards and guidance documents including World Health Organisation *Guidelines for Community Noise* (1999) and BS8233:2014 *Guidance on sound Insulation and noise*.

Appropriate external and internal noise criteria have been considered to minimise adverse impacts on health and quality of life as a result of the new development. Appropriate mitigation measures have been outlined including proprietary thermal double-glazing, potential secondary glazing and trickle vents.

The sound insulation between the different areas has been considered, and recommendations have been made as to improvements within the limitations of the existing building to protect future residents.

Jamie Duncan MIOA



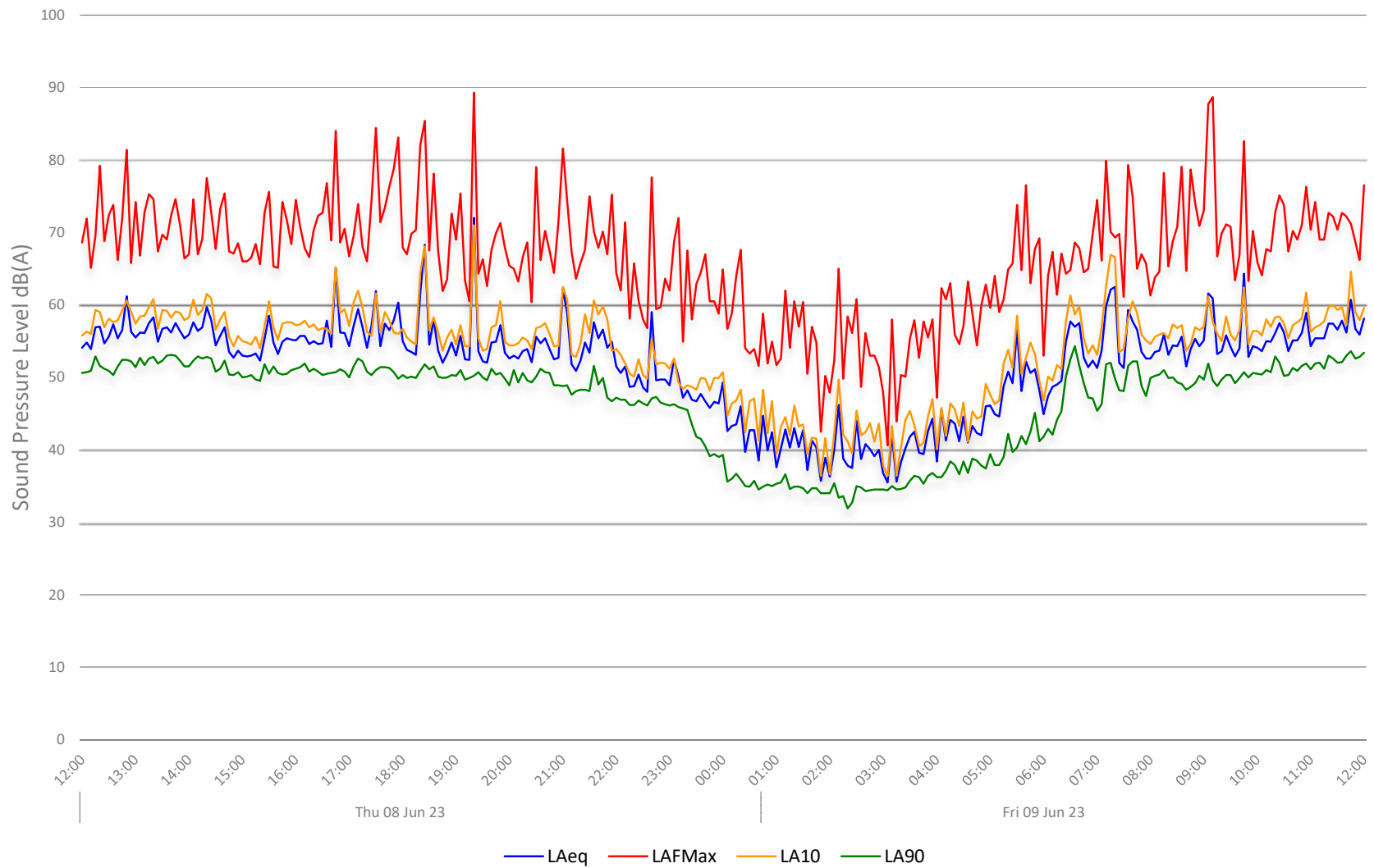
7-9 Fish Row, Salisbury

