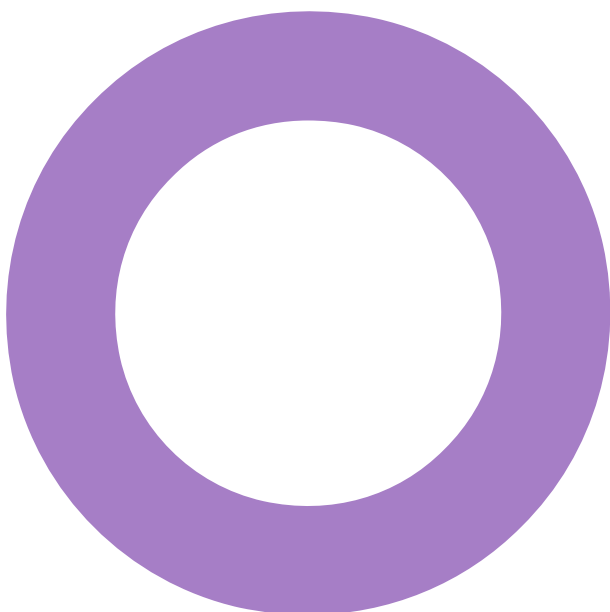


**Field House.
Dewsbury.
DLA Design Group.**

ACOUSTICS
PLANNING REPORT

REVISION 01 - 15 MAY 2019



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
01	15/05/2019	Initial issue	RJ/LR	PM	PM

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Project number: 10/11282

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Contents.

Audit sheet.	2
Summary.	4
1. Introduction.	5
2. Site and development details.	5
2.1 Site location.	5
2.2 Surrounding area.	5
2.3 Local noise climate.	6
3. Acoustic criteria.	6
3.1 Kirklees Council requirements.	6
3.2 Standard guidance.	6
4. Environmental noise survey.	7
4.1 Observations.	8
4.2 Attended measurement results.	9
4.3 Unattended measurement results.	10
5. Initial building envelope assessment.	10
5.1 Basis of external noise levels.	10
5.2 Note on existing glazing systems.	11
5.3 Facades, glazing and ventilation.	11
6. Noise transfer between commercial and residential premises.	12
7. Plant noise egress.	12
7.1 Basis of plant noise limits.	12
7.2 Plant noise limits.	12
7.3 Attenuation measures.	12
8. Conclusion.	13
Appendix A: Survey and equipment details.	14
Appendix B: Time History of unattended measurements.	16
Appendix C: Statistical analysis of background sound levels.	17

Summary.

Hoare Lea Acoustics (HLA) have been appointed by Mood Developments to carry out an environmental noise survey and noise impact assessment in relation to the proposed development of Field House which is located on Dewsbury Ring Road, Dewsbury.

An environmental noise survey has been carried out and a noise egress assessment undertaken in accordance with the requirements of Kirklees Council and BS 4142:2014 guidance. The survey was carried out between 1 May 2019 and 13 May 2019.

The representative background sound levels measured during the survey were $L_{A90,15min}$ 58 dB during the daytime (07:00 to 23:00 hrs) and $L_{A90,15min}$ 39 dB at night-time (23:00 to 07:00 hrs).

On the basis of Kirklees Council requirements and BS 4142:2014 guidance, all plant, equipment and machinery associated with the development shall be controlled to ensure that the overall sound pressure levels at 1 m from the façade of the nearest noise sensitive premises:

- Elevations facing Dewsbury Ring Road: $L_{Ar,T}$ 53 dB during the daytime (07:00 to 23:00)
 $L_{Ar,T}$ 34 dB during the night time (23:00 to 07:00)
- Other elevations: $L_{Ar,T}$ 43 dB during the daytime (07:00 to 23:00)
 $L_{Ar,T}$ 34 dB during the night time (23:00 to 07:00)

If the plant contains any tonal characteristics a further correction will be required.

An initial assessment of the building envelope sound insulation requirements has been carried out and minimum sound insulation performances for the building envelope elements have been given. In general, a standard thermal double glazing and passive ventilation strategy would be appropriate for the majority of the site with higher rated acoustic laminate glazing systems with high performance acoustic trickle ventilators to apartments overlooking Dewsbury Ring Road.

1. Introduction.

Hoare Lea Acoustics (HLA) have been appointed by Mood Developments to provide acoustic advice for the proposed development of Field House, Dewsbury. The site is located within the jurisdiction of Kirklees Council. An environmental noise survey has been carried out on site over 5 days commencing on 1 May 2019. The aim of the survey is to determine the existing sound levels around the site, with the purpose of establishing the prevalent ambient and representative background noise levels in order to set maximum noise egress limits for plant and machinery associated with the development.

This report presents the findings of the sound survey and sets out the permissible maximum plant noise egress limits in accordance with Kirklees Council and BS 4142:2014 guidance. An initial building envelope sound insulation assessment is also presented.

