MZA ACOUSTICS

LAND AT MERCHANTS FIELDS, CLECKHEATON, WEST YORKSHIRE

Noise Survey & Impact Asessment Report

Document History

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Rev	Date	Comment	Author	Checked
1	12/12/2024	Updated figures	GH	-
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Contents

1. INTRODUCTION

MZA Acoustics has been appointed by Harron Homes Limited (the 'Client') to provide acoustic consultancy services in relation to a requirement to discharge a planning condition (#25) in relation to noise, for a recently approved application for 291no. dwellings at the site known as Merchant Fields Farm, off Hunsworth Lane, Cleckheaton.

A noise impact assessment was provided with the original planning application submitted to Kirklees Council (2021/62/92801/E) and was undertaken by Surface Property (ref Merchants Fields Noise Impact Assessment dated August 2019). This assessment was based on a survey undertaken in 2015 and Kirklees Council Environmental Health recommended that whilst the development could be approved a condition was required to provide a new noise survey and assessment.

This report sets out the results of a new baseline survey and resultant noise impact assessment in accordance with Condition #25 of the consented scheme.

This report occasionally employs technical terminology. In order to assist the reader, a glossary of terms is presented in **Appendix A**

2. SITE DESCRIPTION

2.1 Site Location

Merchants Fields is located approximately 1km due north of Cleckheaton Town Centre in the Kirklees District of West Yorkshire.

The proposed development Site is in the suburb of Hunsworth with the northern boundary formed by the dwellings off Kilroyd Avenue, Mazebrook Avenue and Mazebrook Crescent, the west by Hunsworth Lane and Links Avenue, the south by the rear of commercial units on the north side of Riverside Drive and the east by Brookfield Terrace, Brookfield Avenue and Brookfield View and open farmland.

The centre of the site is occupied by a small number of residential dwellings located around Merchants Fields Farm, which are due to remain as part of the proposals.

Figure 1 shows the approximate Site boundary in red, in relation to the surrounding area.

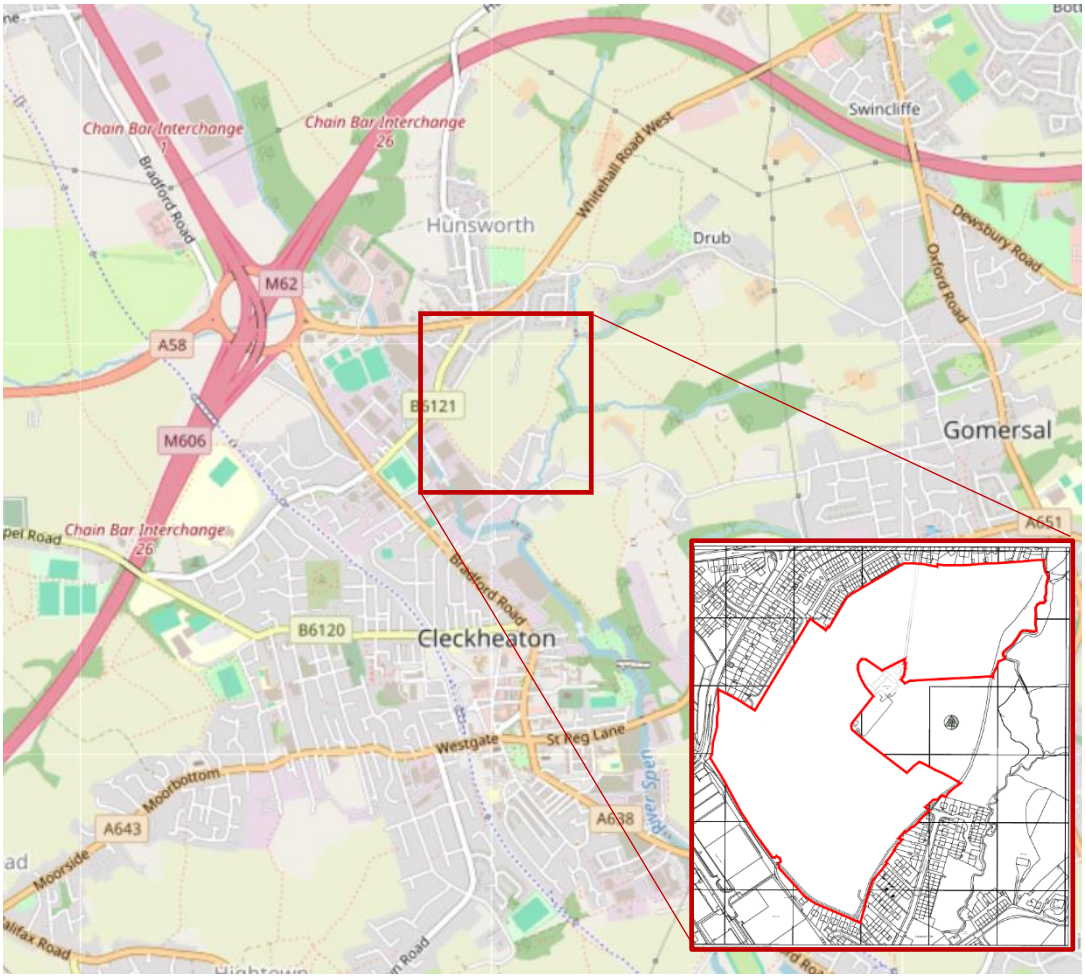


Figure 1 – General Site Location (Courtesy of OpenStreetMap)

2.2 Key Environmental Sound Sources

The key environmental noise sources in the vicinity of the Site are local road traffic noise from Hunsworth Lane and Whitehall Road West (A58), commercial/industrial noise from units to the west and more distance road traffic from the M62 approximately 700m to the north and west.

The proposed development is surrounded on most boundaries with existing residential properties.

On the west side of Hunsworth Lane is the Flexitallic site (who manufacture industrial sealing products, including gaskets, sheet materials, and custom rubber products) and off Riverside Drive the following are located;

- Hub26 – co-working facility with meeting rooms, offices, gym and spa
- MRC Global – valve engineering / a regional distribution centre
- Status International UK limited – Supplier of electrical and lighting equipment, warehouse facilities.

2.3 Proposed Development

The proposed development is for a range of 2, 3 and 4 bed dwellings, as indicated in Figure 2 below. Merchants Fields Farm and associated dwellings will remain.

This layout forms the basis of this noise impact assessment.

Figure 2 – Indicative Site Layout

3. NOISE POLICY AND GUIDANCE

3.1 Introduction

Within the following section of the report, detail is presented relating to the relevant national and local planning policies and guidance applicable to the proposed development.

Further details of relevant policy and assessment guidance documents are presented in Appendix B and are summarised below.

3.2 National Planning Policy Framework (NPPF), December 2023

The NPPF determines the government's planning policy for England. The document was first published in March 2012, revised in July 2018, updated in 2019, 2021 and 2023.

In response to the 'Levelling-up and Regeneration Bill: reforms to national planning policy consultation' the NPPF has been completely revised and the version published on 19 December 2023 completely replaces the previous NPPF document.

Planning policy, in relation to noise is considered in Chapter 15 – 'Conserving and enhancing the natural environment', specifically in terms of pollution.

Paragraph **191** states that:

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In by doing so they should:

a) ***mitigate and reduce to a minimum*** *potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.*

b) ***Identify and protect tranquil areas*** *which have remained relatively undisturbed by noise and are prized for their recreational amenity value for this reason; and*

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

Furthermore, Paragraph **193** continues:

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

The guidance contained within the NPPF reference the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010).

3.3 Noise Policy Statement for England (NPSE, March 2010)

The NPSE attends to three types of noise:

- "Environmental noise" which includes noise from transportation sources;
- "Neighbour noise" which includes noise from inside and outside people's homes; and
- "Neighbourhood noise", which includes noise arising from within the community such as industrial and entertainment premises, trade and business premises, construction sites and noise in the street.

In line with the aims determined in the NPPF, the NPSE determines three aims;

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

The guidance detailed within the NPSE relates a number of key phrases with regards to adverse effects which can be applied to noise impacts as used by the World Health Organisation.

- **NOEL – No Observed Effect Level** - The level below which no health effect or detrimental impact on the quality of life is observed.
- **LOAEL – Lowest Observed Adverse Effect Level** - The level at which adverse effects on health and quality of life can be detected.
- **SOAEL – Significant Observed Adverse Effect Level** - The level above which significant adverse effects on health and quality of life occur.

The guidance indicates that it is not possible to have a single objective noise-based measure that defines SOAEL, and as such the SOAEL is likely to be different for different noise sources and receptors. The document indicates that further research is required to establish what may constitute a significant adverse impact on health and quality of life from noise.

While the NPSE determines the NOEL, LOAEL and SOAEL descriptions, the document indicates that, unlike other environmental disciplines, there are currently no European or national noise limits which have to be met although the NPSE states that "there can be specific local limits for specific developments" allowing for negotiation.

3.4 Planning Practice Guidance – Noise (PPG)

The Planning Practice Guidance for noise (published in March 2014 and updated July 2019) broadly considers the same issues as demonstrated within both the NPPF and the NPSE with regards to noise within the planning realm.

The information detailed within the PPG indicates that noise should be considered when:

- New developments may create additional noise; and/ or,
- New developments would be sensitive to the prevailing acoustic environment.

The guidance indicates that Local Planning Authorities should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and,
- Whether or not a good standard of amenity can be achieved.

The impact of noise is rated within the policy document in terms of the relative 'Observed Effect Level', defined in line with the guidance within the NPSE. Further detail is provided in Appendix B.

3.5 Professional Practice Guidance on Planning and Noise (ProPG, 2017)

The Professional Practice Guidance on Planning and Noise (ProPG) has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England.

The scope of the ProPG is limited to the consideration of new residential development that will be exposed predominantly to airborne noise from transport sources and is implemented in this assessment as it provides a logical approach to the assessment of noise impact on the proposed development.

The recommended approach to the ProPG assessment is shown in **Appendix B** and is summarised as follows:

Stage 1 – An initial noise risk assessment of the proposed development site, which will inform the level of detail required in the more detailed 'Stage 2' assessment.

Stage 2 – A systematic consideration of four key assessment elements:

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

The Stage 2 assessment also refers to quantitative guidance for the acoustic design of residential development in the following documents:

- British Standard 8233:2014 *Guidance on sound insulation and noise reduction for buildings;*
- The World Health Organisation *Guidelines for community noise;* and
- British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound.*

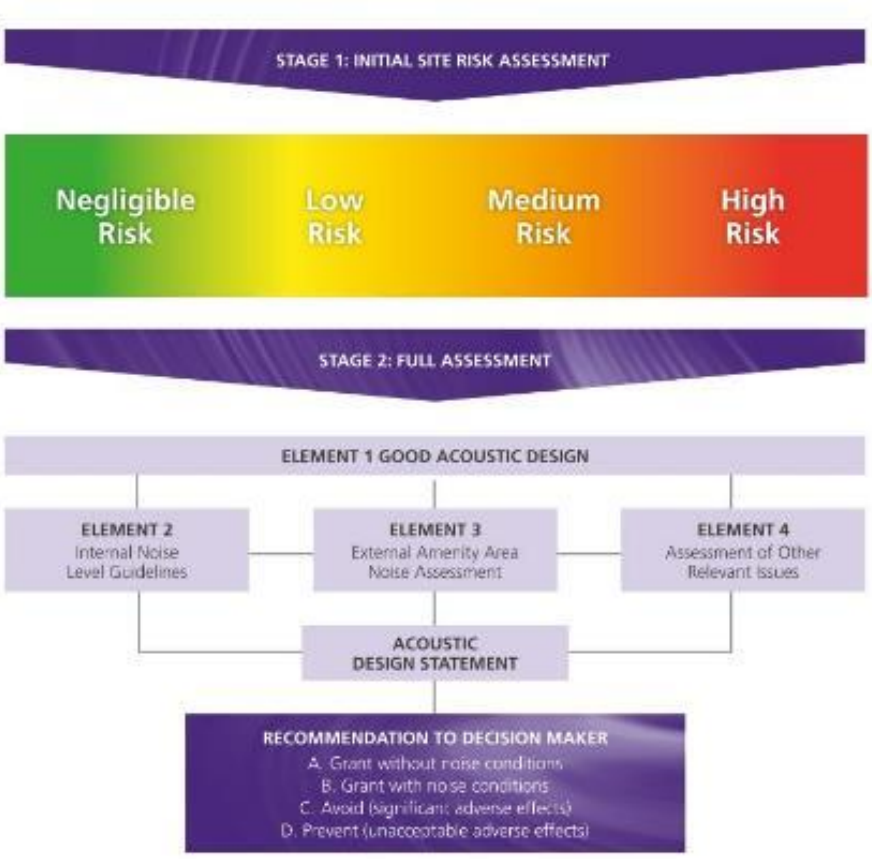


Figure 3 – Flowchart summary of the ProPG approach

3.6 Technical Guidance

3.6.1 Acoustics, Ventilation and Overheating: Residential Design Guide (The AVO Guide, 2020)

The Association of Noise Consultants' (ANC) AVO Guide collates and appraises guidance on internal target noise levels and seeks to provide a holistic approach to acoustic assessments for new residential development that takes due regard of the interdependence of provisions for acoustics, ventilation, and overheating.

The document proposes a very similar two-stage approach to ProPG, with comparable threshold levels for risk grading of the site in relation to noise impact. It then continues to provide guidance on appropriate internal noise standards and schemes of mitigation that may be appropriate to meet these standards.

Application of the AVO Guide is intended to demonstrate good acoustic design as described in the ProPG. Further detail is presented in **Appendix B**.