Environmental Noise Time History: 1

Position 1 - Fish Row



Figure VA4746/TH1



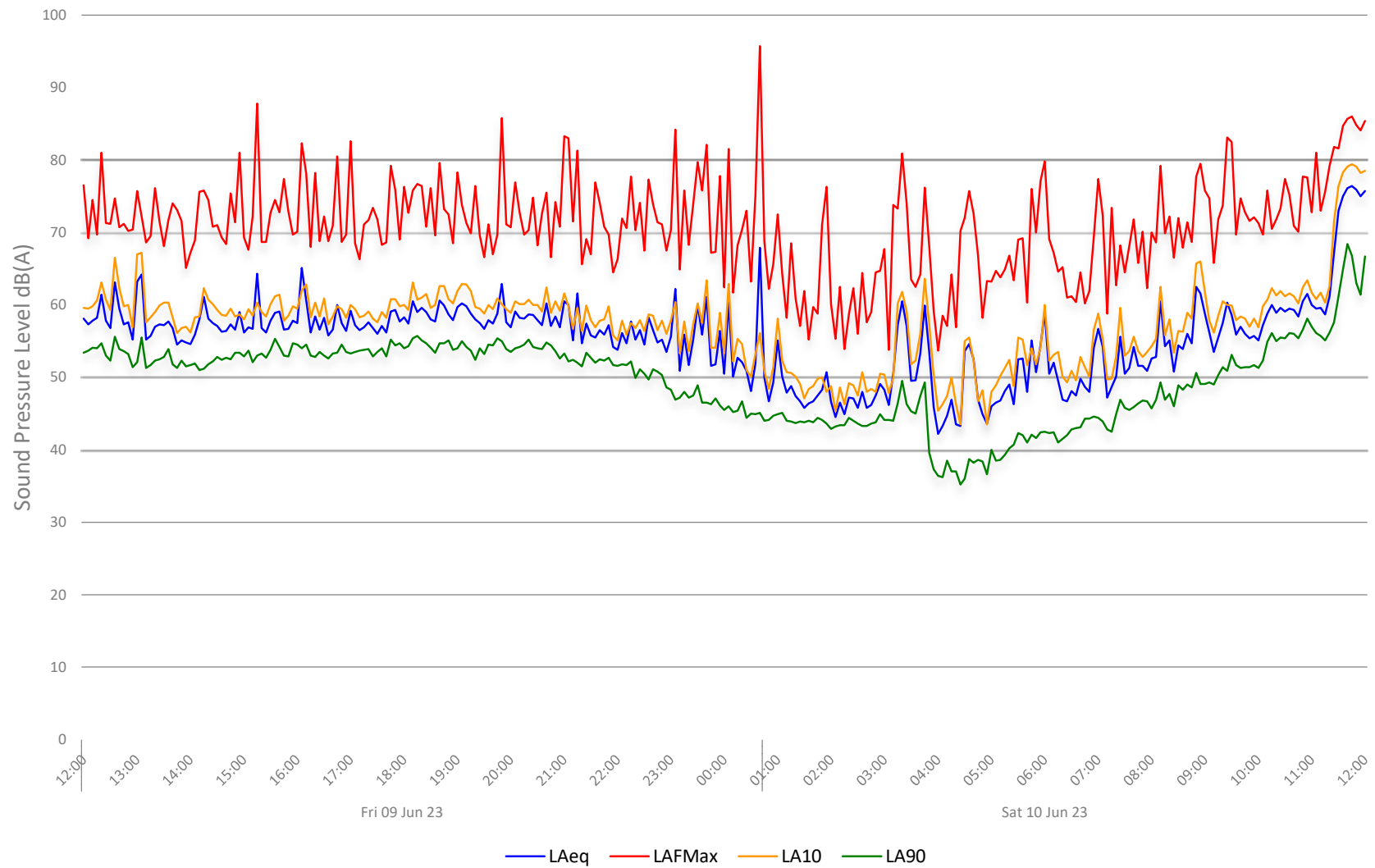
7-9 Fish Row, Salisbury

Environmental Noise Time History: 2

Position 1 - Fish Row



Figure VA4746/TH2



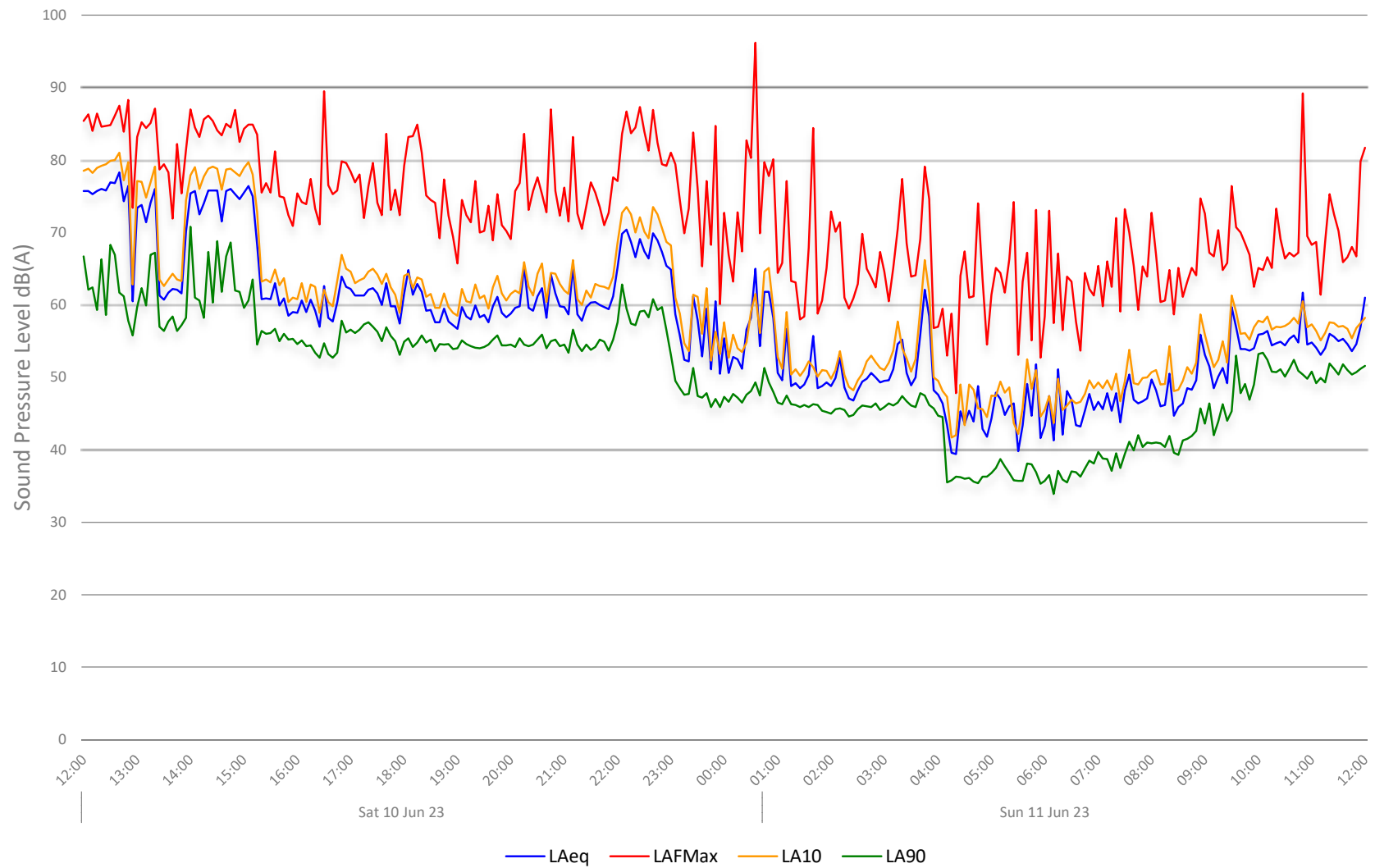
7-9 Fish Row, Salisbury

Environmental Noise Time History: 3

Position 1 - Fish Row



Figure VA4746/TH3



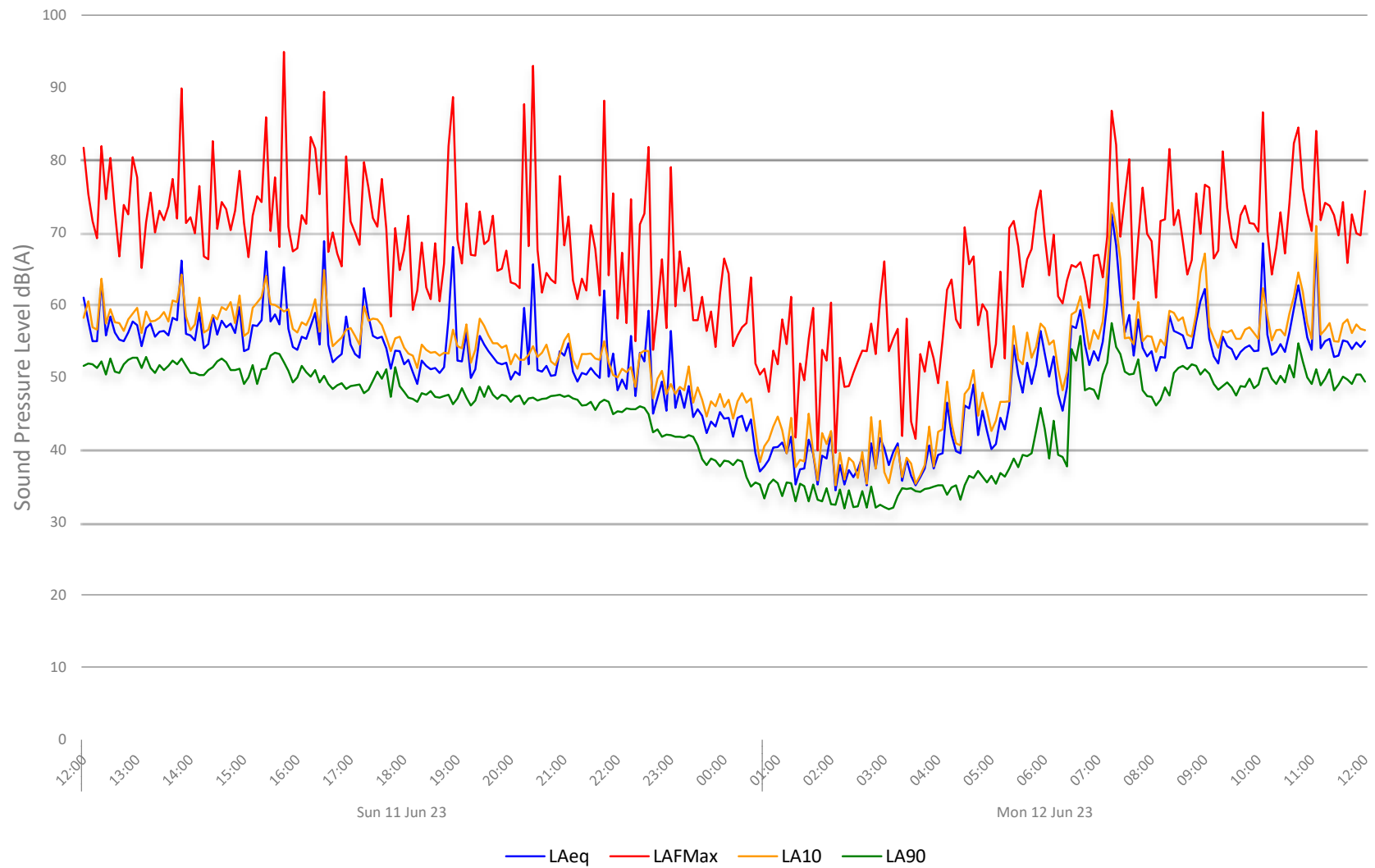
7-9 Fish Row, Salisbury

Environmental Noise Time History: 4

Position 1 - Fish Row



Figure VA4746/TH4



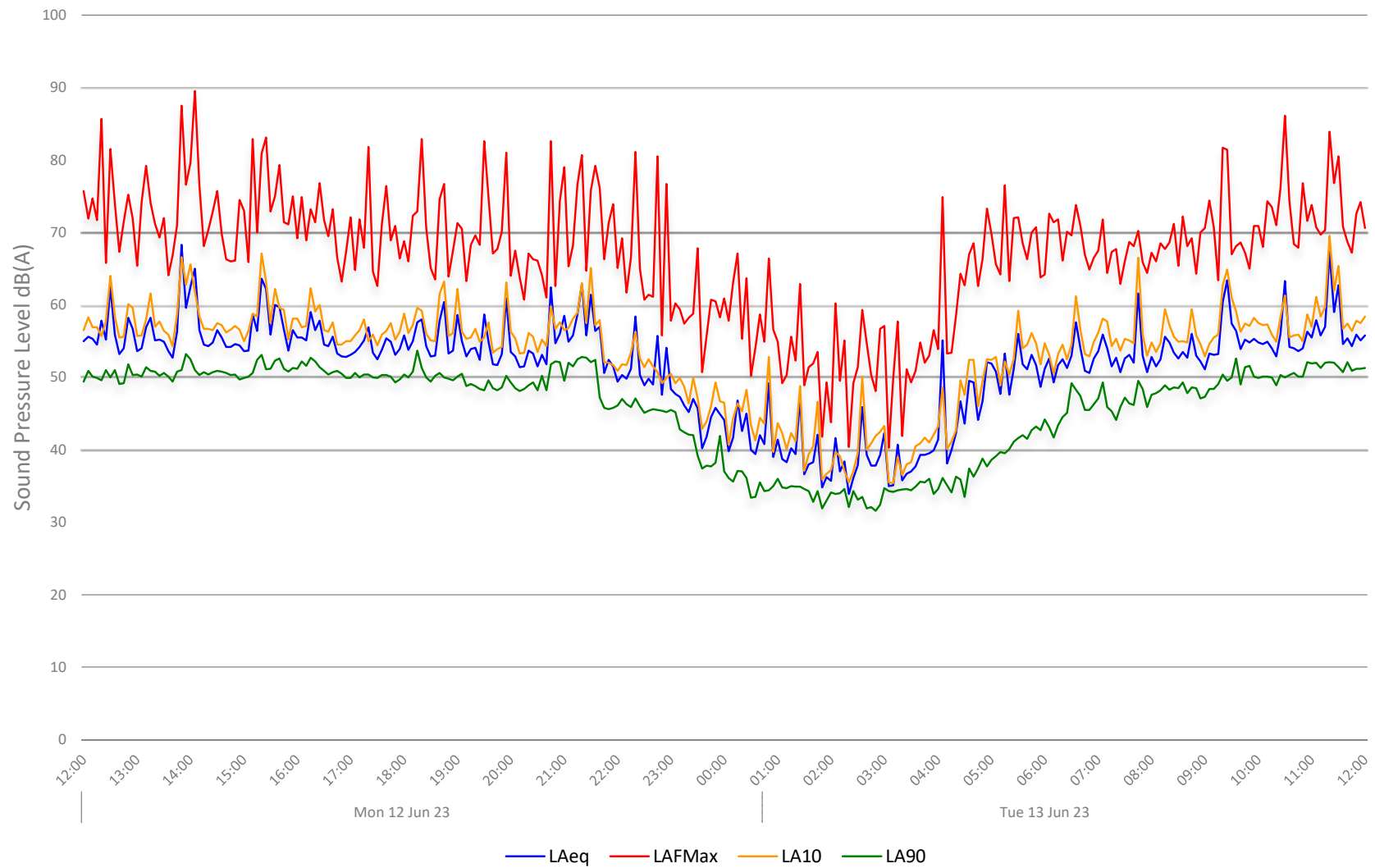
7-9 Fish Row, Salisbury

Environmental Noise Time History: 5

Position 1 - Fish Row



Figure VA4746/TH5



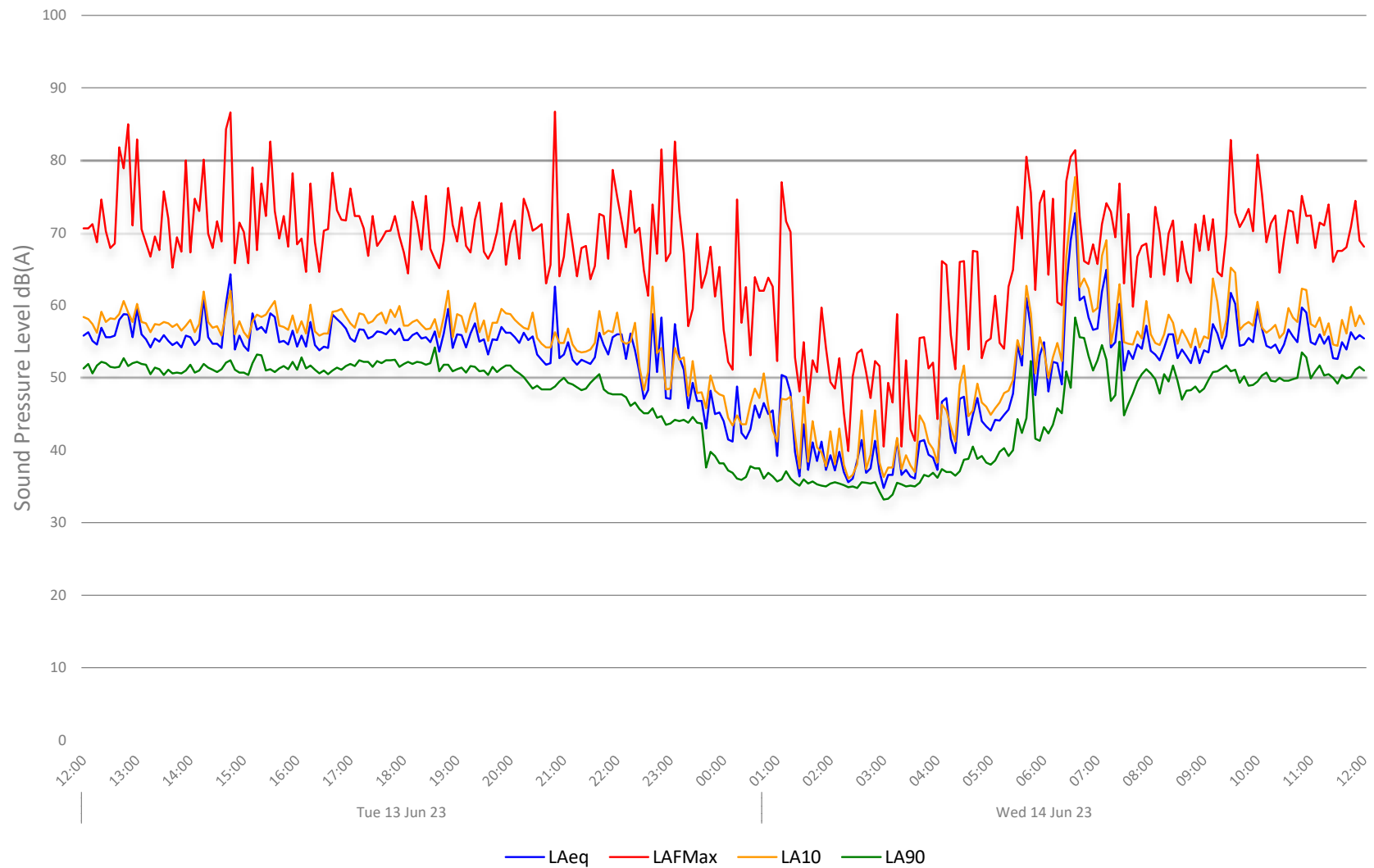
7-9 Fish Row, Salisbury

Environmental Noise Time History: 6

Position 1 - Fish Row



Figure VA4746/TH6



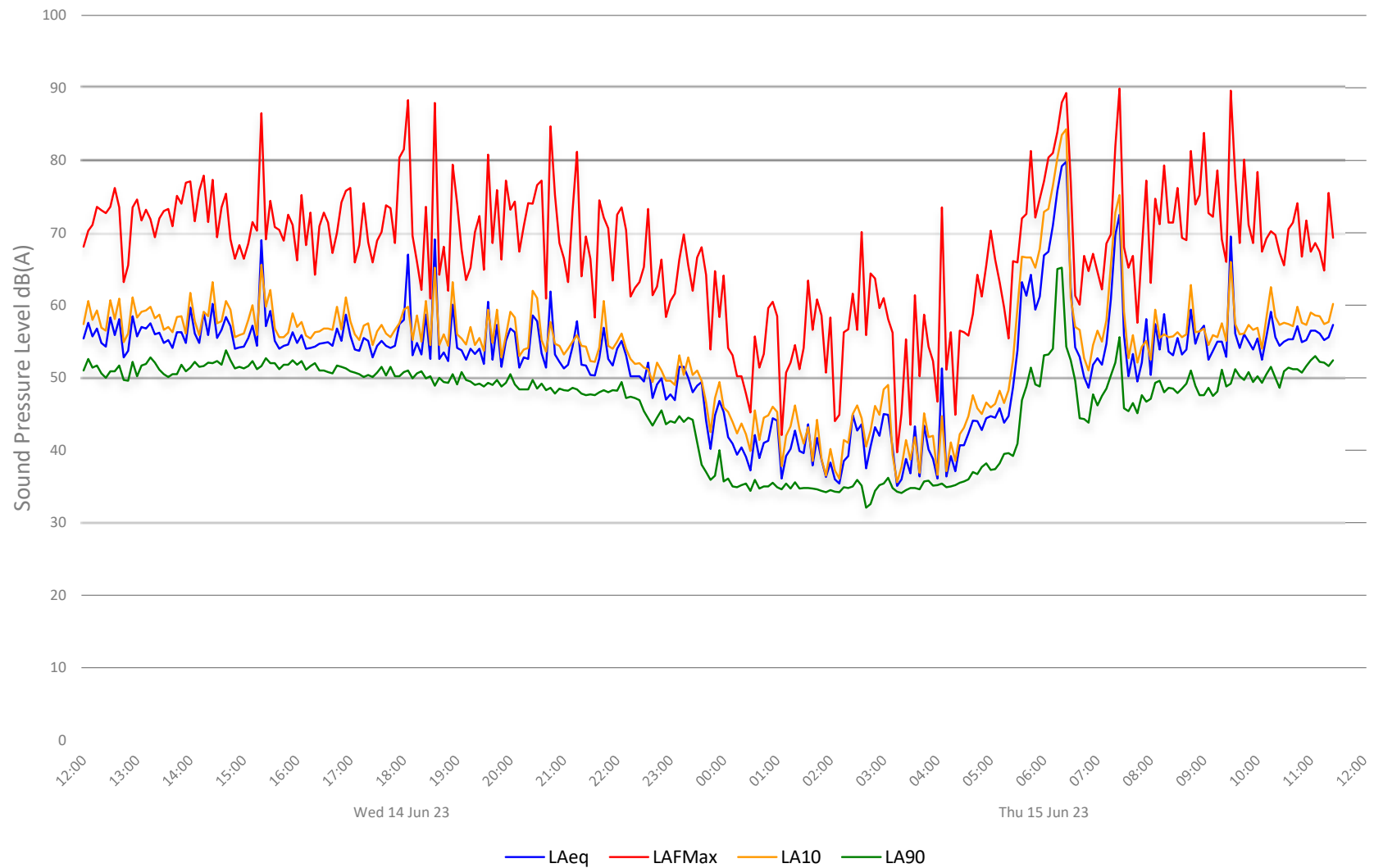
7-9 Fish Row, Salisbury

Environmental Noise Time History: 7

Position 1 - Fish Row



Figure VA4746/TH7



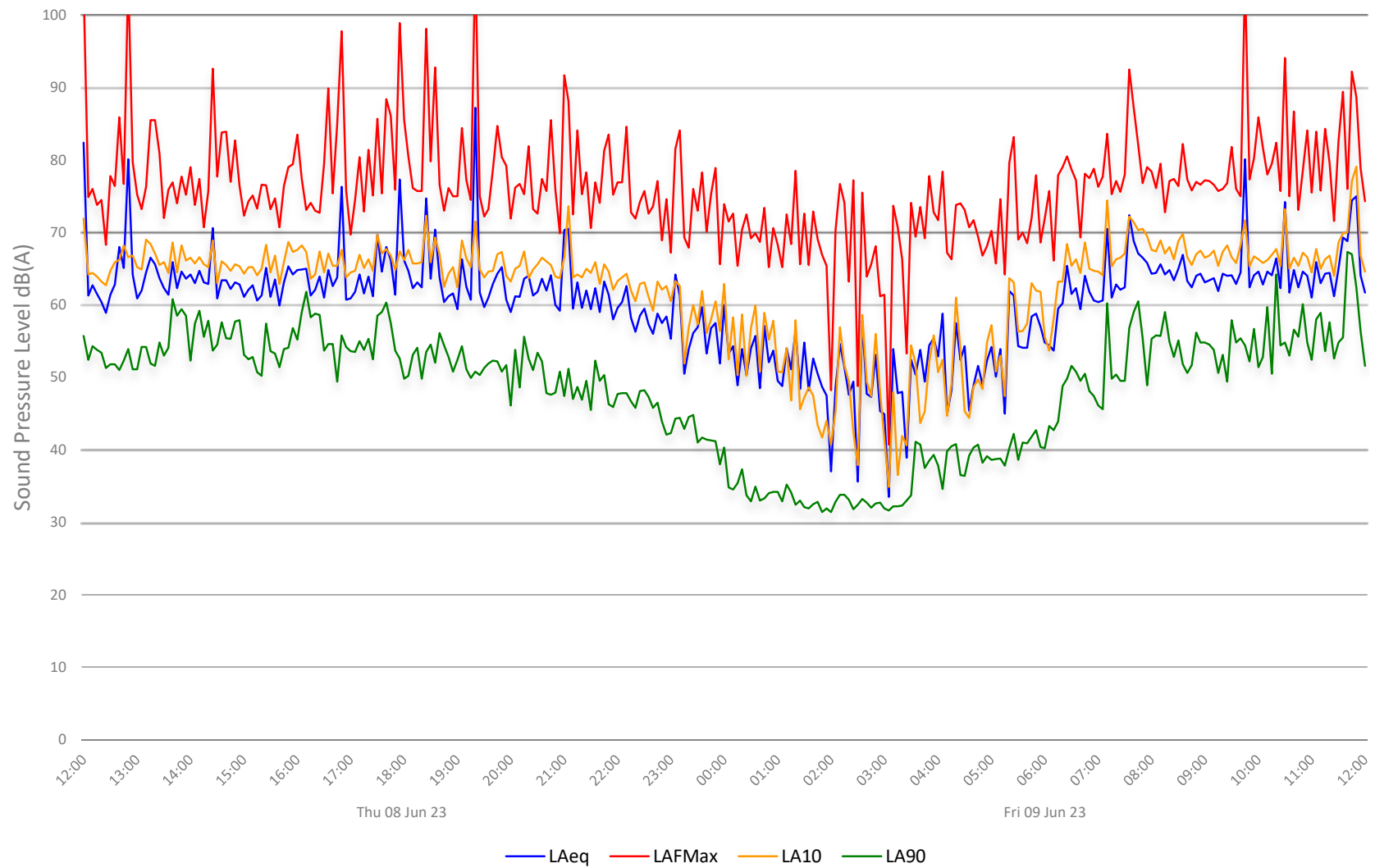
7-9 Fish Row, Salisbury

Environmental Noise Time History: 8

Position 2 - New Canal



Figure VA4746/TH8



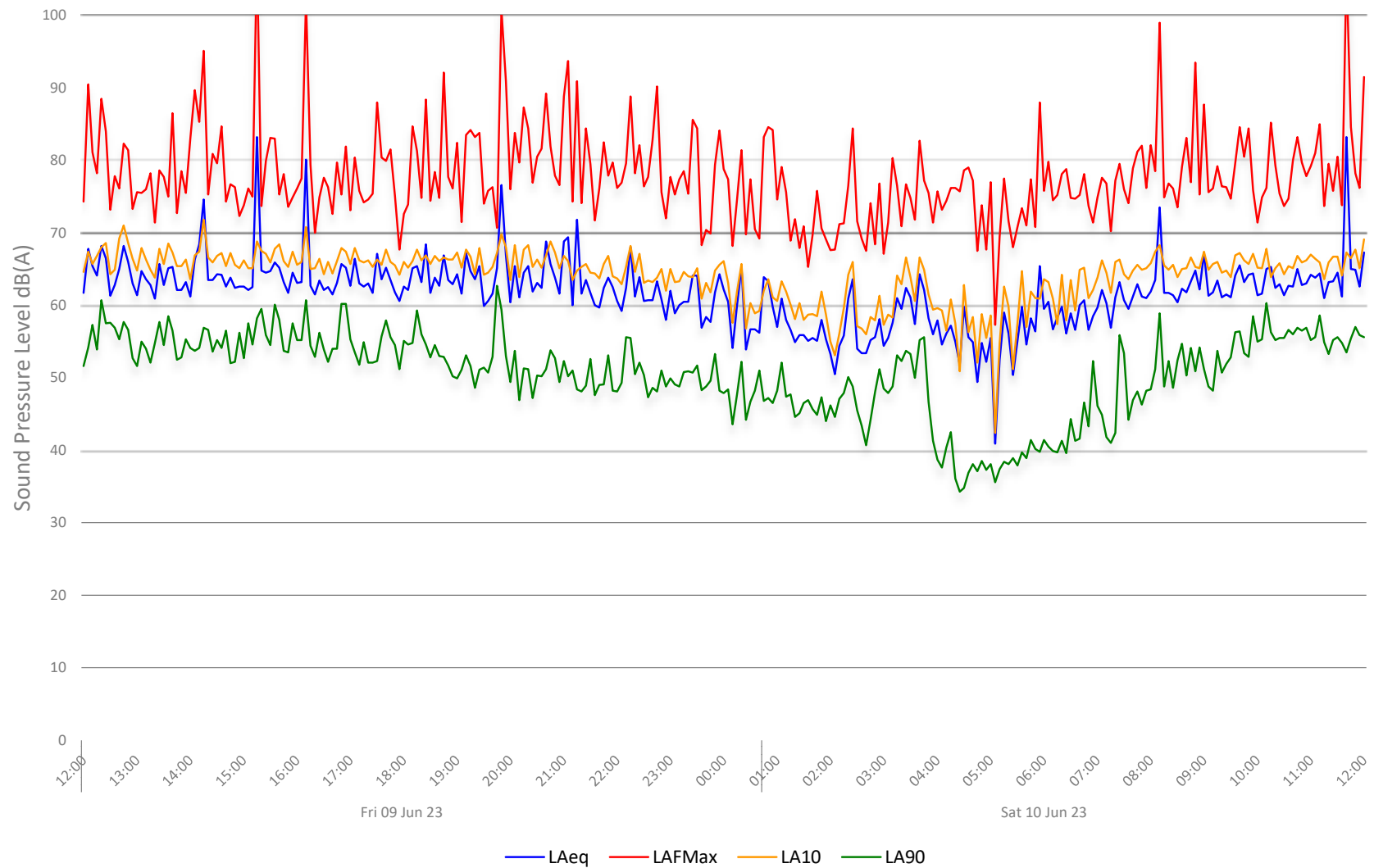
7-9 Fish Row, Salisbury

Environmental Noise Time History: 9

Position 2 - New Canal



Figure VA4746/TH9



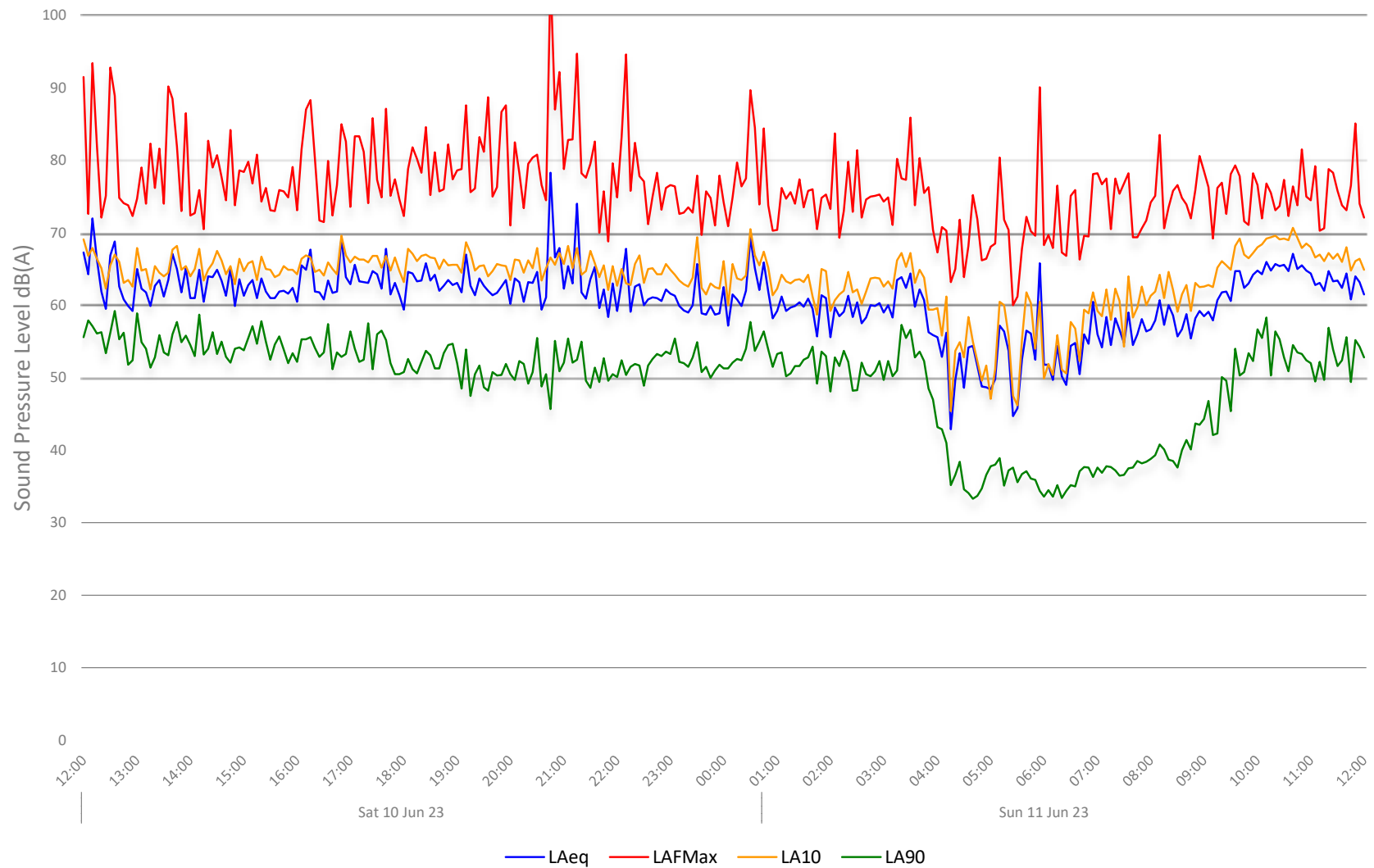
7-9 Fish Row, Salisbury

Environmental Noise Time History: 10

Position 2 - New Canal



Figure VA4746/TH10



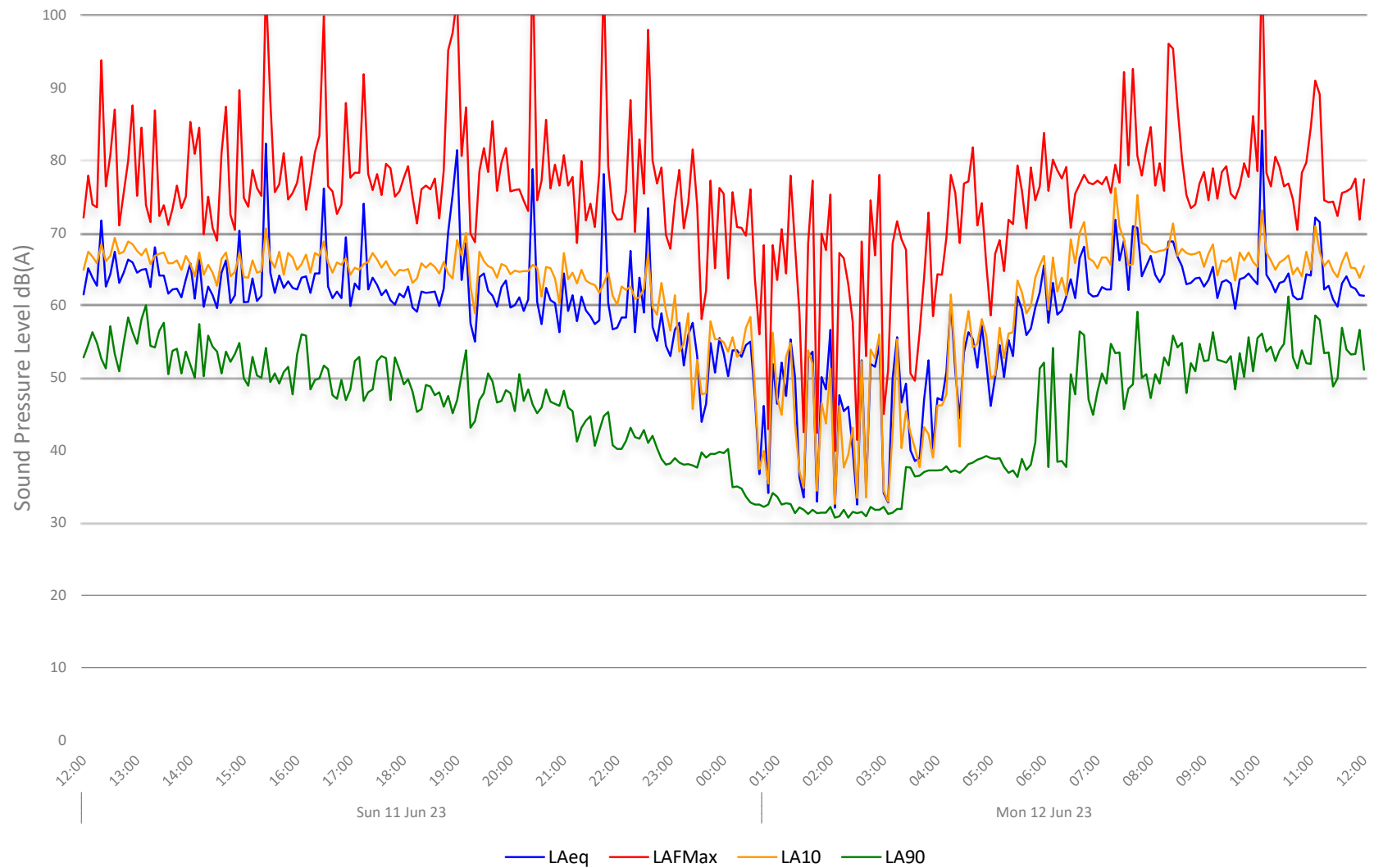
7-9 Fish Row, Salisbury

Environmental Noise Time History: 11