3.6.2 The Building Regulations 2010: Approved Document O – Overheating (2021)

This approved document took effect on 15th June 2022 for use in England and applies to all Building Regulations building notices, full plans applications and initial notices submitted from this date and to any buildings with prior approvals not started by 15th June 2023.

Its application is for new residential buildings only. Those included in this scope are shown in Table 1.

Table 1 - ADO Table 0.1 Residential buildings within the scope

Title	Purpose for which the building is intended to be used
Residential (dwellings)	Dwellings, which includes both dwellinghouses and flats.
Residential (institution)	Home, school or other similar establishment, where people sleep on the premises. The building may be living accommodation for the care or maintenance of any of the following. Older and disabled people, due to illness or other physical or mental condition People under the age of 5 years
Residential (other)	Residential college, hall of residence and other student accommodation, and living accommodation for children aged 5 years and older.

Further details and requirements are presented in **Appendix B**.

3.6.3 British Standard 7445-2:1991

BS 7445-2:1991 'Description and Measurement of Environmental Noise - Part 2: Guide to the acquisition of data pertinent to land use' defines parameters, procedures and instrumentation required for noise measurement and analysis. Accordingly, together with associated guidance within the documents below, this Standard has been used to ensure the survey and data are fit for purpose. Further details and requirements are presented in **Appendix B**.

3.6.4 West Yorkshire Planning Consultation Guidance (Condensed Version) - Noise & Vibration (May 2016)

This document has been produced jointly by Kirklees, Calderdale, Leeds, Wakefield and Bradford Councils, is intended to provide guidance to developers and Environmental Health professionals when reviewing planning applications and making recommendations to Planning Services on matters relating to noise and vibration.

In relation to the proposed development the following are considered applicable to this development (i.e. containing noise sensitive users and no noise generating sources).

3.6.4.1 Noise from anonymous sources (e.g. road traffic)

The scheme should be designed to mee the following noise criteria, which are based on an absolute criterion and are generally concordant with British Standard 8233:2014 – "Guidance on Sound Insulation and Noise Reduction for Buildings".

Table 2 – Recommended Maximum Noise Levels applied to the Development

Table 1: Recommended Maximum, LOAEL sound levels based upon an Absolute criterion.

Location	Time Period	Ambient Level (dB $L_{Aeq,T}$)	Maximum noise level (dB L_{AFmax})
		LOAEL	LOAEL
External amenity areas	0700-2300	55	-
External amenity areas	2300-0700	45	60
Habitable room	0700-2300	35	-
Bedroom	2300-0700	30	45
Dining Room	0700-2300	40	-

3.6.4.2 Noise from commercial / industrial sources

The document suggests a number of approaches are possible. The relevant text is extracted below.

Where a Comparative noise criterion is selected, the developer should undertake an assessment in line with BS 4142: 2014

- *The Rating Level (calculated in accordance to BS 4142: 2014) does not exceed the exiting Background noise level (L_{A90});*
- *Between the hours of 19:00 and 07:00, the maximum noise levels (L_{AFmax}) from the guidance document shall not exceed the L_{A90} by more than 10 dB; however, where the existing background noise level is 45 dB L_{A90} or less, the maximum noise levels shall not exceed 60 dB L_{AFmax}.*

Where a BS 4142: 2014 assessment suggests a high probability of complaints, it is likely that the development will not be supported. Where a BS 4142: 2014 assessment suggests a positive indication that complaints are unlikely, it is likely that the development will be supported.

or:

The use of Noise Rating (NR) curves, as discussed in the DEFRA document, 'Noise from Pubs and Clubs, Phase I' (2005), is an alternate way of establishing acceptable levels in noise sensitive premises where low frequency noise may be an issue:

- *NR 25 in bedrooms (23:00 to 07:00 hours).*
- *NR 30 in all habitable rooms (07:00 to 23:00 hours).*
- *Noise rating curves should be measured as a 15 minute linear L_{eq} at the octave band centre frequencies 31.5 to 8 KHz.*

or:

An absolute criterion should be adopted. See Table 1.

3.6.5 Kirklees Council Environmental Health Comments on Previous Report

Whilst not formal guidance, the comments provided by the Environmental Health Department on the previous noise impact assessment by Surface Property, have been considered in order to ensure these points are addressed.

A summary of the pertinent comments is provided below (taken from document reference WK/202126495 on the Kirklees planning portal);

1. The previous NIA stated that a noise survey was undertaken between Tuesday 3rd and Thursday 5th November 2015 to determine noise levels at two locations on site. The author states that there has been no significant development in the area, or any other changes likely to affect the acoustic environment since 2015. As such, they consider the data measured during this survey to be suitable for use within this assessment. The Environmental Health Officer did not share this opinion and as no evidence was offered to support this claim, it was recommended that a condition for a new report to be submitted be imposed.
2. Due to the large scale of the development and the close proximity of residential properties to the site boundary there was deemed to be a potential for loss of amenity to the occupiers of nearby properties from noise, vibration, dust and artificial light from the construction phase of the development. However, it was deemed that this could be adequately controlled through a Construction Environmental Management Plan condition.

In light of the above a new noise survey has been undertaken. It is not considered necessary to consider construction noise and vibration impacts as this is covered by Condition #3.

4. BASELINE CONDITIONS

4.1 Introduction

An environmental noise survey is required to quantify the baseline conditions and qualify the type and characteristics of any sound incident at the proposed development Site. The noise survey is undertaken in accordance with the methodology and guidance of BS 7445-2:1991 'Description and Measurement of Environmental Noise - Part 2: Guide to the acquisition of data pertinent to land use'.

4.2 Equipment

The following equipment was used to undertake the baseline noise survey.

The sound level meters were calibrated prior to commencement, and upon completion, of the survey. No significant calibration drift was observed in any of the sound level meters. Serial number identification information for the equipment used during the survey is given below in Table 4.

Table 3 - Equipment information

Position	Equipment	Model	Serial Number	Calibration due
MP1	Sound Level Meter	01dB FUSION	14151	14/09/2025
	Pre-amplifier	01dB PRE22	2113233	
	Microphone	GRAS 40CD 1/2" Pre-polarised free-field	466798	
MP2	Sound Level Meter	01dB CUBE	14240	04/06/2026
	Pre-amplifier	01dB PRE22	2138129	
	Microphone	GRAS 40CD 1/2" Pre-polarised free-field	367230	
Both	Calibrator	Cirrus CR:515	96168	21/02/2025

4.3 Meteorological Conditions

At the start of the measurement survey on 23rd October 2024, weather conditions were recorded in the field to be dry and partly overcast with around 50% cloud cover. Wind speed was measured on a handheld anemometer with a maximum reading of 2.5ms^{-1} from the west on installation. Local air temperature was around 13°C.

As the majority of the survey was unattended due consideration has been given to data at a nearby meteorological station. The station selected which is within 2km of the site (ICLECKHEA2 on the Weather Underground wundermap website).

- Weds 23rd Oct
    - A high of 14°C dropping to a low of 8°C overnight
    - Winds from the west up to circa 6pm then gradually shifting to the south-east
    - Wind speeds of between 3 and 5m/s (noting that this position is elevated at the top of a mast and therefore measure higher speeds than present at ground level)
    - No precipitation during survey
- Thurs 24th Oct
    - A high of 14°C dropping to a low of 11°C overnight
    - Winds predominantly from south-east
    - Wind speeds of between 2 and 6m/s – periods above 5m/s were limited to the morning and reduced gradually through the afternoon.
    - No precipitation
- Fri 25th Oct
    - A high of 13°C
    - Winds predominantly from the east
    - Wind speeds of between 1.5 and 3m/s
    - No precipitation

4.4 Measurement Positions

Upon arrival on site it was evident the dominant source of noise was road traffic noise from the west, being in part from the M62 and also the A638 Bradford Road being audible.

Two long term (min 24hr) noise measurement positions were used as described below. These were considered to be in positions where the road traffic noise levels would be at their highest.

4.4.1 Measurement Position 1

The meter was installed on the temporary Heras fencing that has been installed around the site perimeter, at the corner of the turning circle / garden boundary at the end of Links Avenue. At this point the site starts to fall away down to Hunsworth Lane. As the site was very overgrown in this area the meter was installed at a height of circa 2.5m above ground level to be clear of the surrounding bushes.

The position was considered to be in free-field conditions and representative of the closest dwellings to Hunsworth Lane.

4.4.2 Measurement Position 2

The meter was installed towards the access road to the site off Kilroyd Drive. It was noticeably quieter on this side of the site and the position was selected to capture the worst case noise levels on the northern boundary where there was a gap in the building line of properties facing Whitehall Road West (A58).

The microphone was installed on a tripod at the side of the track at a height of circa 1.2m height. The position was considered to be in free-field conditions and representative of the closest dwellings to Whitehall Road West.

Figure 4 - Approximate noise measurement positions

4.5 Observations

The ambient daytime sound climate was observed to be dominated by road traffic from the M62 / A638. It was noted that Hunsworth Lane also carries a lot of traffic, which accelerate to get up the hill towards the A58.

A drive around during the daytime and evening identified that Flexitallic operates 24 hours a day. Noise emissions are masked during the daytime due to the prevailing road traffic noise. During quieter periods some fan noise and a high pitched intermittent noise lasting for a few seconds every 2-3 minutes was audible on Hunsworth Lane overlooking the Flexitallic site.

Operations on Riverside Drive were mostly daytime only, except for Hub26 (gym / spa / co-working lounge) which was open into the evening but created no perceptible noise (mid week stated closing time is 21:00), and Status Warehouse, whose gates were open and lights in the yard were on presumably being operational, but no noise was perceptible, and no deliveries witnessed.

4.6 Noise Monitoring Results

Table 5 presents a summary of the noise measurement data across the full survey period, as well as a summary for key periods of interest analysed using proprietary software.

A full time-history presenting all data is available in Appendix C.

Table 4 - Summary of measurement data

Measurement Period	MP1			MP2		
	$L_{Aeq,T}$ [1]	$L_{A90,\ T}$ [2]	L_{Amax} [3]	$L_{Aeq,T}$ [1]	$L_{A90,\ T}$ [2]	L_{Amax} [3]
Day 1 ≈12:00 - 23:00 on 23/10/24	55	50	67	48	45	68
Day 2 07:00 – 16:30 on 24/10/24	53[4]	49[4]	73[4]	47[4]	41[4]	69[4]
Day 3 07:00 – ≈12:00 on 25/10/24	54	47	71	46	39	67
Daytime combined	54	49	73	47	41	69
Night 1 23:00 to 07:00 on 23/10/24	50	47	60	44	37	55
Night 2 23:00 to 07:00 on 24/10/24	49	45	67	38	34	49
Night time combined	49	47	67	41	34	55

[1] L_{Aeq} calculated by logarithmic average of all 'T' periods.

[2] Statistically most frequent for the measurement period.

[3] Typical highest L_{AMax} levels measured (based on 90th percentile of 5-minute periods).

[4.] AM Period had some wind speeds slightly over 5m/s.

5. NOISE IMPACT ASSESSMENT

5.1 Introduction

In this section of the report, ambient noise levels are presented and discussed according to the West Yorkshire Guidance Document criteria for internal noise, and free-field values for external amenity area of the approved development.

The prevailing sound climate is demonstrated to be dominated by distant road traffic noise during the daytime and night time. There is some noise from deliveries at the commercial units off Riverside Drive that will be present but this was hard to distinguish above the general ambient noise levels, except for the reversing alarms and the gate siren.

As such the assessment considers both road traffic noise and commercial / industrial noise.

5.2 Road Traffic Noise

The first step of the assessment is to determine the noise levels present at the proposed dwellings and to do this a 3D noise model was created.

5.2.1 Derivation of Noise Levels across the Development

A 3D digital noise model of the existing Site was prepared using proprietary software (CadnaA 2024) to provide an accurate calculation of future noise levels at the proposed development.

A baseline model of the existing site was first calibrated using the worst-case levels measured at MP1 and MP2.

The noise model was established using publicly available digital mapping from OpenStreetMap. The topography of the site has been included in the model using LIDAR data provided by the Government's Environment Agency.

The spatial position of the local road infrastructure has been taken directly from the digital mapping, and the noise emission line for the various roads is taken to be 0.5m above local ground height.

The model is noted to match the measured noise levels within 1dBA for both daytime and night-time period at MP1, and is approximately 1dBA over-predicting for both daytime and night-time at MP2. It is considered that this level of accuracy is within the general limits of 3D modelling of environmental noise levels, and is considered acceptable.

Table 5: Differences between Measured and Modelled Noise Levels

Position	Measured		Modelled	
	Daytime $L_{Aeq,16hr}$	**Night-time $L_{Aeq,8hr}$**	**Daytime $L_{Aeq,16hr}$**	**Night-time $L_{Aeq,8hr}$**
MP1	54	49	54	49
MP2	47	41	48	42

An image of the model is pictured in **Figure 5**.

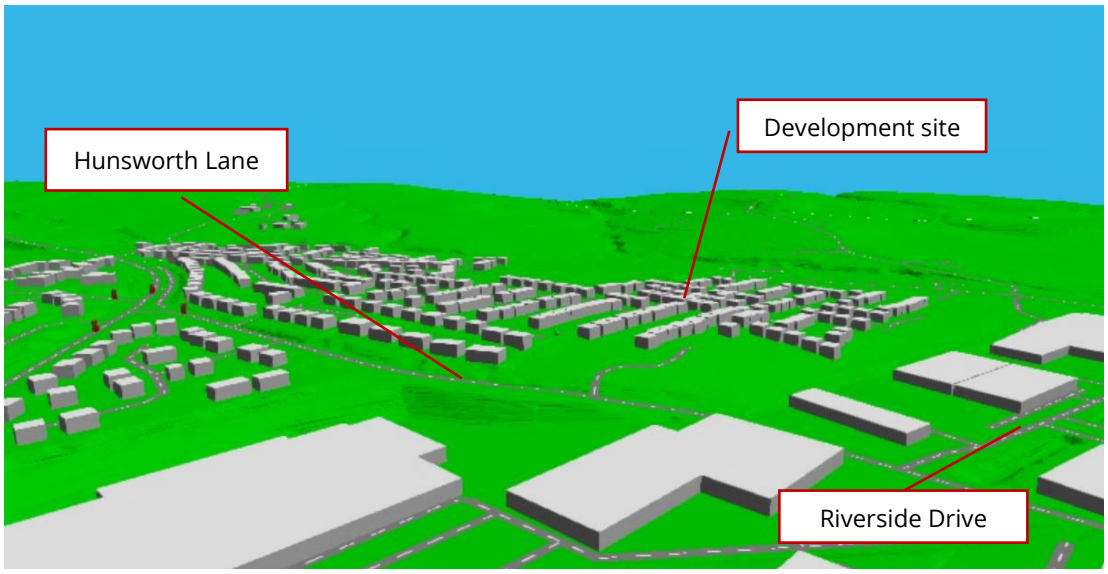


Figure 5: Noise model screen grab. View from the north of the Site

The outputs of the noise model are shown in Figure 6 for the daytime, which shows the predicted noise levels at 1.5m above ground levels and Figure 7 for the night-time, which shows the predicted noise levels at 4.5m above ground levels as bedrooms will typically be on first floor and there will be less ground attenuation present.

A night-time grid at 1.5m above ground level is provided in Figure 8 for use against the external amenity criteria issued by Kirklees.

Figure 6: Noise model output – daytime $L_{Aeq,16hr}$ noise levels at 1.5m above ground level

Figure 7: Noise model output – night-time $L_{Aeq,8hr}$ noise levels at 4.5m above ground level (for assessment of internal noise levels)

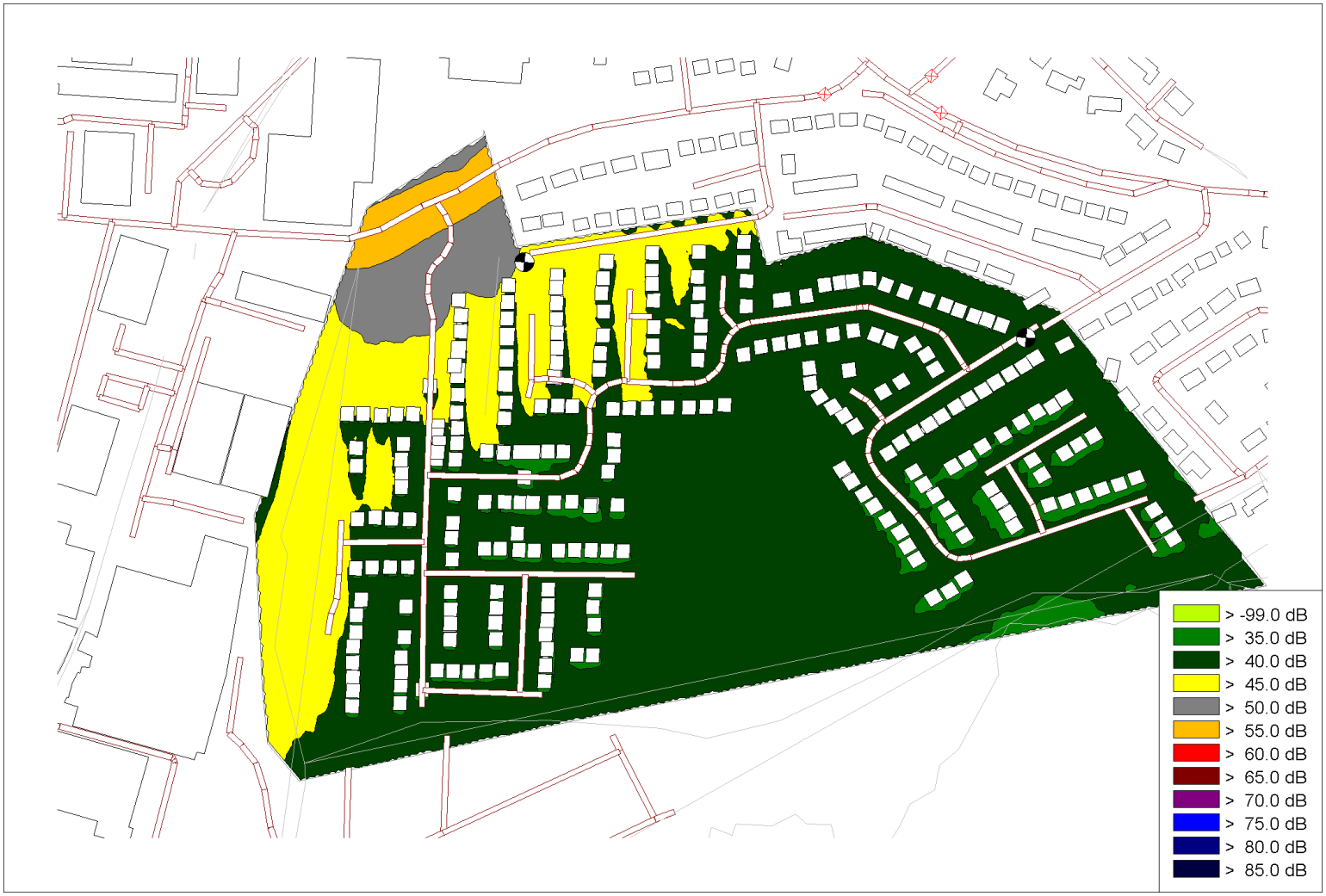
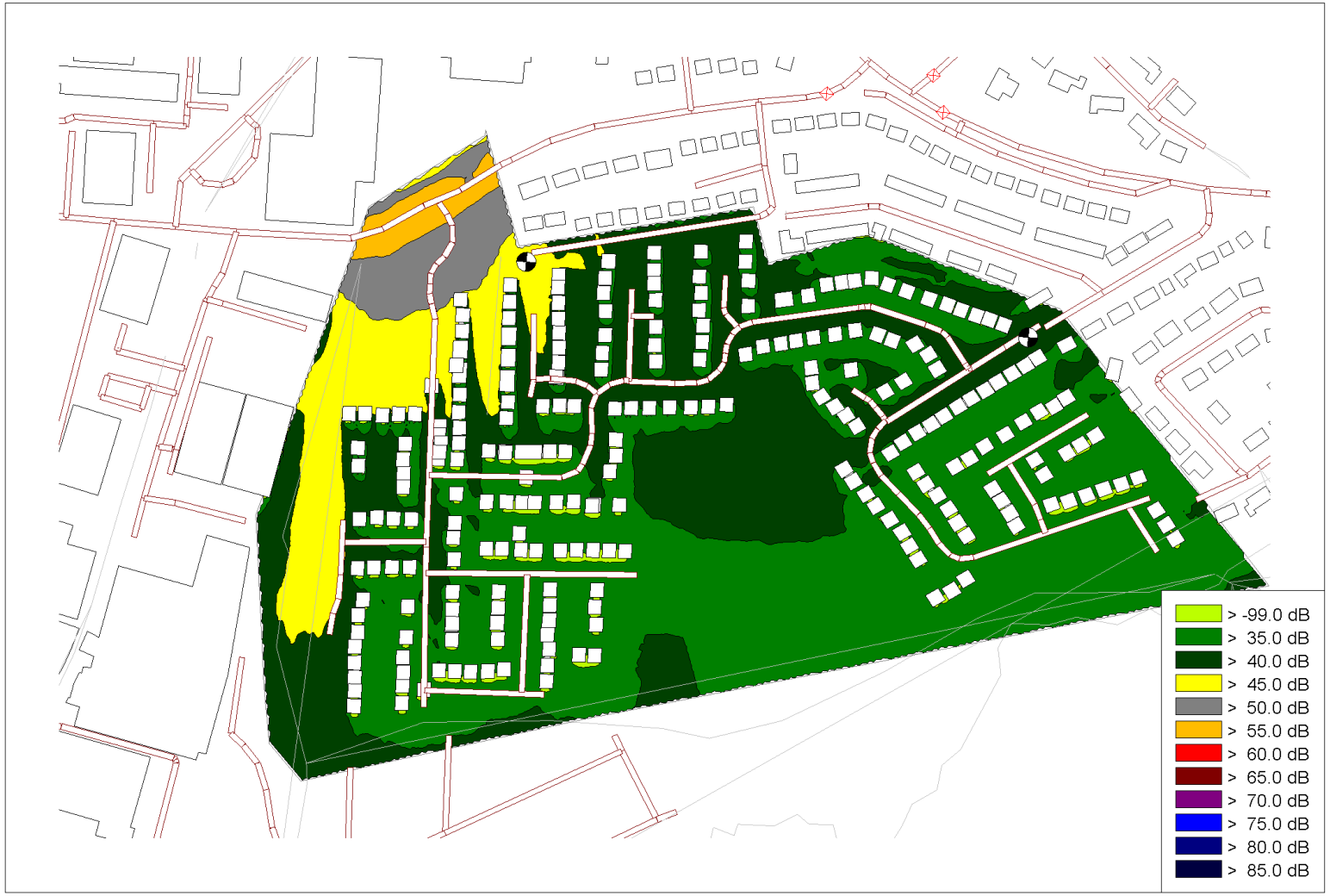


Figure 8: Noise model output – night-time $L_{Aeq,8hr}$ noise levels at 1.5m above ground level (for assessment of external noise levels)



5.2.2 External Amenity

The Kirklees Noise Design Advice document recommends an ambient noise level limit of $L_{Aeq,16hr}$ 55dB during the daytime and $L_{Aeq,8hr}$ 45dB and L_{AFMax} 60dB at night.

In terms of the daytime it can be seen that the $L_{Aeq,16hr}$ 55dB contour (boundary between orange and grey) doesn't extend into the primary (rear) garden space of any proposed dwellings.

During the night-time, it can be seen from Figure 8 that the $L_{Aeq,8hr}$ 45dB contour (boundary between yellow and dark green colours) extends into some garden spaces. The model does not include any boundary garden fences. However, these are noted as 1800mm timber fences and brick pier and timber panel fencing (assumed to also be 1800mm high) to Plots 194 and 229.

Interrogating the model further identified the highest noise level in the rear garden of Plot 229 of $L_{Aeq,8hr}$ 49dB. As such the boundary fencing needs to provide an attenuation of 4dBA. Typical acoustic fences will provide in excess of this. As such it is recommended that the garden fencing to the rear gardens of properties in the yellow zones of Figure 8 be of type to minimise the chances of acoustic weakness via air gaps. Therefore, it is recommended that the following be avoided in these areas:

- hit and miss panels
- Featherboard panels
- Pallisade styles
- Woven panels etc

Fencing types that would be considered acceptable would be;

- Tongue and groove panels
- Double sides panels
- Acoustic fences

Subject to the above it is considered the 4dBA acoustic reduction would be provided and therefore meet the Kirklees criteria for external amenity spaces for both daytime and night-time periods.

5.3 Internal Amenity

During the daytime it can be seen that the highest $L_{Aeq,16hr}$ noise levels are present to the western side of the site towards Hunsworth Lane. The highest levels are $L_{Aeq,16hr}$ 55dB.

The internal criterion for habitable rooms is $L_{Aeq,16hr}$ 35dB and as such the façade needs to provide a reduction against road traffic of at least 20dB. A standard thermal double-glazed window with non-acoustic (hit and miss style) trickle ventilators are capable of reducing internal noise levels to below 30dBA and as such no acoustic requirements are necessary for the glazing and / or trickle ventilators.

A similar outcome is determined for the worst-case night-time noise levels using standard thermal double-glazed window with non-acoustic (hit and miss style) trickle ventilators achieving an internal noise level of below 25dBA.

Therefore, consideration has been given to the potential for open windows to control overheating. The Acoustics, Ventilation and Overheating Guide (AVO Guide) published by the Association of Noise Consultants (ANC) recommends that a Stage 2 assessment is optional where the external free-field noise levels exceeds $L_{Aeq,16hr}$ 53dB during the daytime and / or $L_{Aeq,8hr}$ 48dB at night. Above $L_{Aeq,16hr}$ 60dB during the daytime and / or $L_{Aeq,8hr}$ 50dB at night a Stage 2 assessment is considered recommend as opposed to optional.

At dwellings overlooking Hunsworth Lane it is predicted that the external noise levels will exceed these threshold and as such a limited Stage 2 assessment is required to these dwellings. The affected facades of dwellings are shown below in blue (orange highlighted facades are covered in Section 5.4). All other dwellings are below the Stage 2 thresholds and as such can rely on opening windows for the control of overheating.

Figure 9: Dwellings that require AVO Guide Stage 2 Assessment

The AVO Stage 2 approach considers the resultant predicted internal noise levels with the overheating measures in place. There is no 'acceptable' or 'unacceptable' criteria but it grades the resultant internal noise levels from green to red.

Another useful tool here is Approved Document O that sets a strict requirement that windows should normally be closed at night if the internal noise level in bedrooms would exceed $L_{Aeq,8hr}$ 40dB and / or L_{AFMax} 55dB more than 10 times per night.

Based on the highest predicted external noise levels at night of $L_{Aeq,8hr}$ 52dB (from the noise model) and L_{AFMax} 67dB (taken as the 10th loudest event during any night directly from MP1, as modelling L_{AFMax} noise levels is prone to lots of assumptions) implies a reduction in noise levels from outside to inside of 12dBA is required. Assuming a typical sized bedroom (4 x 3 x 2.4m) this would enable an acoustic open area of 2.4% of the floor area (or 0.289m^2) would be sufficient to provide this level of reduction in noise levels.