Position 2 - New Canal



Figure VA4746/TH11



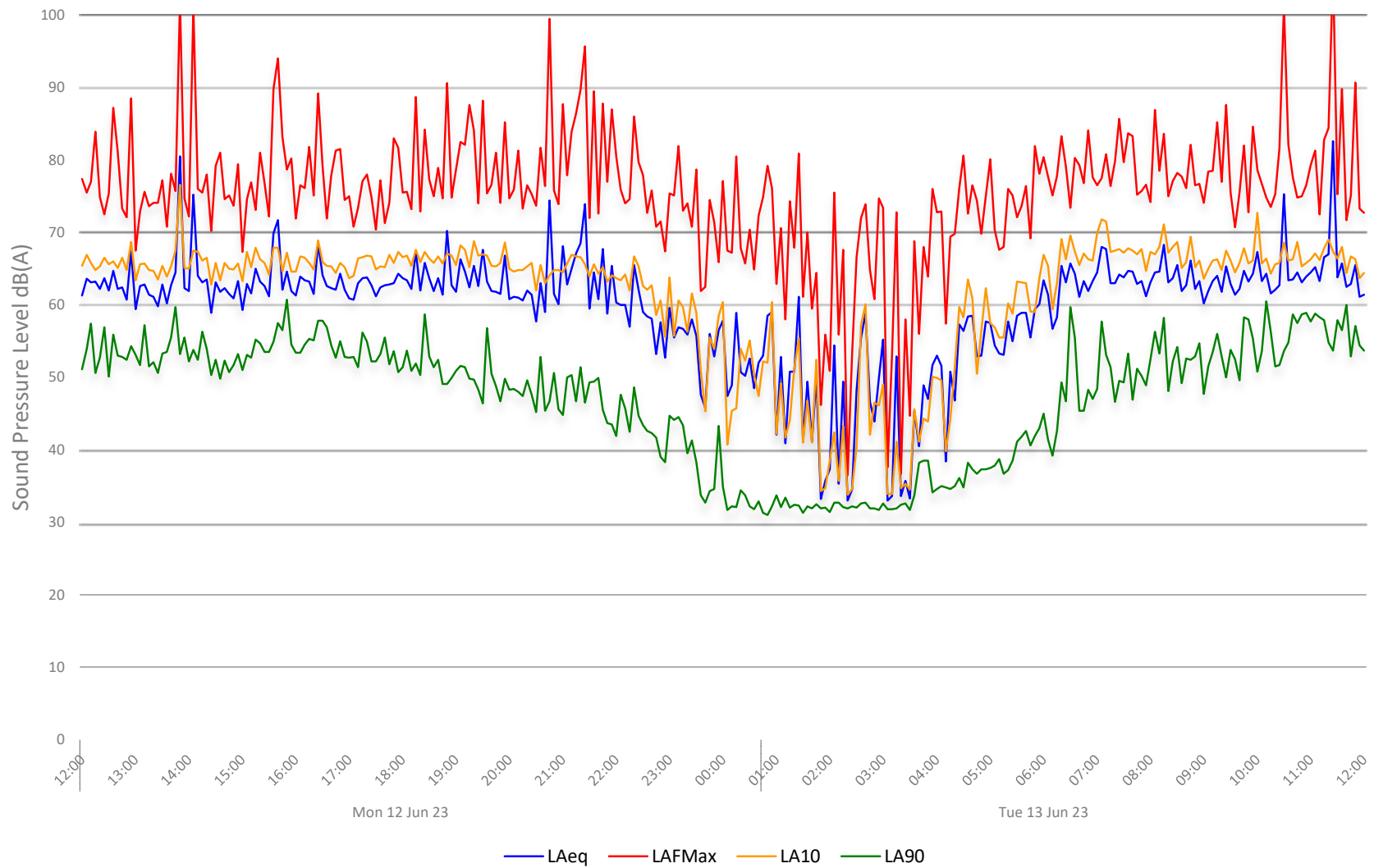
7-9 Fish Row, Salisbury

Environmental Noise Time History: 12

Position 2 - New Canal



Figure VA4746/TH12



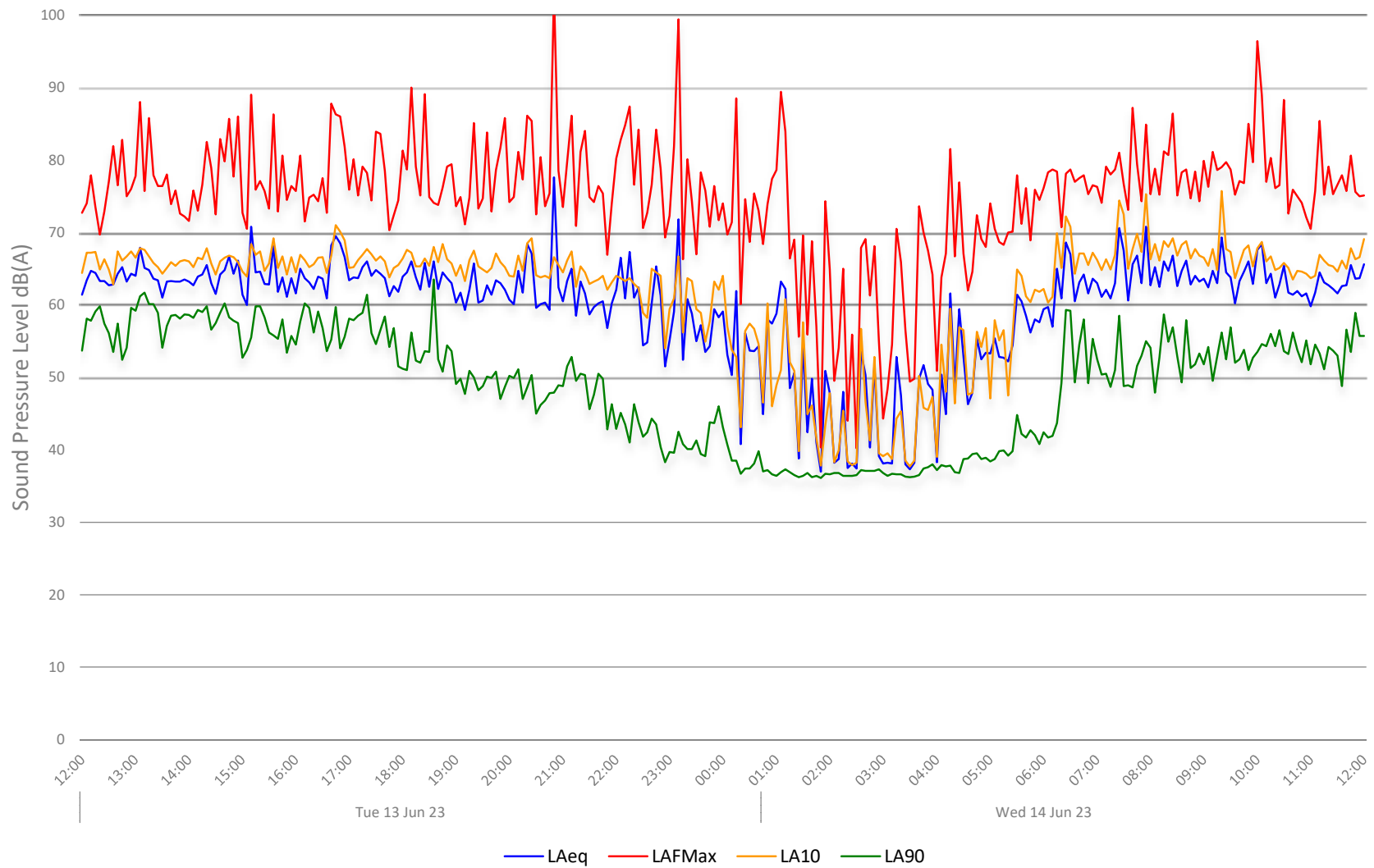
7-9 Fish Row, Salisbury

Environmental Noise Time History: 13

Position 2 - New Canal



Figure VA4746/TH13



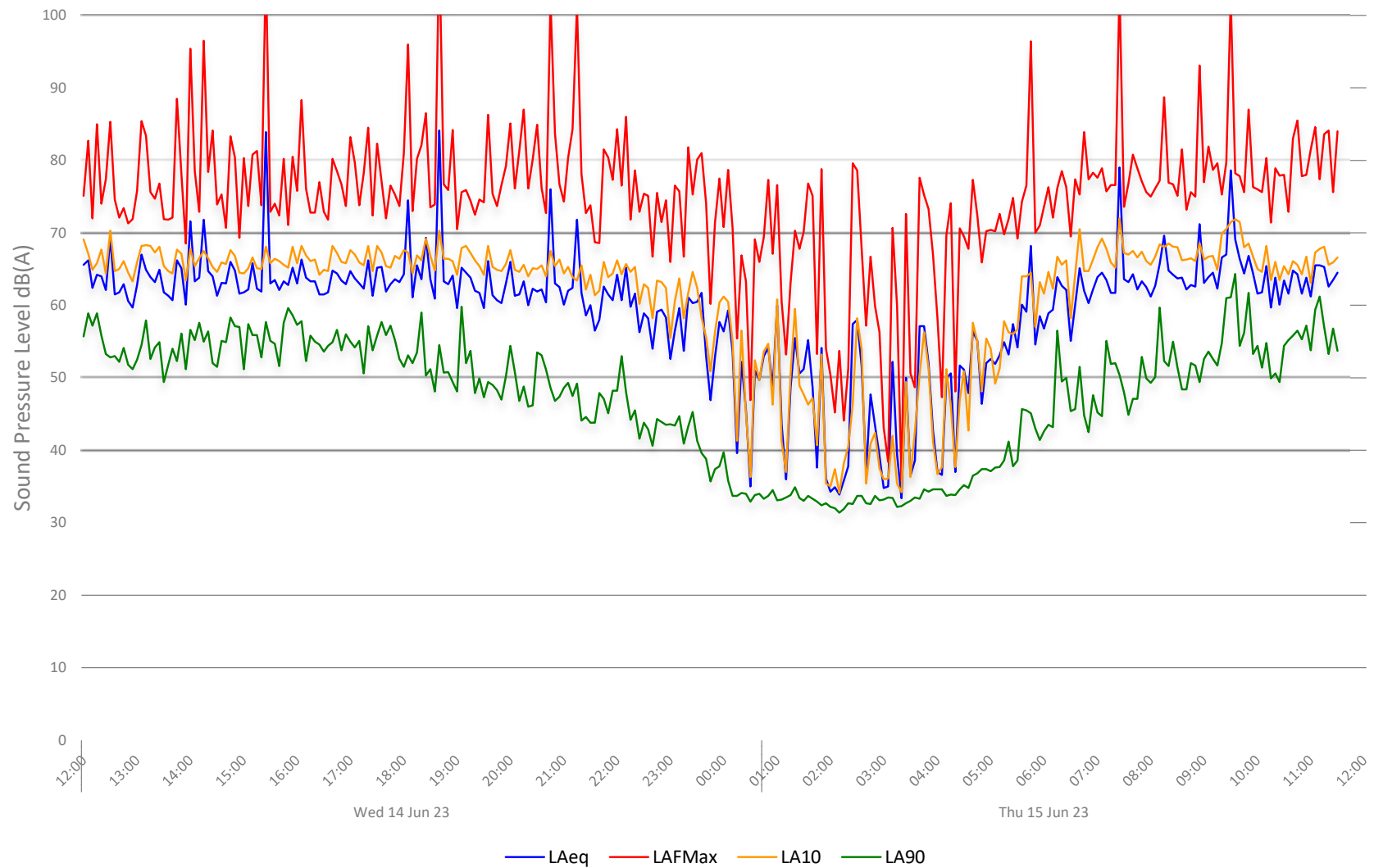
7-9 Fish Row, Salisbury

Environmental Noise Time History: 14

Position 2 - New Canal



Figure VA4746/TH14



APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

1.1 Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

Sound	Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.
Noise	Sound that is unwanted by or disturbing to the perceiver.
Frequency	The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of 'pitch', with low frequencies producing low 'notes' and higher frequencies producing high 'notes'.
dB(A):	Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or L_A . A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc).
L_{eq} :	The concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction. Because L_{eq} is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.
L_{10} & L_{90} :	Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, L_{10} is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise. It is common practice to use the L_{10} index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.
L_{max} :	The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.

1.2 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000
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APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

1.3 Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

Appendix B

Sound Insulation Test Report

Hayes McKenzie — Consultants in Acoustics

7/9 Fish Row, Salisbury, SP1 1EX

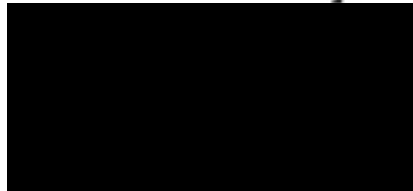
Sound Insulation Testing

Report HM: 3613_R01_EXT2

01 September 2022

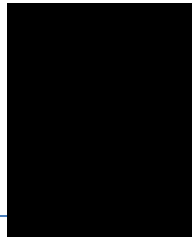
7/9 Fish Row, Salisbury, SP1 1EX
Sound Insulation Testing
Report HM: 3613_R01_EXT2,
01 September 2022
Date of Test: 09 June 2022

Prepared for: Listed Building Consultants Ltd
Hill View,
1 Dalwood,
Axminster,
EX13 7EG



Report Prepared by:

Aedan Mansfield BEng, AMIOA



Report Authorised by:

Seth Roberts BEng, MIOA

Hayes McKenzie Partnership Ltd (HMPL) has prepared this report for the sole use of the client. The report may not be relied upon by any other party, without prior and express agreement of HMPL. Where findings are based on information provided by third parties, this information has not been independently verified by HMPL, unless otherwise stated.

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1. SITE DESCRIPTION

- 1.1 Listed Building Consultants Ltd. has appointed Hayes McKenzie Partnership Ltd. to carry out airborne sound insulation and impact sound transmission tests on separating floors between flats formed by a material change of use at 7/9 Fish Row, Salisbury, SP1 1EX. This report is not an Association of Noise Consultants (ANC) Registered Report as the conversion work has not been completed and this is not a pre-completion test report.
-

2. TEST METHODOLOGY

- 2.1 Airborne and impact sound insulation tests were conducted on the 9th of June 2022. Two airborne and two impact sound insulation tests were carried out on separating partitions between living rooms and bedrooms. The layout of the property at Fish Row is shown at section 4.
- 2.2 The airborne sound insulation tests were conducted in full accordance with BS EN ISO 140 Part 4, and the impact tests were conducted in full accordance with BS EN ISO 140 Part 7. All the procedures in Annex B of the Approved Document E to the Building Regulations have been followed except in the case of impact testing between R4 and R0 which was conducted using a sheet of plywood on top of a soft floor covering.

Equipment

- 2.3 The equipment used is listed in Appendix B. The sound level meter was calibrated before and checked after measurements and no drift in calibration was found to have occurred. The equipment conforms to the requirements specified in BS EN ISO 140 parts 4 and 7, namely: an omnidirectional sound source, a sound level meter with an accuracy class 0 or 1 (defined in IEC 60651 and IEC 60804), a calibrator with an accuracy class 1 (defined in IEC 60942), electronic filters conforming to IEC 61260, reverberation time measurement requirements defined in ISO 354 and a tapping machine conforming to requirements set out in Annex A of BS EN ISO 140-7.

Test Procedure

Airborne Sound Insulation Tests

- 2.4 For each source room, the sound source was placed in two different locations both 0.5 m or more from any reflecting surface in accordance with the procedures outlined in BS EN ISO 140 Part 4.
- 2.5 For each source position, the sound pressure levels in the source and receiving rooms were measured in $\frac{1}{3}$ rd octave bands using a moving microphone technique¹ with an averaging time of 30 seconds and one measurement position. For each separating partition tested, including both source positions, there were two source measurements, two receiver measurements, two background noise measurements and eight individual reverberation time measurements. The locations of the sound source were chosen so that a sound field as diffuse as possible was created and efforts were made to ensure that the distances between the sound source and separating building elements were sufficient to prevent direct sound radiation being dominant.
- 2.6 For each source position, the volume level of the sound source was not altered between measurements made in the source room and the receiving room and the same loudspeaker system was utilised in the two locations for the sound source.
- 2.7 Background noise was measured in the receiving rooms directly after a receiver room measurement. In this instance, the background noise consisted of road traffic noise from the nearby busy road and in R3, an extractor just outside the window.
- 2.8 Reverberation time measurements were carried out using four static microphone positions and two source positions. The source used for reverberation time measurements was an interrupted Pink noise source.

Calculation of Weighted Standardised Level Difference

- 2.9 BS EN ISO 140-4:1998 defines the formula used to derive the standardised level difference (D_{nT}) for each $\frac{1}{3}$ rd octave band. The formula (number 4 in BS EN ISO 140-4) used for this calculation is reproduced below:

$$D_{nT} = D + 10 \log_{10} \left(\frac{T}{T_0} \right) \text{ dB}$$

where:

$$D = L_1 - L_2$$

L_1 is the average sound pressure level in the source room

L_2 is the average sound pressure level in the receiving room

¹ This technique conforms with BS EN ISO 140 parts 4 and 7

T is the reverberation time in the receiving room

T₀ is the reference reverberation time (0.5 seconds for dwellings)

- 2.10 BS EN ISO 717-1:1997 defines the procedure for calculating the single figure Weighted Standardised Level Difference (D_{nT,w}). The 1/3rd octave D_{nT} values are compared to the reference curve defined in BS EN ISO 717-1:1997 and the reference curve is shifted in steps of 1 dB towards the measured curve until the sum of the unfavourable deviations is as large as possible but not more than 32 dB. The weighted level is then the value of the shifted reference curve at 500 Hz.

Impact Sound Insulation Tests

- 2.11 The impact sound insulation tests of the separating floors between rooms were undertaken in full accordance with the procedures outlined in BS EN ISO 140 Part 7.
- 2.12 For each source room, the tapping machine was placed in four different locations all 0.5 m or more from any walls. The drop height of the tapping machines hammers has been calibrated and certified as conforming to the standards required for BS EN ISO 140 Part 8.
- 2.13 For each tapping machine position, the average sound pressure level in the receiving room was measured in 1/3rd octave bands using a moving microphone technique² with an averaging time of 30 seconds per measurement. For each separating partition tested, including all four source positions, there were four receiver measurements, two background noise measurements and four individual reverberation time measurements.
- 2.14 At the time of the tests the rooms were disused with doors fitted but no furniture. R0 and R4 had carpet with underlay fitted, so the impact sound insulation test involving R4 varies from standard measurement procedure. A wooden board was placed under the tapping machine to reduce/minimise the effect that the soft floor covering would have on the impact test..

Calculation of Weighted Standardised Impact Sound pressure Level

- 2.15 BS EN ISO 140-7:1998 defines the formula used to derive the standardised impact sound pressure level (L'_{nT}) for each 1/3 octave band. The formula (number 3 in BS EN ISO 140-7) used for this calculation is reproduced below:

$$L'_{nT} = L_i + 10 \log_{10} \left(\frac{T}{T_0} \right) \text{ dB}$$

where:

² This technique conforms with BS EN ISO 140 parts 4 and 7

L_i is the impact sound pressure level in the receiving room
 T is the reverberation time in the receiving room
 T_0 is the reference reverberation time (0.5 seconds for dwellings)

- 2.16 BS EN ISO 717-2:1997 defines the procedure for calculating the single figure Weighted Impact Sound Pressure Level ($L'_{nT,w}$). The $\frac{1}{3}$ octave L'_{nT} values are compared to the reference curve defined in BS EN ISO 717-2:1997 and the reference curve is shifted in steps of 1 dB towards the measured curve until the sum of the unfavourable deviations is as large as possible but not more than 32 dB. The weighted level is then the value of the shifted reference curve at 500 Hz.

Compliance with Approved Document E

- 2.17 All the procedures in Approved Document E have been followed; measurements and results conform to the requirements set out in Annex B of the approved document except for the soft floor covering in R4. BS EN ISO 140 Part 4 states that measurements where the margin between background noise and measured level is less than 6 dB should be highlighted, indicating that the measured results are at the limit of measurement. For this site, some of the test measurements were less than 6 dB above background noise in some of the frequency bands and the values at the limit of measurement are highlighted accordingly.

3. TEST RESULTS

- 3.1 The results of the airborne and impact sound insulation tests for the separating floors are shown at Table 1 (see Figure 1 and Figure 2 for the room labels).

Table 1 – Measured Airborne and Impact Sound Insulation Performance of Separating Floors

Test No.	Test type	Source Room	Vol (m ³)	Receiver Room	Vol (m ³)	Measured $D_{nT,w} + C_{tr}$ (dB)	Measured L'_{nTw}	Requirement $D_{nT,w} + C_{tr}$ or L'_{nTw}	Pass/Fail
1	Airborne	R4	39.7	R3	27.1	37 dB	-	≥ 43 dB	Fail
2	Airborne	R0	154.0	R4	39.7	≥ 36 dB	-	≥ 43 dB	Fail
3	Impact	Landing	26.2	R0	154.0	-	67 dB	≤ 64 dB	Fail
4	Impact	R4	39.7	R0	154.0	-	≤ 59 dB	≤ 64 dB	Pass

- 3.2 Section 0 of Approved Document E (2003 Edition) to The Building Regulation 2000 requires each airborne sound insulation test result to be equal to or greater than 43 dB $D_{nT,w} + C_{tr}$ and each impact sound transmission test result to be equal to or less than 64 dB L'_{nTw} . It can be seen that the airborne sound insulation results and one of the impact sound transmission do not satisfy the

performance requirement of section 0 of Approved Document E and the other impact sound transmission results does. However, the impact sound transmission result which did pass was the test which deviated from the approved methodology since the impact test was onto a board due to the floor area being carpeted.

- 3.3 The airborne sound insulation test result are included in Appendix B. The impact sound insulation test results are included in Appendix C.