Harron Homes have confirmed that in such cases rather than consider partially open windows, they would automatically default to a purge fan in affected bedrooms. This fan will be provided in conjunction with the acoustic trickle vents in the window frames. The fan will be sized to provide control of overheating without the need to open windows. Harron Homes have a TM59 study identifying the number of air changes required to control overheating with windows closed based on their standard house designs. As such this information will be used to size the fan for affected bedrooms. This will typically require in 3 or 4 air changes per hour during hot weather. Harron Homes will determine the fan size based on the results of the TM59 assessment.

It is noted that this requirement only applies to bedrooms on the blue coloured facades in Figure 9, rather than all bedrooms in that dwelling. Also, where a façade is coloured this applies to all bedrooms on that elevation including those with dormer windows etc.

The purge fan system must be designed to comply with the acoustic requirements set out in Approved Document F, namely;

> *Although there is no requirement to undertake noise testing, achieving the levels in the following guidance would ensure good acoustic conditions. The average A-weighted sound pressure level for a ventilator operating under normal conditions and not at boost rates should not exceed both of the following.*
>
> *a. 30dB LAeq,T* for noise-sensitive rooms (e.g. bedrooms and living rooms) when a continuous mechanical ventilation system is running on its minimum low rate.*
>
> *b. 45dB LAeq,T* in less noise-sensitive rooms (e.g. kitchens and bathrooms) when a continuous operation system is running at the minimum high rate or an intermittent operation system is running*

Subject to the above it is considered that this provides sufficient control of internal noise levels due to dwellings to control road traffic noise levels. Note the above requirements only apply to the façades of dwellings highlighted in Figure 9.

5.4 Industrial / Commercial Noise

5.4.1 Flexitallic

The Flexitallic site is located on the north side of Hunsworth Lane. There were two types of noise witnessed emanating from the site when observed from a position on Hunsworth Lane overlooking the Flexitallic site.

There was a continuous white noise from a fan that appeared to operate 24hours a day. This was faintly observed during the daytime at MP1 but normally masked by road traffic noise and was only just detectable between lulls in traffic.

The second noise was a high pitch (circa 2kHz) noise that was only evident on Hunsworth Lane. It occurs on a cyclical basis lasting, on average, about 2 to 3 seconds every 3 to 4 minutes. This was present during the daytime and during the late evening (observed after 20:00hrs) and therefore also believed to be 24hrs. The noise was not observed when on the development site.

Based on the measured noise levels on Hunsworth Lane the high pitch noise is predicted to be below 45dBA at MP1 due to distance attenuation alone. It can be seen that the prevailing noise levels at MP1 (representative of the nearest dwellings to the Flexitallic site) were $L_{Aeq,16hr}$ 54dB during the day and $L_{Aeq,8hr}$ 49dB at night. Therefore, the short cyclical noise is unlikely to be audible and therefore not considered further.

The fan noise was audible at MP1 and during a walkover of the site and has been considered further. The only 1/3rd octave band trace from MP1 which shows any distinctive sign of plant noise is at 25Hz, due to masking from other environmental noise sources.

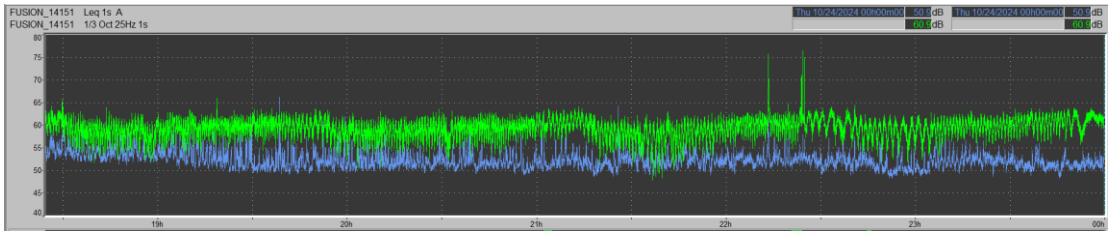


Figure 10: Noise trace from MP1 with L_{Aeq} time history in blue and the 25Hz time history in green

This 25Hz trace is typical of that present throughout the survey. The broadband A-weighted level due to the fan was estimated to be circa 42dBA when observed between lulls in road traffic at a position on Hunsworth Lane with direct line of sight into the Flexitallic site. Distance correction back to a position equivalent of MP1 would therefore be well below the prevailing ambient noise level, and sufficiently low that internal levels from the fan alone would be significantly below the internal ambient noise level criteria.

However, due to the presence of the 25Hz tone at the measurement position it is considered prudent to compare this to the Low Frequency Noise Curves issued by the University of Salford on behalf of the Department for the Environment, Food and Rural Affairs (DEFRA).

Table 2 Proposed reference curve

Hz	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB, Leq	92	87	83	74	64	56	49	43	42	40	38	36	34

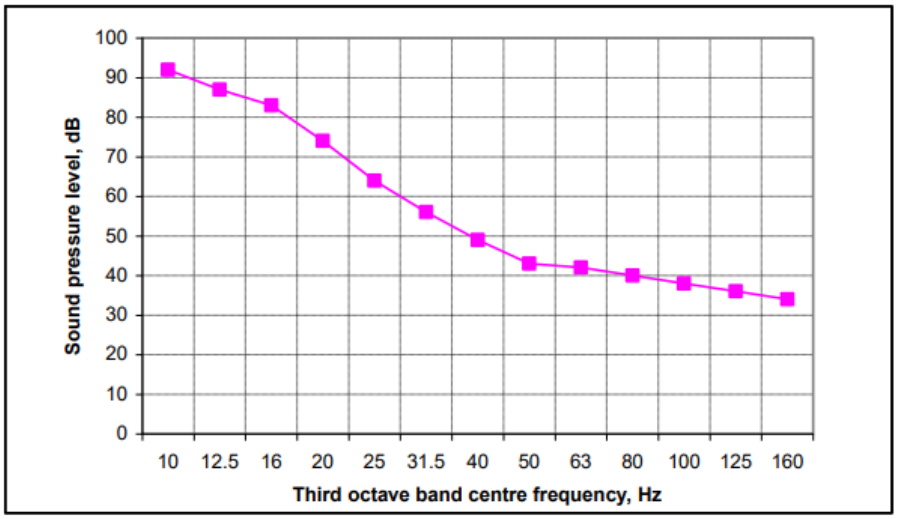


Figure 1 Criterion curve for assessment of low frequency noise

Figure 11: Extract of Low Frequency Noise Curves from NANR45

Figure 11 repeats the proposed criterion curves for the assessment of low frequency noise, and are based on measurements internally. It can be seen that the noise levels recorded at 25Hz were below 64dB externally and therefore can be expected to be even lower internally.

Therefore, consideration of mitigation is considered unwarranted.

5.4.2 Uses on Riverside Drive

There are a number of commercial units off Riverside Drive which forms the western boundary of the site. Those that directly abut the site boundary are;

- Hub26 – co-working facility with meeting rooms, offices, gym and spa
- MRC Global – valve engineering a regional distribution centre
- Status International UK limited – Supplier of electrical and lighting equipment, warehouse facilities.

Daytime and evening observations were made of each, as set out below;

5.4.2.1 Hub26

Hub26 is a co-working office with gym, meeting facilities and spa. It is open until 21:00hrs at night. There is some plant visible in a recess in the roof but this was not audible on site or on Riverside Drive during the daytime or evening observations.

Therefore this is not considered any further.

5.4.2.2 MRC Global

MRC Global is a valve engineering company but the Cleckheaton site appears to be more of a regional distribution centre. The site was only open during daytime hours and one delivery was observed arriving at 13:49 on Wednesday 23rd October.

It sounded the horn on arrival at the gate to the yard, and after a brief pause the gate opened accompanied by an alarm whilst it slid open and then closed (about 30 seconds each direction). The unloading took place via forklift truck (assumed to be LPG as no engine noise was audible). The delivery vehicle left at 14:21.

The noise trace for the period covering the delivery and the period immediately before and after shows that the noise from the delivery activity is not discernible above the prevailing ambient noise levels. The noise from the gate alarm is just evident (in blue) noting that it was quieter on the departure as the vehicle was between the alarm and the measurement position.

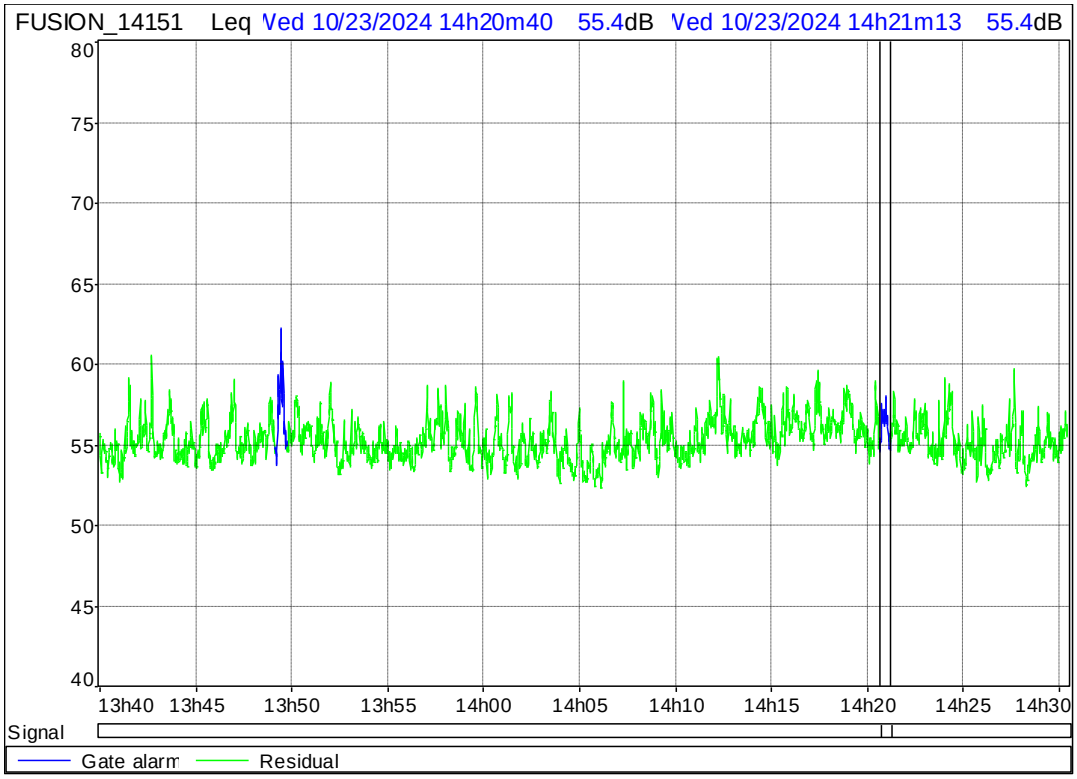


Figure 12: Noise trace from MP1 during delivery at MRC Global

The $L_{Aeq,T}$ noise levels immediately before and after the delivery were 55.3dB and during the delivery were 55.6dB. Thus indicating a source noise level of 43.8dB at MP1 based on logarithmic subtraction.

The estimated distance from the yard to MP1 was 250m and the distance from the yard to the nearest proposed dwelling is circa 70m. This would result in a noise level at the nearest dwelling of circa 55dBA. The predicted road traffic noise levels at these dwellings is 53dBA during the daytime (from the noise model).

The daytime background noise levels from MP1 which is considered to be equally applicable to the assessment location, was $L_{A90,T}$ 47dB. As such, an excess of the rating level over the background of circa 6dB is calculated (assuming no acoustic character penalties given the activity is comparable to the typical road traffic noise levels except for the gate alarm but this is for a maximum of 1 minute per delivery and based on a hour assessment period for the daytime the correction would be -18dB).

Calculations with standard thermal double glazing and hit and miss (non-acoustic trickle vents) have identified that internal noise levels below NR30 in habitable rooms during the daytime (with windows closed). No activity occurs from this site at night.

On the basis of the above it is recommended that the dwellings identified in orange below have an alternative means of ventilation other than open windows (e.g. purge fans). It is also recommended the western boundary fences of plots 193, 181 and 166 have the same specification as described in 5.2.2. The combination of the above protects external amenity areas and internal habitable rooms.

The ventilation system should be designed in accordance with the acoustic criteria set out in Approved Document F.

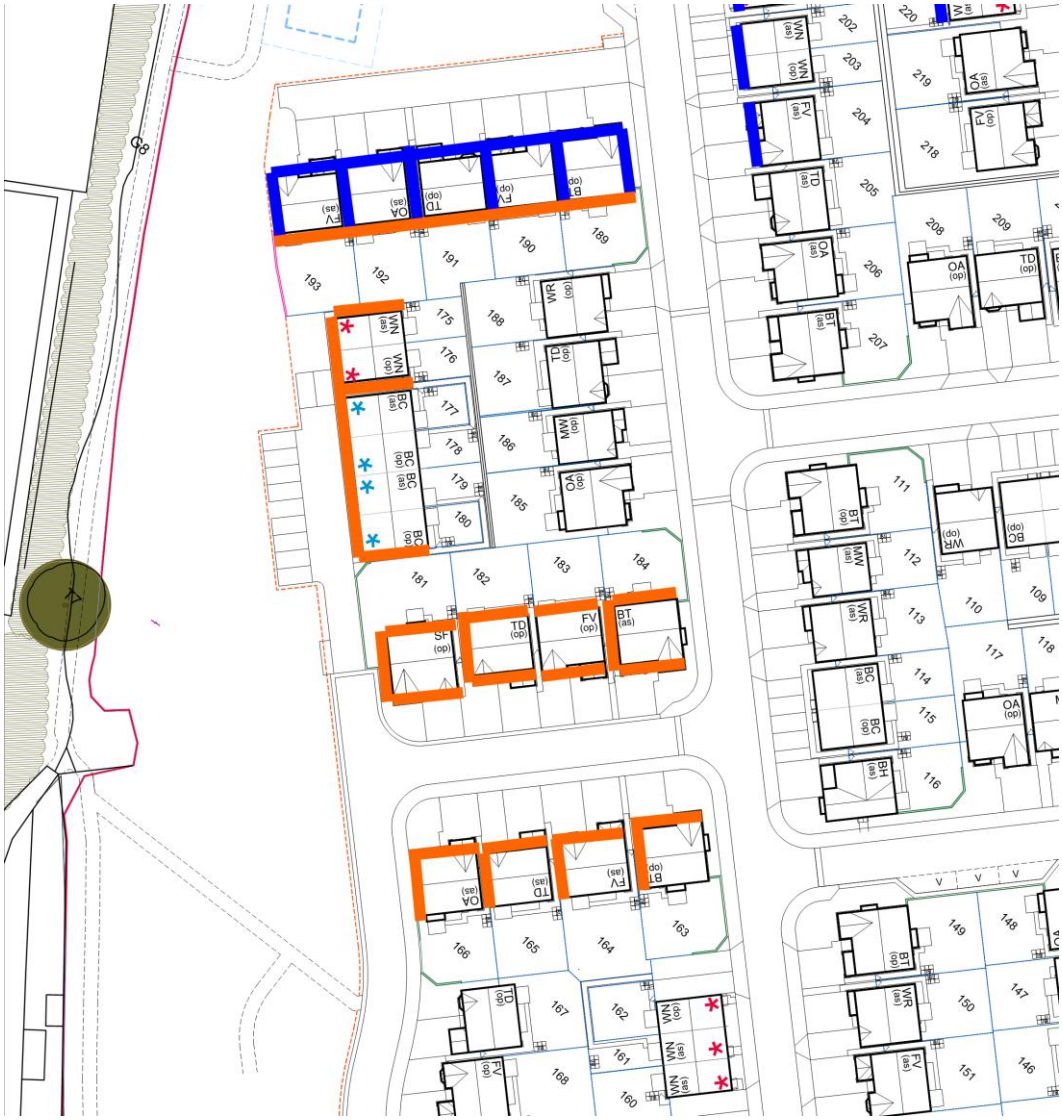


Figure 13: Properties requiring alternative means of ventilation due to noise from MRC Global (orange)

5.4.2.3 Status International

Status International UK limited is a supplier of lighting and electrical accessories. The site in Cleckheaton is noted as one of their warehousing facilities. The site appeared open 24 hours but no deliveries were observed at the site in the evening.

During the survey, 2 HGV's were noted to arrive and depart the site, but on no occasion was any noise audible on the development site. This is likely due to the building form creating screening between the yard and the development site and it is assumed the use of docking bays, where the HGV reverses up to the building to allow FLTs to load 'internally', help contain any noise.

In light of the above and the mitigation for MRC Global also protecting dwellings close to Status, no additional mitigation is considered necessary.

6. CONCLUSIONS AND RECOMMENDATIONS

MZA Acoustics has been appointed by Harron Homes Limited (the 'Client') to provide acoustic consultancy services in relation to a requirement to discharge a planning condition (#25) in relation to noise, for a recently approved application for 291no. dwellings at the site known as Merchant Fields Farm, off Hunsworth Lane, Cleckheaton.

A noise impact assessment was provided with the original planning application submitted to Kirklees Council (2021/62/92801/E) and was undertaken by Surface Property (ref Merchants Fields Noise Impact Assessment dated August 2019). This assessment was based on a survey undertaken in 2015 and Kirklees Council Environmental Health recommended that whilst the development could be approved a condition was required to provide a new noise survey and assessment.

This report sets out the results of a new baseline survey and resultant noise impact assessment in accordance with Condition #25 of the consented scheme.

A new noise survey has been undertaken over a 48hour period at both ends of the site, at locations considered to be representative of the highest environmental noise levels.

Road traffic noise was identified to dominate noise levels across the site with localised areas to the west affected by noise from nearby industrial / commercial uses.

It has been identified that standard thermal double glazing with non-acoustic hit and miss style trickle ventilators would be sufficient to meet the required internal noise criteria across the site, with limited acoustic enhancements as noted below;

- Bedrooms of dwellings identified in blue in Figure 9 would exceed the internal noise criteria outlined in Approved Document O with open windows. Therefore, these dwelling will be provided with an alternative means of ventilation via a purge fan in line with Harron Homes standard designs. The fans will be sized to control overheating which will be based on TM59 modelling undertaken by JSP on behalf of Harron Homes. This will typically require a rate of 3 to 4 air changes per hour depending on plot type. The fan system should be selected / installed in accordance with the acoustic requirements of Approved Document F.
- Habitable rooms identified in orange in Figure 13 also require an alternative means of ventilation to habitable rooms in order to protect against noise from the commercial units. Again, Harron Homes propose purge fans to meet this requirement. The fan system should be selected / installed in accordance with the acoustic requirements of Approved Document F.
- Plots 119, 224, 193, 181 and 166 require acoustic protection from the boundary garden fencing – options for suitable fencing are outlined for selection.

It is considered that the above measures would ensure compliance with the criteria set out in the Kirklees Noise Design Advice document and as such should be acceptable for discharge of Condition #25.

Appendices

Appendix A - Glossary of Acoustic Terminology

Acoustics is the branch of physics concerned with the properties of sound, including ultrasound, infrasound and vibration. A scientist or engineer who works in the field of acoustics is an acoustician or acoustic engineer.

Sound can be measured by a sound level meter or other measuring system. Noise is related to a human response, and is routinely described as unwanted sound, or sound that is considered undesirable or disruptive. Care has been taken in this document to use the most relevant of these terms (whereby 'sound' is used predominantly); however, in most reference documents, and, indeed, generally, 'sound' and 'noise' are used interchangeably. Consequently, just because the term 'noise' is used doesn't necessary mean a negative effect exits or will occur, and the context of the accompanying text should be taken into account.

Human hearing is able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble), and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain).

The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify sound in a manner that approximates the response of the human ear, a weighting mechanism is used, which reduces the importance of lower and higher frequencies in a similar manner to human hearing.

The weighting mechanism that best corresponds to the response of the human ear (though not necessarily perfectly) is the 'A'-weighting scale. This is widely used for environmental sound measurement, and the levels are denoted as dBA, dB(A) or LAeq, LA90 etc. according to the metric being measured or determined (see the Definitions over leaf).

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB is generally regarded as the minimum difference needed to perceive a change under normal listening conditions. Where other changes occur (associated with the change in sound level), such as additional vehicle movements on a road, which can be seen, then these may result in changes in sound level being more noticeable than they might otherwise be.

Further to such visual clues, and any other non-acoustical factors that affect people's response (such personal characteristics, and social, residential or environmental factors), the subjective response to a sound is dependent not only upon the sound pressure level and component frequencies, but also its intermittency. Consequently, various metrics have been developed to try and correlate people's attitudes to different sounds with the sound level and its fluctuations. The metrics used in this document, as per the relevant guidance, are defined overleaf.

Airborne Sound	Sound that reaches the point of interest by propagation through air.
Ambient Sound	Sound from all sources at any given time, form both near and far. Usually measured in terms of L_{Aeq}.
A-Weighting	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Background Sound Level	The A-weighted sound pressure level that can be considered the baseline in the absence of any noise from a specific source of sound under assessment. Measured in terms of $L_{A90, T}$.
Calibration	The measurement system/ chain should be periodically calibrated, within a laboratory, against traceable calibration instrumentation, to either National Standards or as UKAS-Accredited, as required. The calibration of the system should also be checked in the field using a portable calibrator before and after each short term measurements, and periodically for longer term monitoring.
Class 1	The Class of a sound level meter describes its accuracy as defined by the relevant international standards – Class 1 is more accurate than Class 2. The older standard IEC 60651 referred to the grade as "Type", whereas the new standard IEC 61672 refers to it as the "Class". The most accurate meters used in the field (as opposed to a laboratory) are Class 1. Class 2 meters can be used in some instances; however MZA Acoustics use Class 1 (or Type 1) meters by default, as required by BS 4142:2014, for example.
Decibel	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds (s1 and s2) is given by 20 log10 (s_1/s_2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20 Pa.
Fast time Weighting (F)	Averaging time used in sound level meters. Defined in BS EN 61672-2:2013 Electroacoustics. Sound level meters. Pattern evaluation tests.
Free-field / Façade	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5 m away.
$L_{AF90, T}$	The A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time fast time-weighting (F). Generally used to describe the 'background' sound conditions.
L_{AFmax}	The maximum A-weighted sound pressure level during a given time period. Lmax is sometimes used for the assessment of occasional loud sounds, which may have little effect on the overall L_{eq} noise level, but could still affect the sound environment. Unless described otherwise, it is measured using the fast time-weighting (F).
$L_{eq, T}$	A sound level index called the equivalent continuous sound level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded. Where the value is A-

	weighted, is will be presented '$L_{Aeq,T}$' or 'dBA $L_{eq,T}$', otherwise is should be an un-weighted (or linear) value.
L_p	See Sound Pressure Level.
Noise	Related to human response to sound. Unwanted sound, or sound that is considered undesirable or disruptive.
Octave Band	Frequency ranges in which the upper limit of each band is twice the lower limit. Octave bands are identified by their geometric mean frequency, or centre frequency.
Sound Absorption Coefficient	A measure of how effective a material is at absorbing sound incident to its surface. The index range is between 0 and 1, where 1 indicates a perfectly absorbent material and 0 indicates a perfectly reflective one.
Sound Power	In a specified frequency band, the rate at which acoustic energy is radiated from a source. In general, the rate of flow of sound energy, whether from a source, through an area, or into an absorber.
Sound Power Level	Of airborne sound, ten times the common logarithm of the ratio of the sound power under consideration of the standard reference power of 1 pW. Expressed in decibels.
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level	The sound level is the sound pressure relative to a standard reference pressure of 20 Pa ($20x10^{-6}$ Pascals) on a decibel scale.
Weighted Sound Reduction Index (R_w)	A single-figure quantity which characterises the airborne sound insulating properties of a material or element over a range of frequencies.

Appendix B – Assessment Guidance

PLANNING PRACTICE GUIDANCE – NOISE (PPG-N), 2019

The Government launched the Planning Practice Guidance (PPG) web-based resource in March 2014 and refreshed it in July 2019. The section on noise provides tabulated descriptions of example outcomes of the categories introduced in the NPSE based on the likely average response. It also adds a fourth category termed Unacceptable Adverse Effect (UAE).

The PPG-N describes sound that is not noticeable to be at levels below the NOEL. It describes exposures that are noticeable but not to the extent there is a perceived change in quality of life as below the LOAEL and need no mitigation. With reference to the definition of noise in the NPSE, such emissions are 'sound; and not 'noise'. On this basis, the audibility of sound from a development is not, in itself, a criterion to judge noise effects that is commensurate with national planning policy.

The PPG-N suggests that noise exposures above the LOAEL cause small changes in behaviour. Examples of noise exposures above the LOAEL provided in the PPG-N is having to turn up the volume on the television; needing to speak more loudly to be heard; where there is no alternative ventilation, closing windows for some time because of the noise; or, a potential for some reported sleep disturbance. In line with the NPPF and NPSE, the PPG-N states that consideration needs to be given to mitigating and minimising effects above the LOAEL but taking account of the economic and social benefits being derived from the activity causing the noise.

The PPG-N suggests that noise exposures above the SOAEL cause material changes in behaviour. Examples of noise exposures above the SOAEL cause material changes in behaviour. Examples of noise exposures above the SOAEL provided in the PPG-N are, where there is no alternative ventilation, keeping windows closed for most of the time or avoiding certain activities during periods when the noise present; and/or there is a potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. In line with the NPPF and NPSE, the PPG-N state that effects above the SOAEL should be avoided and that whilst the economic and social benefits being derived from the activity causing the noise must be taken into account, such exposures are undesirable.

The guidance in the PPG-N, which is based on that provided in the NPSE, is summarised in the following table.

The PPG-N states that there are many factors which should be considered when determining if noise is of concern; one factor is the number of noise events, the frequency and pattern of occurrence of the noise.

The PPG-N provides further information on the adverse effects of noise and how it can be mitigated. For noise sensitive development, mitigation measures can include: avoiding noisy locations; designing the development to reduce the impact of noise from the local environment, including noise barriers; and optimising the sound insulation provided by the building envelope including through noise insulation.

Perception	Examples of Outcomes	Increasing Effect Levels	Action
No Observed Effect Level			
Not present	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

PROFESSIONAL PRACTICE GUIDANCE ON PLANNING AND NOISE (PROPG)

As discussed in Section 2 of this report, the ProPG is designed to provide practitioners with guidance on a recommended assessment approach to the management of noise within the planning system in England for new residential development.

The guidance is non-statutory and is primarily aimed at the assessment of proposed residential development 'exposed predominantly to noise from existing transport sources'. Despite being non-statutory, it is expected to be widely adopted by planning authorities as best practice when considering noise affecting new residential development.

The ProPG aims to complement Government planning and noise policy and guidance, and in particular it strives to:

- "advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- encourage the process of good acoustic design in and around new residential developments;
- outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- improve understanding of how to determine the extent of potential noise impact and effect; and
- assist the delivery of sustainable development."