Discussion of Test Results

R4 to R3 Airborne

- 3.4 This test wall failed by 6 dB. The wall would need significant treatment to reduce sound transmission to a level required by the performance standards set out in Approved Document E. The doors to both rooms would also benefit from sealing properly, especially R3, although it is acknowledged that the proposals include moving the doorway in R4 and this would reduce the effect of sound escaping through poorly sealed doors.

R0 to R4 Airborne

- 3.5 Despite carpets being fitted in both R0 and R4, airborne tests between the two rooms failed. The addition of a carpet is likely to improve the airborne sound insulation significantly at higher frequencies and this effect can be seen in the results (Appendix B) above 800 Hz. The results are worse in the low frequencies (third octave band which is worst is 160 Hz) and this is indicative of a lightweight floor structure which does not have sufficient mass to reduce the low frequencies sufficiently. Values in the higher frequency bands were at the limit of measurement for this test.

Landing to R0 Impact Sound Insulation

- 3.6 The landing is over a ~120 mm void where acoustic treatment could be added. The test between the rooms failed by 3 dB. No airborne noise was noted during this test since there were a series of doors and rooms separating the rooms. The test frequencies which caused the test to fail were those below 500 Hz, again indicative of a light weight floor structure.

R4 to R0 Impact Sound Insulation

- 3.7 This test passed by 5 dB, however, a carpet with underlay typically improves impact sound transmission by 10 dB or more and so it is more than likely that the impact sound transmission would fail to meet the requirements of Approved Document E without the carpet and underlay. Values in the high frequency bands were at the limit of measurement for this test. Without the soft floor covering it is likely that a similar result to that measured between the Landing and R0 would have been observed.

4. CONSTRUCTION DETAILS

- 4.1 The development is located at Fish Row, Salisbury, SP1 1EX. It comprises two 2 bedroom flats on the second floor of the building. There is only one party wall between the two flats and the first floor of the building is in use as part of commercial units on the ground floor.
- 4.2 The wall construction (between R3 and R4) consisted of lath and plaster on wooden studs, approximately 100 mm in thickness. Doors were closed during tests but it was noted that the door to R3 had a large air gap. During the tests, it was noted that higher source noise levels were audible nearer to the door but when stood in the room nearer to the wall under test, the noise entering via the door was not the dominant flanking path. There was no furnishing in the receiver rooms except for a dining chair in R3 and medium pile carpet with underlay in R4 which it was not possible to remove during testing.
- 4.3 The separating elements between the ceilings/floors were wooden floor boards with original lath and plaster ceiling and a secondary lower ceiling of unknown thickness. R0 was unfurnished except for thick carpet.

Floor Plans

Figure 1 – First Floor including R0



Figure 2 – Second Floor including R3, R4 and Landing



5. CLOSURE

- 5.1 This report has been prepared by Hayes McKenzie Partnership Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.
- 5.2 This report is for the exclusive use of Listing Building Consultancy Ltd.; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from Hayes McKenzie Partnership Limited.
- 5.3 Hayes McKenzie Partnership Limited disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.
- 5.4 The Association of Noise Consultants accepts no liability for the tests carried out by Hayes McKenzie Partnership Limited.

Appendix A – List of Equipment

Table A-1 List of Equipment

Equipment	Serial Number	Date of Last Calibration	Calibration Certification Number
Larson Davis 831 sound level meter	0002007	15/10/2021	TCRT21/1715
PCB 377B02 Microphone	112745	15/10/2021	TCRT21/1715
PCB PRM831 Pre-amplifier	15281	15/10/2021	TCRT21/1715
LD-CAL200 Sound Level Calibrator	4592	21/06/2021	UCRT21/1767
ANV FTL500 - Combined Noise Generator, Amplifier and Graphic Equaliser	-	-	-
ANV Dodecahedron loudspeaker	-	-	-
Bruel & Kjaer type 3207 Tapping Machine	2481584	04/02/2021	TCRT/1092

Appendix B – Airborne Testing Measurement Results

Standardized level difference according to ISO 140-4
Field measurements of airborne sound insulation between rooms

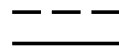
Client: Listing Building Consultancy Ltd. Date of test: 09/06/2022

Site: 7-9 Fish Row

Test Ref: R4 to R3

Hayes McKenzie —
Consultants in Acoustics

Separating element shared area : 6.1 m²
 Source room volume: 39.7 m³
 Receiving room volume: 27.1 m³

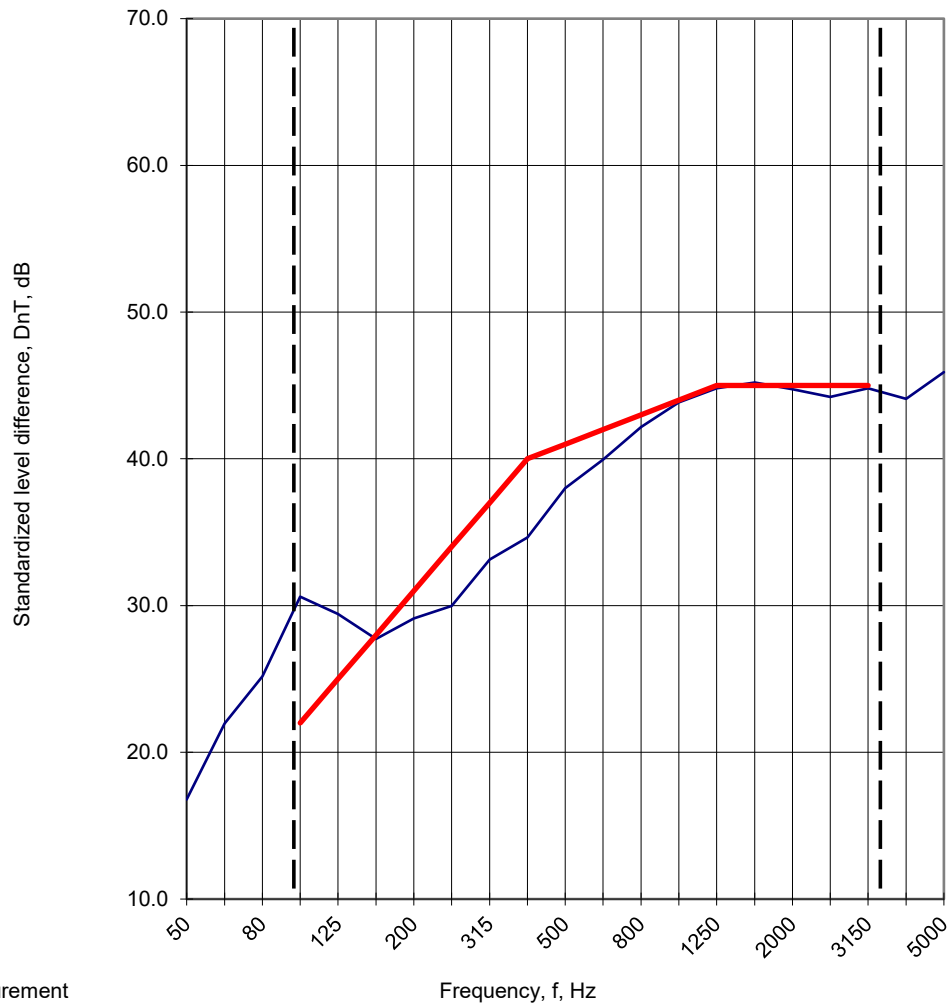


Frequency range according to the
 curve of reference values (ISO 717-1)

Separating element constructed of lath and plaster on wooden studs, approximately 100 mm in thickness

Frequency f Hz	DnT (1/3 octave) dB
50	16.8
63	22.0
80	25.2
100	30.6
125	29.4
160	27.7
200	29.1
250	30.0
315	33.1
400	34.6
500	38.0
630	39.9
800	42.2
1000	43.8
1250	44.8
1600	45.2
2000	44.8
2500	44.2
3150	44.8
4000	44.1
5000	45.9

≥ denotes value at limit of measurement



Rating according to ISO 717-1

Required $D_{nT,w} + C_{tr}$: 43

$D_{nT,w} + C_{tr} = 37$ dB (Fail)

$D_{nT,w}(C;C_{tr}) = 41$ (-1 ; -4) dB

$C_{50-3150}$

$C_{50-5000}$

$C_{100-5000}$

Evaluation based on field measurement
 results obtained by an engineering method

$C_{tr,50-3150}$

$C_{tr,50-5000}$

$C_{tr,100-5000}$

ANC Test Ref. No. #N/A
 Date: 02/08/2022

Hayes McKenzie Partnership
 Signature: S Roberts

Standardized level difference according to ISO 140-4
Field measurements of airborne sound insulation between rooms

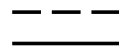
Client: Listing Building Consultancy Ltd. Date of test: 09/06/2022

Site: 7-9 Fish Row

Test Ref: Ro to R4

Hayes McKenzie —
Consultants in Acoustics

Separating element shared area : 18.6 m²
 Source room volume: 154 m³
 Receiving room volume: 39.7 m³

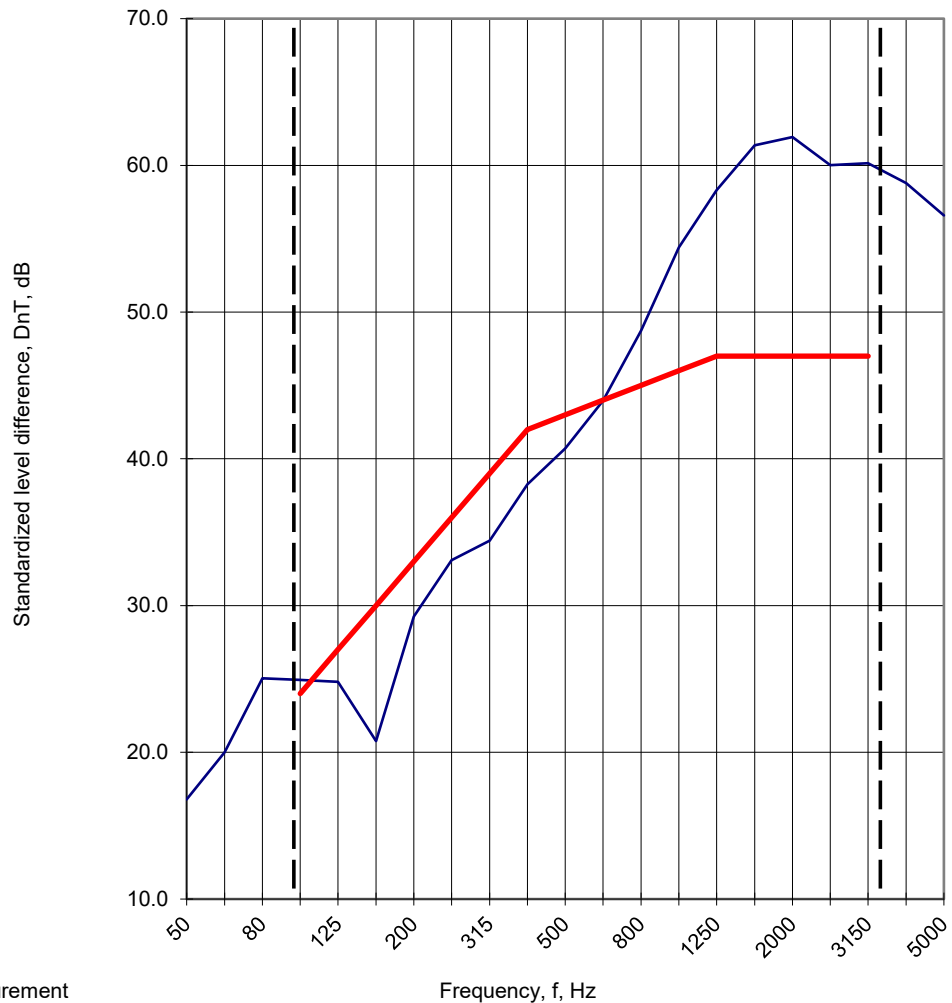


Frequency range according to the
 curve of reference values (ISO 717-1)

Separating element constructed of lath and plaster on wooden studs, approximately 100 mm in thickness

Frequency f Hz	DnT (1/3 octave) dB
50	16.8
63	≥ 20.0
80	25.1
100	24.9
125	24.8
160	20.8
200	29.3
250	33.1
315	34.4
400	38.3
500	40.7
630	44.0
800	48.7
1000	54.4
1250	58.3
1600	≥ 61.4
2000	≥ 61.9
2500	≥ 60.0
3150	≥ 60.2
4000	≥ 58.8
5000	≥ 56.6

≥ denotes value at limit of measurement



Rating according to ISO 717-1

Required $D_{nT,w} + C_{tr}$: 43

$D_{nT,w} + C_{tr} = 36$ dB (Fail)

$D_{nT,w} (C; C_{tr}) = 43$ (-3 ; -7) dB

$C_{50-3150}$

$C_{50-5000}$

$C_{100-5000}$

Evaluation based on field measurement
 results obtained by an engineering method

$C_{tr,50-3150}$

$C_{tr,50-5000}$

$C_{tr,100-5000}$

ANC Test Ref. No. #N/A
 Date: 01/08/2022

Hayes McKenzie Partnership
 Signature: S Roberts

Appendix C – Impact Testing Measurement Results

Standardized impact sound pressure level according to ISO 140-7
Field measurements of impact sound insulation of floors

Client: Listing Building Consultancy Ltd. Date of test: 09/06/2022

Site: 7-9 Fish Row

Test Ref: Landing to R0

Hayes McKenzie —
Consultants in Acoustics

Separating element shared area : 11.7 m²

Source room volume: 26.2 m³

Receiving room volume: 154 m³

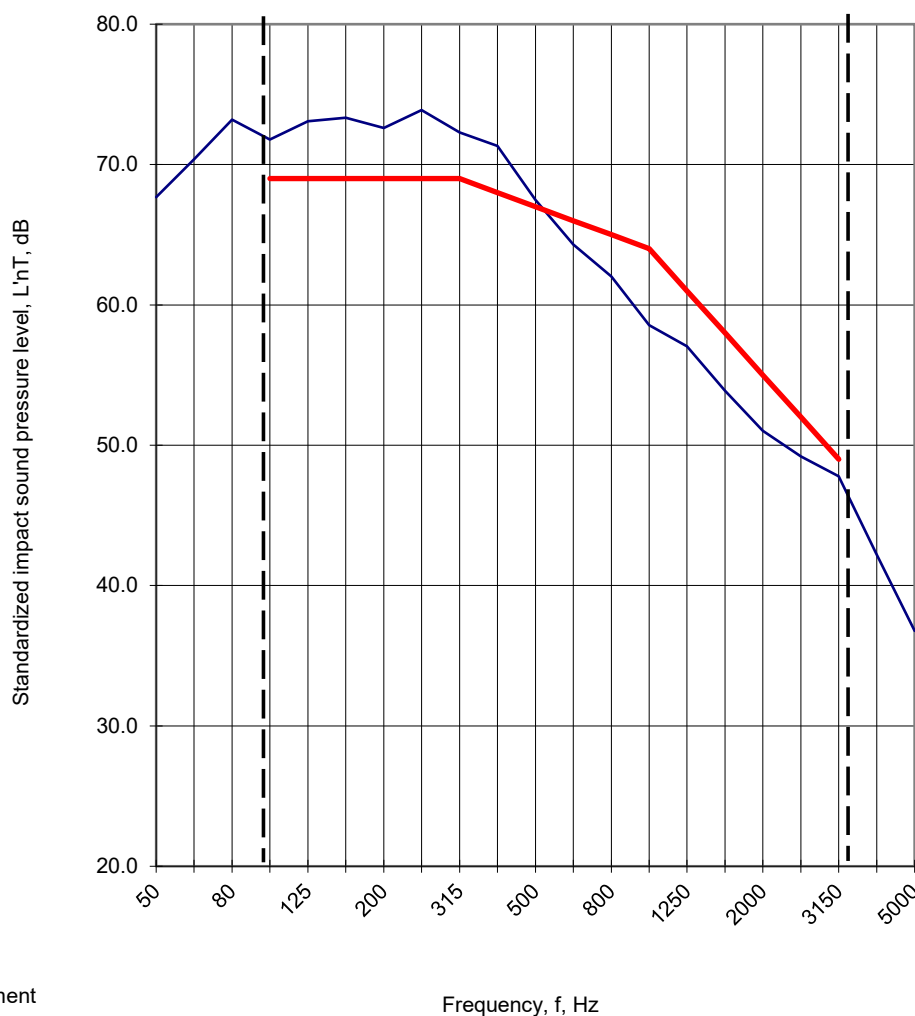


Frequency range according to the
 curve of reference values (ISO 717-2)

Separating element constructed of wooden floor boards with original lath and plaster ceiling and lower ceiling of unknown thickness

Frequency f Hz	L'nT (1/3 octave) dB
50	67.7
63	70.4
80	73.2
100	71.8
125	73.1
160	73.3
200	72.6
250	73.9
315	72.3
400	71.3
500	67.5
630	64.3
800	62.0
1000	58.6
1250	57.1
1600	53.9
2000	51.0
2500	49.2
3150	47.8
4000	42.2
5000	36.8 *

* denotes value at limit of measurement



Rating according to ISO 717-2

Required L' nT,w: 64

L' nT,w = 67 dB (Fail)

L' nT,w (C_i) = 67 (0) dB

C_{i,50-2500} 1 dB

Evaluation based on field measurement results obtained in one-third octave bands by an engineering method

ANC Test Ref. No. #N/A
 Date: 01/08/2022

Hayes McKenzie Partnership
 Signature: S Roberts

Standardized impact sound pressure level according to ISO 140-7
Field measurements of impact sound insulation of floors

Client: Listing Building Consultancy Ltd. Date of test: 09/06/2022

Site: 7-9 Fish Row

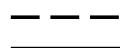
Test Ref: R4 to R0

Hayes McKenzie —
Consultants in Acoustics

Separating element shared area : 18.6 m²

Source room volume: 154 m³

Receiving room volume: 39.7 m³

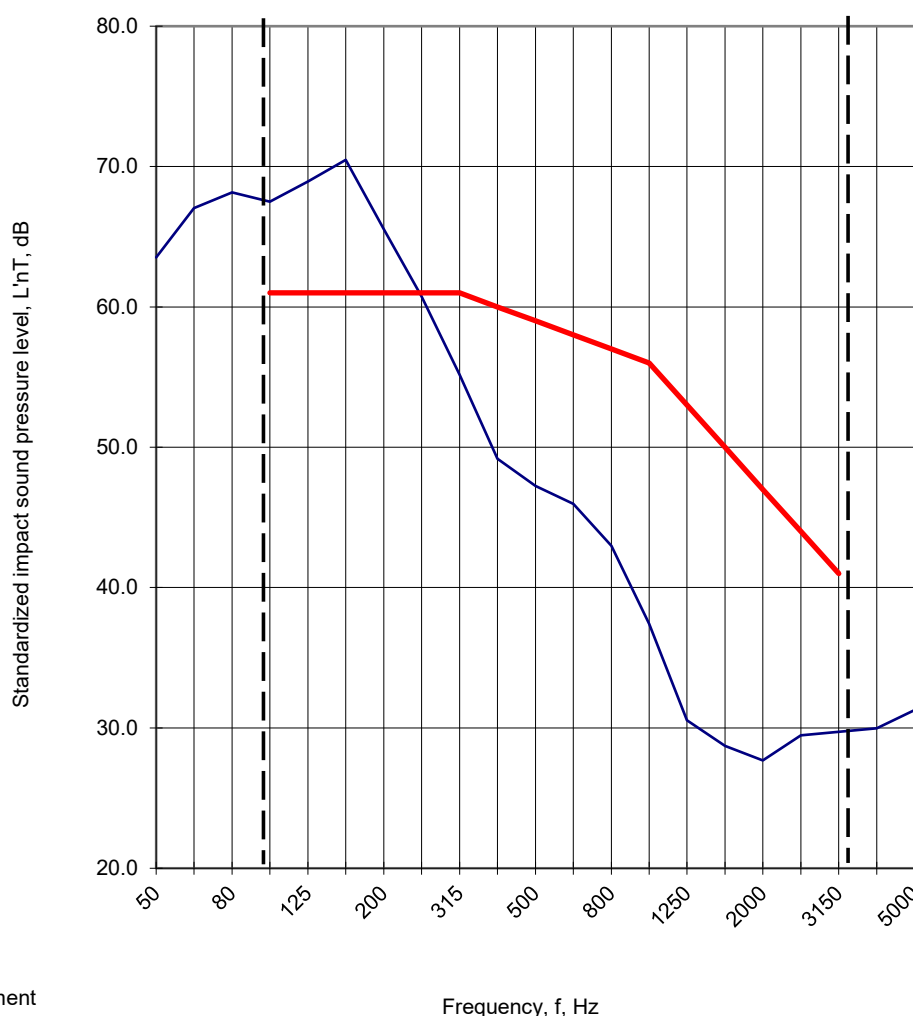


Frequency range according to the
 curve of reference values (ISO 717-2)

Separating element constructed of carpet on wooden floor boards with original lath and plaster ceiling and lower ceiling of unknown thickness

Frequency f Hz	L'nT (1/3 octave) dB
50	63.5
63	67.0
80	68.1
100	67.5
125	68.9
160	70.5
200	65.5
250	60.7
315	55.2
400	49.2
500	47.2
630	46.0
800	43.0
1000	37.4
1250	30.6 *
1600	28.7 *
2000	27.7 *
2500	29.5 *
3150	29.7 *
4000	30.0 *
5000	31.3 *

* denotes value at limit of measurement



Rating according to ISO 717-2

Required L' nT,w: 64

L' nT,w = 59 dB (Pass)

L' nT,w (C₁) = 59 (1) dB

C_{1,50-2500} 2 dB

Evaluation based on field measurement results obtained in one-third octave bands by an engineering method

ANC Test Ref. No.

#N/A

Date:

01/08/2022

Hayes McKenzie Partnership

Signature: S Roberts