The assessment approach, as summarised and implemented in the body of this report, is described as follows.

Stage 1 Risk Assessment

The Stage 1 initial noise risk assessment is based on placing the site within ranges of external noise levels, which correspond to varying degrees of risk. The external noise levels refer to the combined free-field noise level from all relevant sources of transport noise that affect the site. The external noise levels may also include industrial/commercial noise where it is present, but where it is "not dominant".

The indicative noise levels are intended to provide a sense of the noise challenge at a potential residential development site and should be interpreted flexibly having regard to the locality, the project and the wider context.

The initial noise risk assessment approach is presented in Figure 1 in the ProPG, which is reproduced in the following figure.

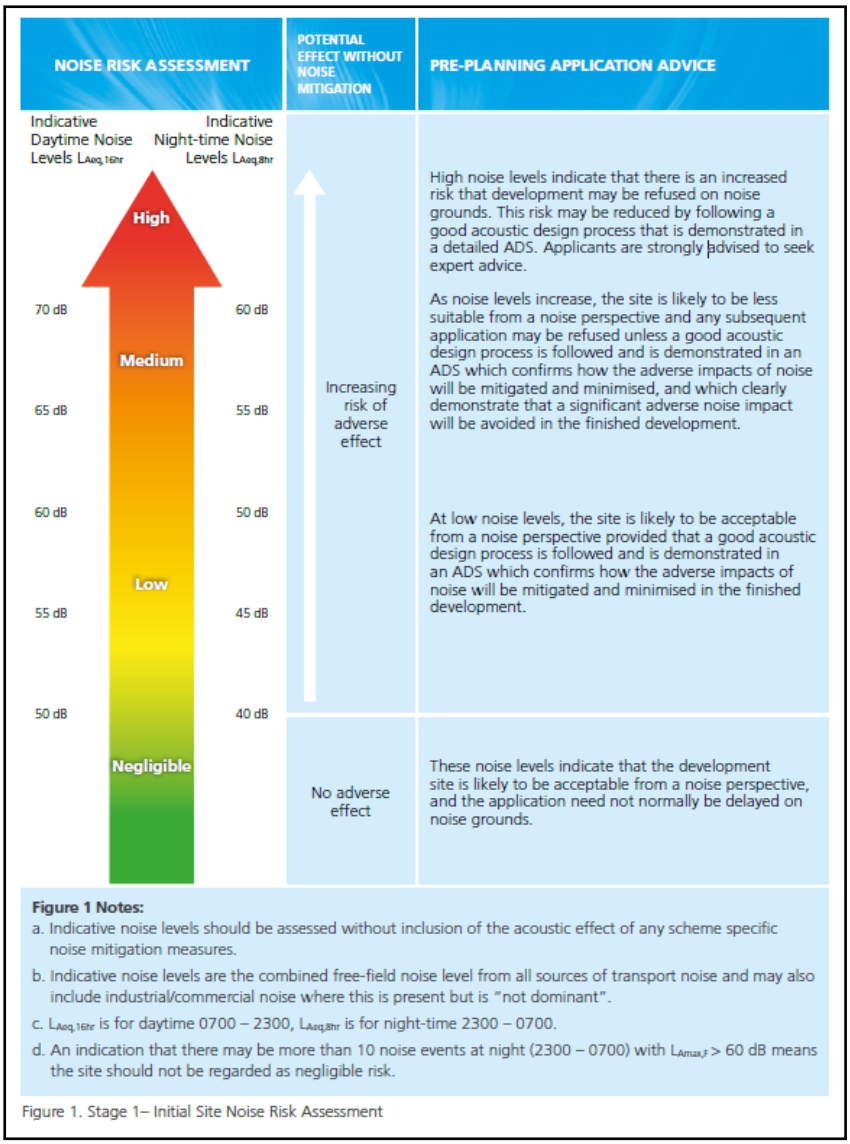


Figure 14: ProPG Stage 1 Risk Assessment

Stage 2 Element 1 – Good Acoustic Design Process

ProPG states that planning applications for new residential development should include evidence that the following have been properly considered:

- Check the feasibility of relocating, or reducing noise levels from relevant sources.
- Consider options for planning the site or building layout.
- Consider the orientation of proposed building(s).
- Select construction types and methods for meeting building performance requirements.
- Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost CDM (construction design and management) etc.
- Assess the viability of alternative solutions.
- Assess external amenity area noise.

Stage 2 Element 2 – Internal Noise Level Guidelines

The internal noise level guidelines provided under Element 2 within Figure 2 of the ProPG are based upon the guidance in BS8233:2014. Accompanying notes 4 – 7 from Figure 2 of the ProPG state the following:

> **"Note 4** – Regular individual noise events (for example, schedules 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. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45 dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number distribution, predictability and regularity of noise events.
>
> **Note 5** – Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7.
>
> **Note 6** – Attention is drawn to the requirements of the Building Regulations.
>
> **Note 7** – Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form."

Stage 2 Element 3 – External Amenity Area Noise Assessment

ProPG refers to the design ranges in BS8233:2014 with respect to the assessment of external amenity, as well as guidance in the PPG-N. Based on these two documents the following guidance is provided with respect to the assessment of noise in external amenity areas:

> *3(i) "If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended"*
>
> *3(ii) "The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB LAeq,16hr."*

3(iii) 'These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces."

3(iv) "Whether or not external amenity spaces are an intrinsic part of the overall design, consideration of the need to provide access to a quiet or relatively quiet external amenity space forms part of a good acoustic design process."

3(v) "Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:

- a relatively quiet façade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or
- a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different protected location); and/or
- a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or
- a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance)."

Stage 2 Element 4 – Other Relevant Issues

ProPG states that the following other relevant issues, should be considered, where appropriate:

- 4(i) compliance with relevant national and local policy
- 4(ii) magnitude and extent of compliance with ProPG
- 4(iii) likely occupants of the development
- 4(iv) acoustic design verses unintended adverse consequences
- 4(v) acoustic design verses wider planning

Planning Recommendations

Following the ProPG assessment approach, will lead the noise practitioner to choose between four possible recommendations to the decision maker. These are as follows:

- planning consent may be granted without any need for noise conditions.
- planning consent may be granted subject to the inclusion of suitable noise conditions.
- planning consent should be refused on noise grounds in order to avoid significant adverse effects ("avoid"); or
- planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects ("prevent").

Full details of where and when the above recommendations apply are provided in Section 3 of ProPG.

ACOUSTICS VENTILATION AND OVERHEATING RESIDENTIAL DESIGN GUIDE – JANUARY 2020

The Acoustics, Ventilation and Overheating (AVO) Guide recommends an approach to acoustic assessments for new residential development that takes due regard of the interdependence of provisions for acoustics, ventilation and overheating.

The AVO Guide is intended for the consideration of new residential development that will be exposed predominantly to airborne sound from transport sources, and to sound from mechanical services that are serving the dwelling in question.

The AVO Guide provides guidance on all stages of the assessment and design of dwellings. However, of particular use at planning stage, is its guidance on the initial site appraisal – which aligns broadly with that of ProPG. The level 1 site risk assessment from the AVO guide is presented in the following figure.

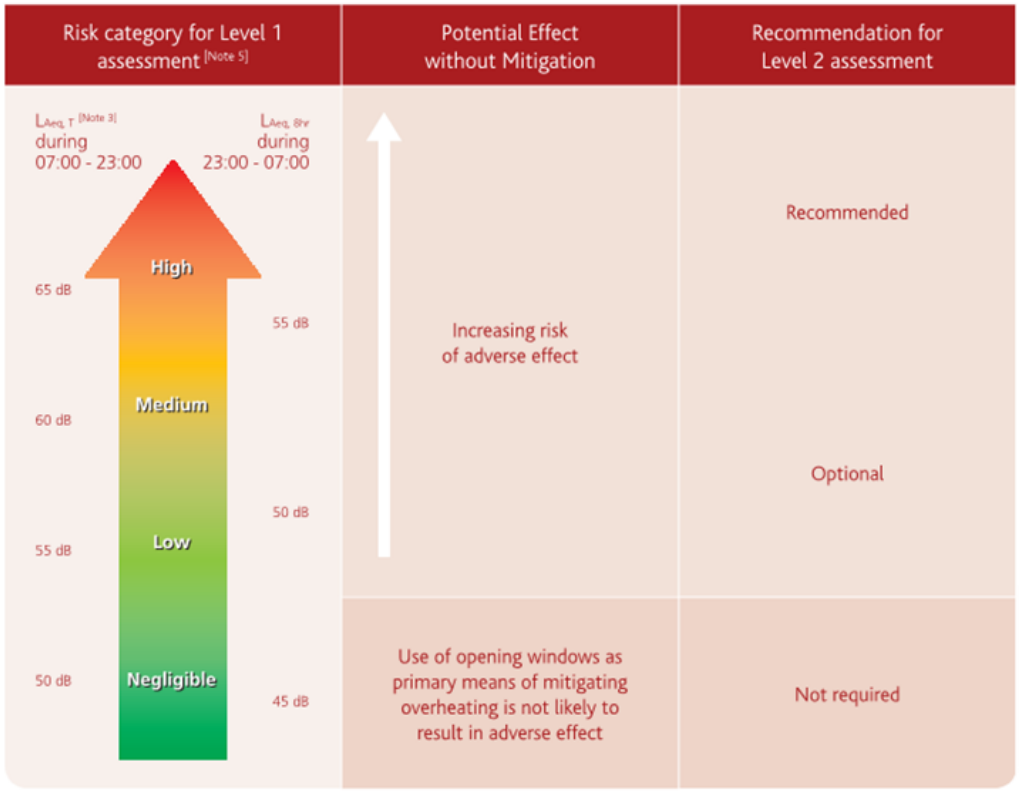


Figure 15: AVO Guide - Level 1 risk assessment

Also of use at the early stages of the design is the AVO Guide's high level recommendations on appropriate glazing and ventilation strategies for schemes depending on their external noise levels.

The following figure presents Table B-2 of The AVO Guide, which provides an initial assessment of appropriate mitigation requirements for dwellings that fall within varying external noise level brackets.

Ventilation System from ADF	Cont. equiv. (L_{Aeq}) or events (L_{AFmax})	Level Difference, external free field level – internal reverberant level, dB	
		Typical windows and vent	Higher acoustic performance windows and vent
1, 2	L_{Aeq}	21	31
	L_{AFmax}	22	35
3 (with trickle vent)	L_{Aeq}	23	33
	L_{AFmax}	24	38
4 (no trickle vent)	L_{Aeq}	27	38
	L_{AFmax}	31	45

Figure 16: The AVO Guide Table B-2: Potential level differences associated with different ventilation systems from ADF

It follows that, depending on their risk categories, developments (or areas of developments) would be subject to more detailed assessments on the risk of occupants being exposed to high levels of noise within dwellings, dependant on the method of controlling overheating and the frequency with which the overheating condition would occur – as informed by the mechanical engineer and, likely, an overheating assessment.

The AVO Guide provides a recognition that the absolute levels within standard documents may be exceeded under overheating conditions and provides a sliding scale on which to assess the impact of an experienced noise level dependant on the frequency with which it is experienced. Figure 17 and Figure 18 presents an example of such a scale during the daytime.

The AVO Guide does not, however, provide a quantitative indication of the duration under which a noise condition may be experienced while still being 'acceptable'.

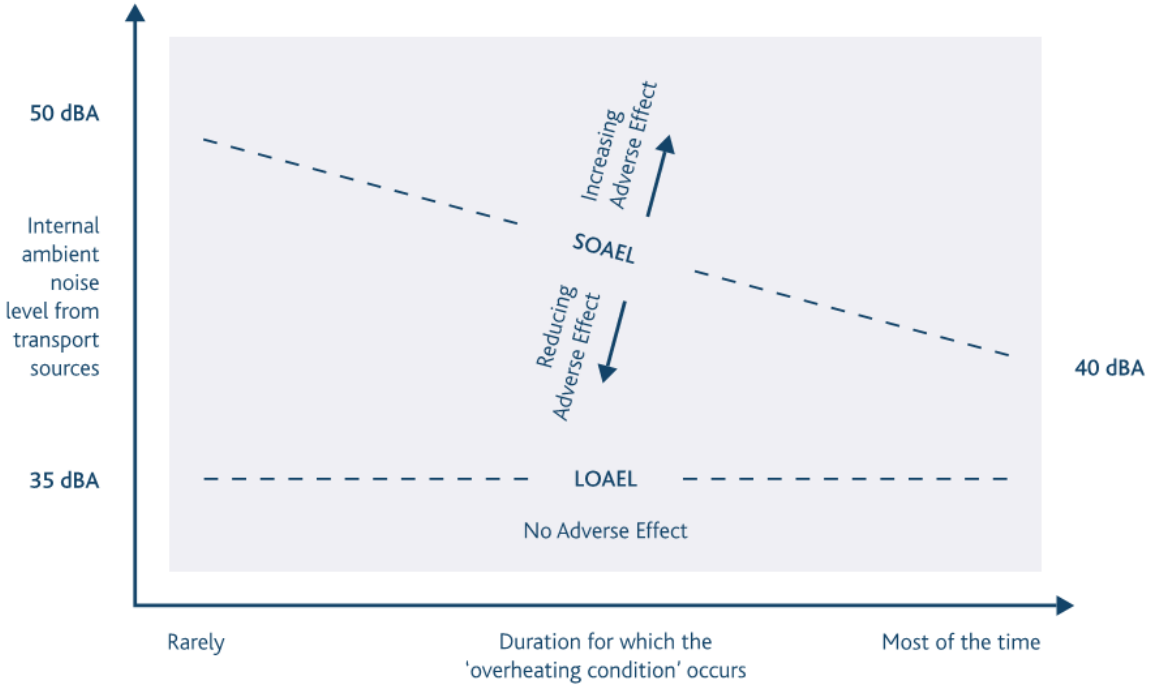


Figure 17: Figure B-2 of the AVO Guide - the 'AVO Diagram' for daytime noise exposure

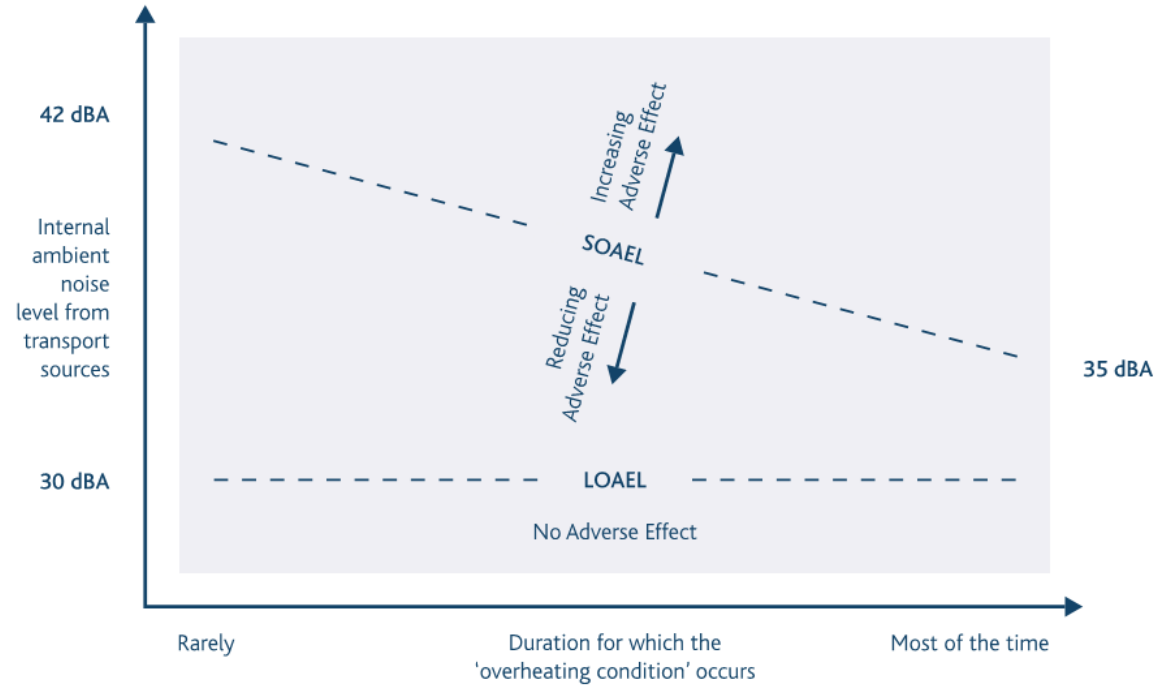
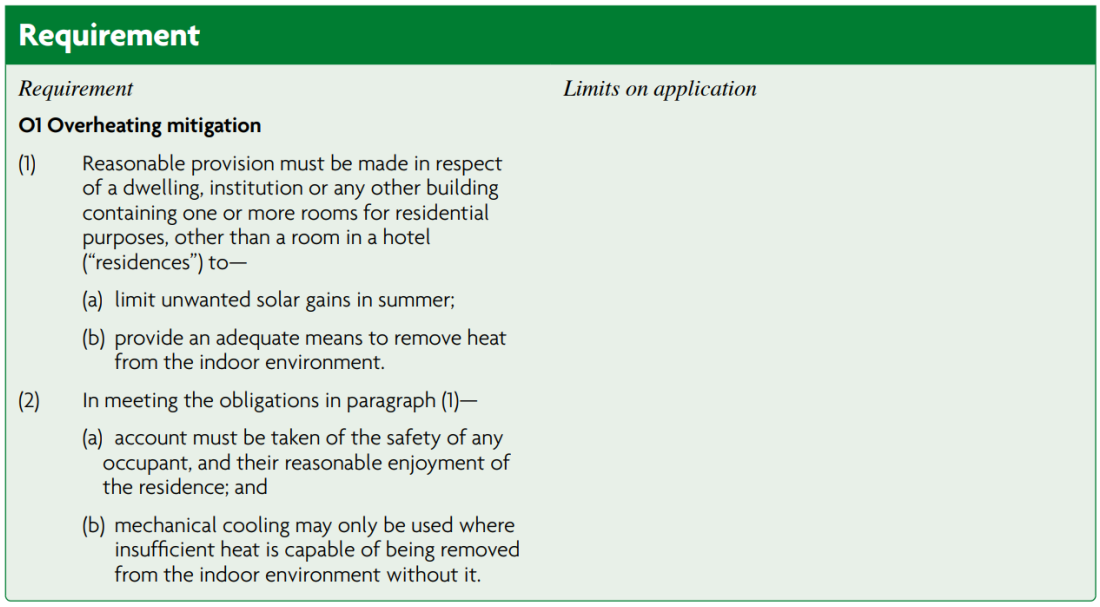


Figure 18: Figure B-3 of the AVO Guide - the 'AVO Diagram' for night-time noise exposure

The Building Regulations 2010: Approved Document O – Overheating (2021)

The aim of requirement O1 is to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures.

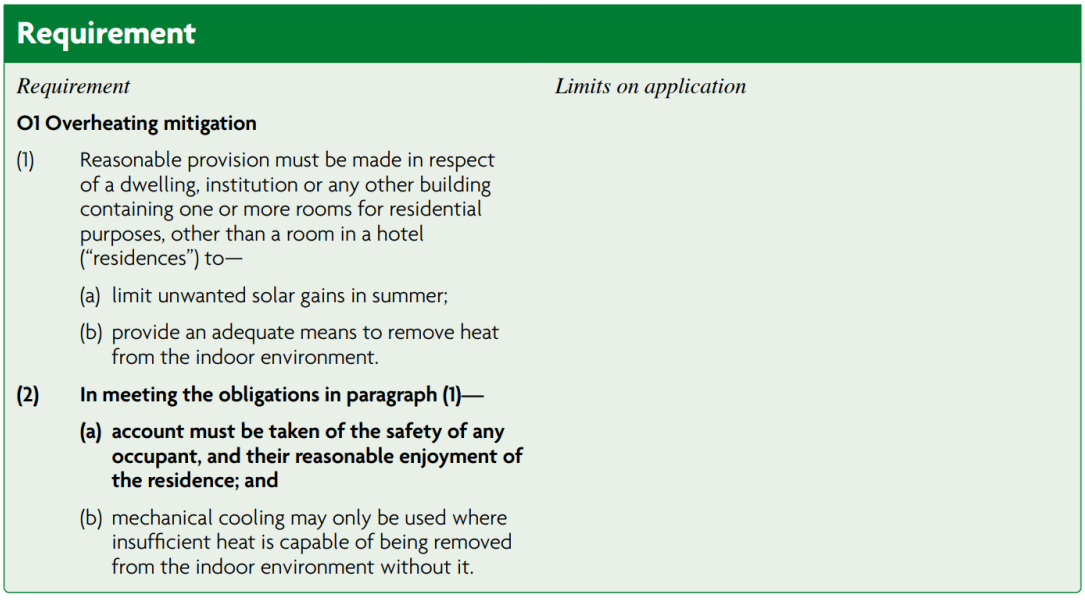
Requirements of Schedule 1 to the Building Regulations 2010 are copied below.



Requirement

Requirement	*Limits on application*
O1 Overheating mitigation	
(1) Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel ("residences") to—	
(a) limit unwanted solar gains in summer;	
(b) provide an adequate means to remove heat from the indoor environment.	
(2) In meeting the obligations in paragraph (1)—	
(a) account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence; and	
(b) mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it.	

Figure 19 - ADO requirement O1



Requirement

Requirement	*Limits on application*
O1 Overheating mitigation	
(1) Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel ("residences") to—	
(a) limit unwanted solar gains in summer;	
(b) provide an adequate means to remove heat from the indoor environment.	
(2) In meeting the obligations in paragraph (1)—	
(a) account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence; and	
(b) mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it.	

Figure 20 - ADO requirement O1(2)(a)

Requirement O1(2)(a) is met in a new residential building if the buildings overheating mitigation strategy for use by occupants takes account of all the following:

- Noise at night
- Pollution
- Security
- Protection from falling
- Protection from entrapment

With respect to noise, the approved document states the following:

> *In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).*
>
> *Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.*
>
> *a. 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).*
>
> *b. 55dB L_{AFmax}, more than 10 times a night (between 11pm and 7am).*
>
> *Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants' 'Measurement of Sound Levels in Buildings' with the overheating mitigation strategy in use.*

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

BS 8233:2014 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

BS8233:2014 Guidance on sound insulation and noise reduction for buildings provides guidance for the control of noise in and around buildings. Through providing appropriate criteria and limits for internal and external noise levels it can be used to guide the design of new buildings (or refurbished buildings undergoing a change of use).

Guidance pertaining to indoor noise levels for residential spaces is summarised in the table below. These levels refer to the overall internal noise resulting from steady external environmental noise, such as road traffic, and are not applicable for sources of noise with specific character.

Table 6: BS 8233 – Indoor ambient noise levels in spaces when unoccupied

Activity	**Location**	**Daytime 07:00 – 23:00**	**Night-time 23:00 – 07:00**
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

In terms of design criteria for "…traditional external areas that are used for amenity space, such as gardens and patios…" BS8233:2014 states that:

> *"…it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where*

development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

In relation to other external amenity areas it states:

"Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

Shorter duration and intermittent noise events can be responsible for sleep disturbance. While BS8233 does not recommend specific maximum noise limits for controlling these events, Note 4 from Figure 2 of the ProPG states that good acoustic design can be used so that individual noise events do not normally exceed 45 dB L_{AFmax} more than 10 times a night.

BS8233:2014 states that, *"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."* However, the document does not recommend any specific criterion.

The noise level criteria specified in BS8233:2014 are broadly in line with those specified by the World Health Organization (WHO) in its Guidelines for Community Noise (1999), as described below.

WHO GUIDELINES FOR COMMUNITY NOISE

The WHO Guidelines consolidate scientific knowledge on the health effects of community noise and provide guidance to environmental health authorities and professionals trying to protect people from the harmful effects of noise in non-industrial environments. The main sources of community noise are identified as road, rail and air traffic; industries; construction and public work; and neighbours.

The effects of noise in dwellings are, typically, sleep disturbance, speech interference and annoyance. Suggested guideline limitations, and the time periods to which they relate, are presented in the following table.

Table 7: WHO guideline values for community noise in specific environments

Specific environment	Critical health effect(s)	$L_{Aeq,T}$	Time base, T (hours)[1]	L_{AFmax}
Outdoor living areas	Serious annoyance, daytime and evening	55 dB	16	-
	Moderate annoyance, daytime and evening	50 dB	16	-
Dwellings indoors	Speech intelligibility and moderate annoyance, daytime and evening	35 dB	16	-
Inside bedrooms	Sleep disturbance, night-time	30 dB	8	45 dB[2]
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45 dB	8	60 dB

[1] These periods are usually taken to be 07:00 – 23:00 (16 hour day) and 23:00 – 07:00 (8 hour night)
[2] The document states that, *"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LAFmax more than 10-15 times per night…"*

In line with the quoted guidance from the WHO Guidelines, it is taken that the L_{AFmax} criterion should not be compared to the highest L_{AFmax} level applicable to the assessment location(s), but rather to that more representative of conditions typically.

It is noted that the WHO guidance relating to night-time maximum noise levels is based on a study of sleep disturbance due to aircraft movements, which are not a prominent feature here. However, in the absence of similar guidance relevant to rail or road traffic, together with aircraft noise typically being considered more annoying than the other two modes of transport, it is considered appropriate to apply the guidance for the purposes of the assessment.

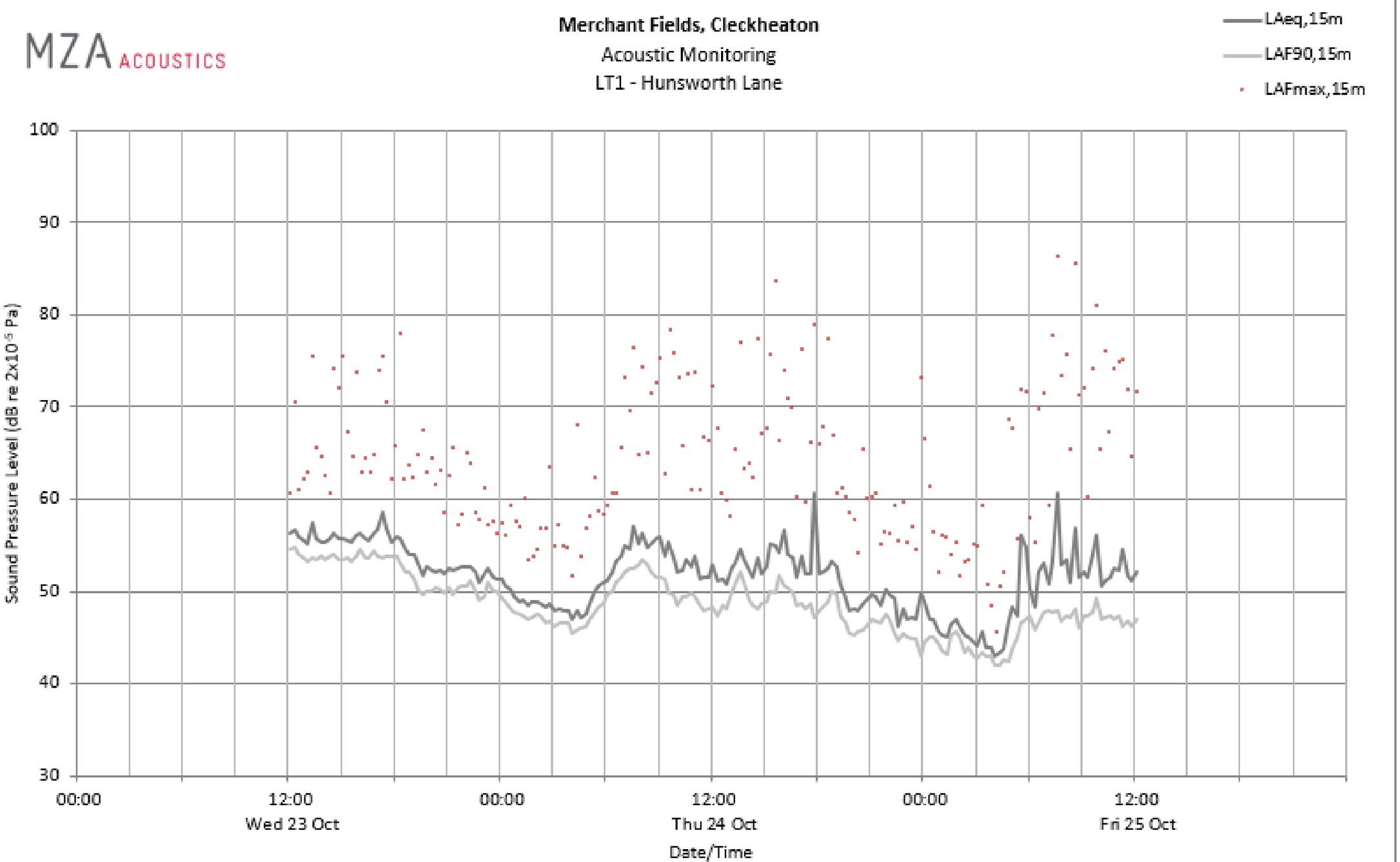
Appendix C – Measurement Survey Data

MZA ACOUSTICS

Merchant Fields, Cleckheaton

Acoustic Monitoring

LT1 - Hunsworth Lane

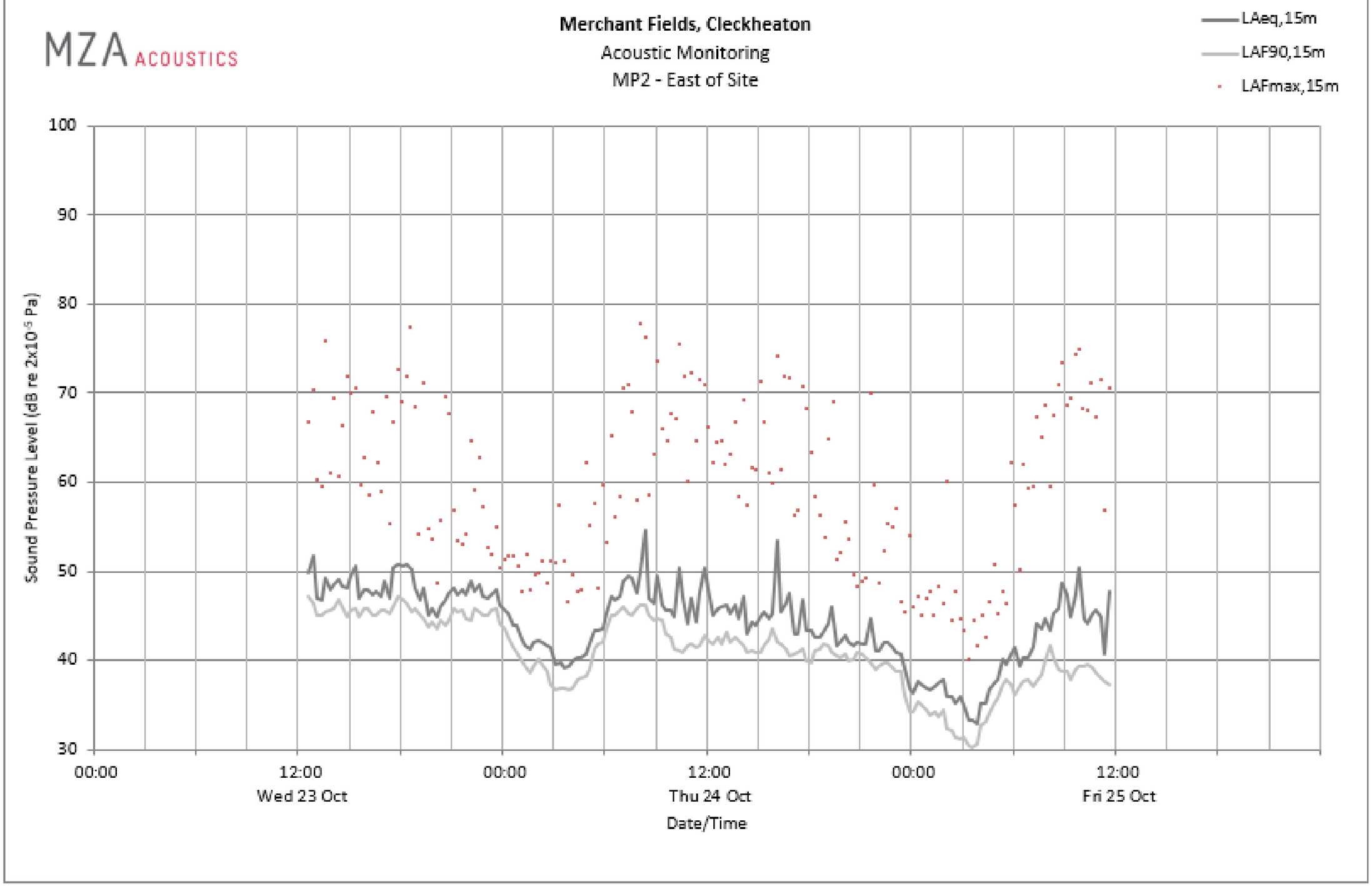


MZA ACOUSTICS

Merchant Fields, Cleckheaton

Acoustic Monitoring

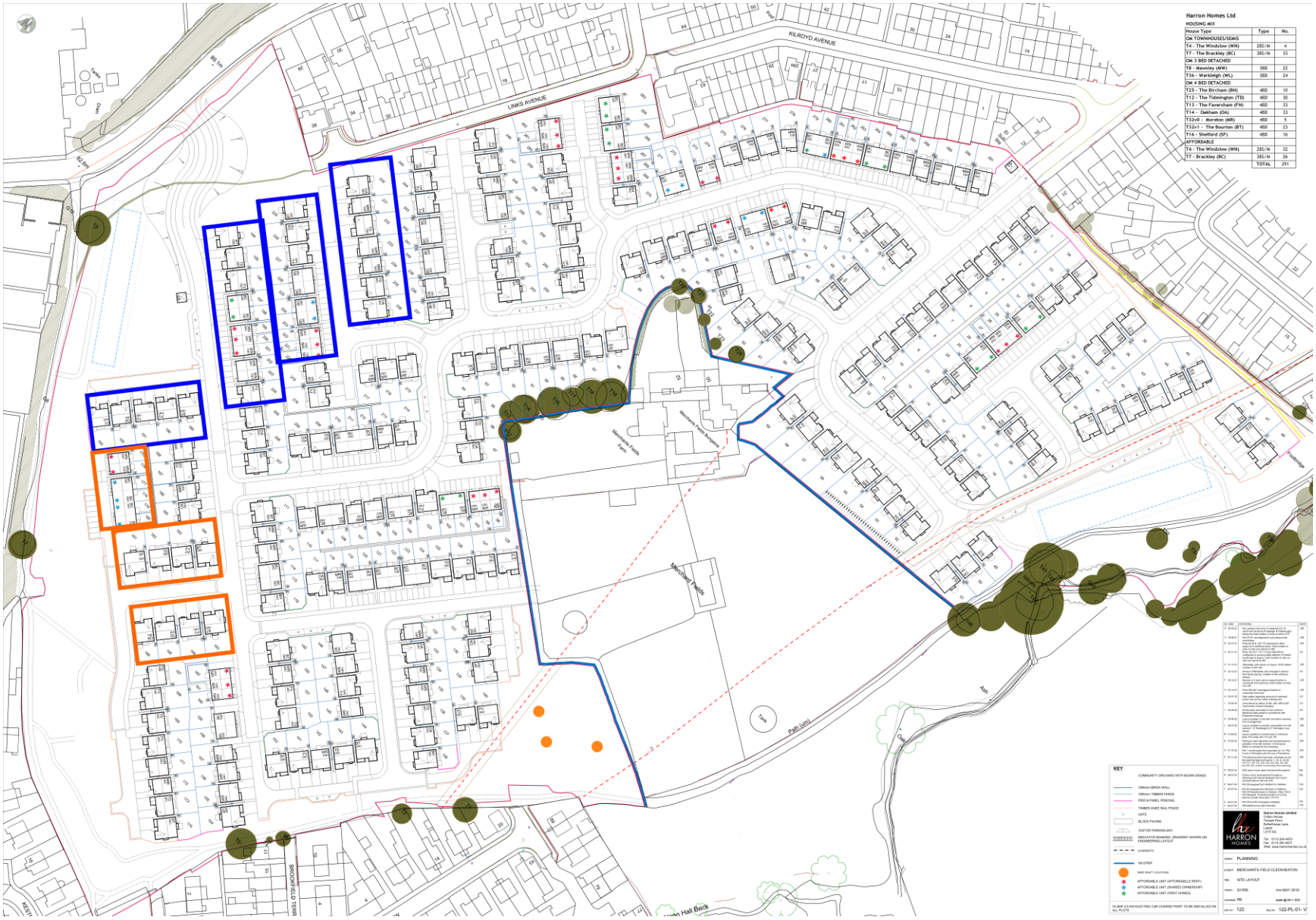
MP2 - East of Site



Appendix D – Assessed Site Layout

Harron Homes Ltd
HOUSING MIX
House Type | Type | No.
OM TOWNHOUSES/SEMIS
T4 - The Windslow (WN) 2BS/M 4
T7 - The Brackley (BC) 3BS/M 33
OM 3 BED DETACHED
T8 - Mawsley (MW) 3BD 22
T36 - Warkleigh (WL) 3BD 24
OM 4 BED DETACHED
T25 - The Bircham (BH) 4BD 10
T12 - The Tidmington (TD) 4BD 30
T13 - The Faversham (FN) 4BD 33
T14 - Oakham (OA) 4BD 33
T32v0 - Moreton (MR) 4BD 5
T32v1 - The Bourton (BT) 4BD 23
T16 - Shelford (SF) 4BD 16
AFFORDABLE
T4 - The Windslow (WN) 2BS/M 32
T7 - Brackley (BC) 3BS/M 26
TOTAL 291
LINKS AVENUE
KILROYD AVENUE
BROOKFIELD TERR
Merchants Fields Farm
Merchants Fields Bungalow
Merchant Fields
Tank
Path (um)
Ash
Oak
KEY
COMMUNITY ORCHARD WITH MOWN GRASS
1800mm BRICK WALL
1800mm TIMBER FENCE
PIER & PANEL FENCING
TIMBER KNEE RAIL FENCE
GATE
BLOCK PAVING
VISITOR PARKING BAY
INDICATIVE BANKING, GRADIENT SHOWN ON ENGINEERING LAYOUT
EASEMENTS
1M STRIP
MINE SHAFT LOCATIONS
AFFORDABLE UNIT (AFFORDABLLE RENT)
AFFORDABLE UNIT (SHARED OWNERSHIP)
AFFORDABLE UNIT (FIRST HOMES)
16 AMP 3.5 KW ELECTRIC CAR CHARGE POINT TO BE INSTALLED ON ALL PLOTS
HARRON HOMES
Harron Homes Limited
Colton House
Temple Point
Bullerthorpe Lane
Leeds
LS15 9JL
Tel: 0113 204 4670
Fax: 0113 204 4677
Web: www.harronhomes.co.uk
status: PLANNING
project: MERCHANTS FIELD CLECKHEATON
title: SITE LAYOUT
drawn: GY/RB.
date: MAY 2019
checked: RB.
scale @ A0: 1:500
job no: 122
drg no: 122-PL-01- V

Appendix E – Mitigation Layout


Harron Homes Ltd
HOUSING MIX
House Type | Type | No.
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T4 - The Windslow (WN) | 2BS/W | 4
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On 3 BED DETACHED
T8 - Mawsley (MW) | 3BD | 22
T36 - Warkleigh (WL) | 3BD | 24
On 4 BED DETACHED
T25 - The Bircham (BH) | 4BD | 10
T12 - The Tidmington (TD) | 4BD | 30
T13 - The Faversham (FN) | 4BD | 33
T14 - Oakham (OA) | 4BD | 33
T32v0 - Moreton (MR) | 4BD | 5
T32v1 - The Bourton (BT) | 4BD | 23
T16 - Shelford (SF) | 4BD | 16
AFFORDABLE
T4 - The Windslow (WN) | 2BS/W | 32
T7 - Brackley (BC) | 3BS/W | 26
TOTAL | | 291
KILROYD AVENUE
LINKS AVENUE
Merchants Fields
Path (um)
KEY
HARRON HOMES
PLANNING
MERCHANTS FIELD CLECKHEATON
SITE LAYOUT
122-PL-01-V

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