2. Site and development details.

2.1 Site location.

The proposed site comprises Field House, an existing 4 storey office building which is proposed to be converted into 5 storeys of residential apartments, including a one-storey partial extension and an A3 class commercial unit at ground floor level. The location of the site is indicated in Figure 1 by the area shaded in yellow and the nearest identified noise sensitive premises are indicated in blue.

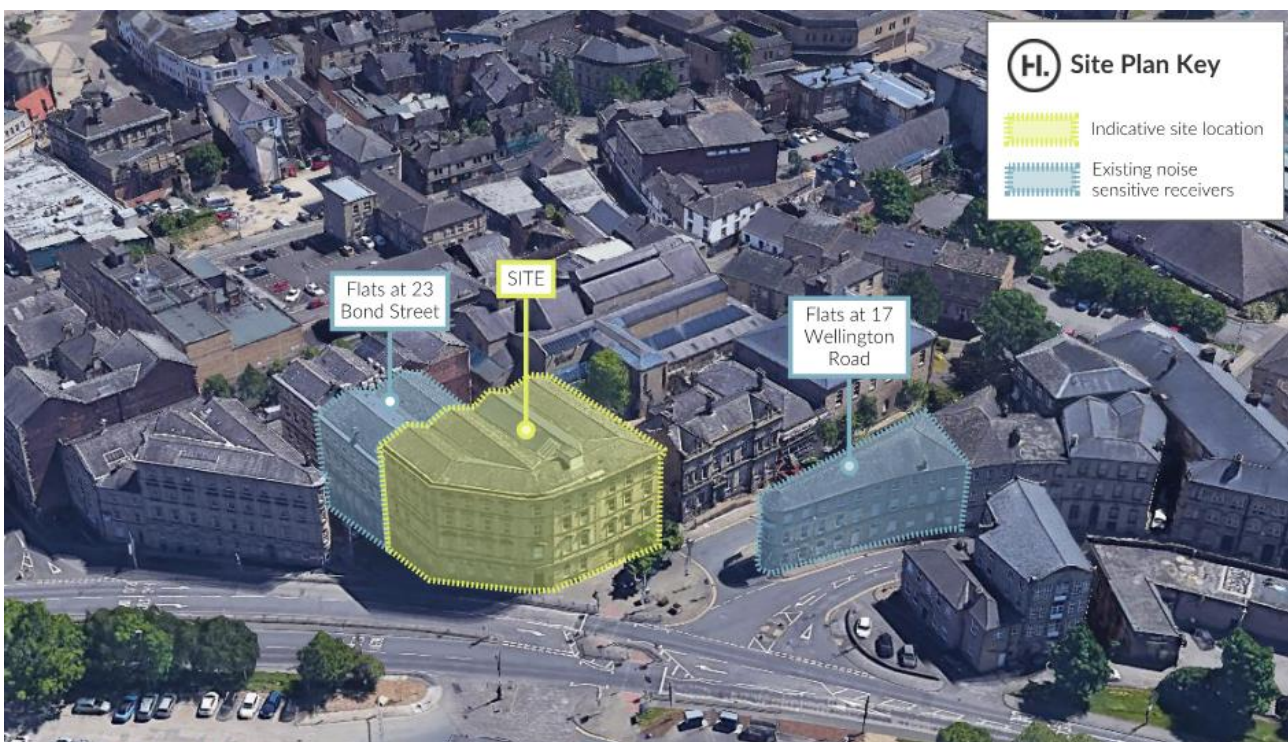


Figure 1 Annotated 3D rendered image showing development location and context (courtesy of Google Earth)

2.2 Surrounding area.

The site is located within a mixed commercial and residential area of Dewsbury. The nearest noise sensitive receivers have been identified as residential flats at 23 Bond Street, which directly bound the site to the east, and 17 Wellington Road approximately 15m to the south west. These are indicated by the areas shaded in blue in Figure 1.

2.3 Local noise climate.

The site is bounded by Dewsbury Ring Road to the north west, Bond Street to the north and Wellington Street to the south west. The train line through Dewsbury along with Dewsbury train station lie approximately 65m to the north west. The existing local noise climate is currently dominated by constant road traffic noise along Dewsbury Ring Road.

3. Acoustic criteria.

3.1 Kirklees Council requirements.

3.1.1 Plant noise egress.

It is understood that Kirklees Council does not state specific criteria for plant noise egress from new residential land use. Instead, the following criteria has been assumed from section 1 of the document *"Noise Design Advice (May 2007)"* relating to new industrial/commercial use near to residential use.

"Developers should carry out an assessment in accordance with BS 4142 to determine the rating level of the new development. It is recommended that during normal daytime hours (0700 to 2300 hours), the BS 4142 rating level, measured over 1 hour, should be 5dB below the background (L_{A90}). During the night-time period (2300 to 0700 hours), the BS 4142 rating level, measured over 5 minutes should be 5dB below the background (L_{A90})."

Therefore, the above shall form the basis of plant noise egress for the proposed development.

3.1.2 External noise ingress.

With regards to noise ingress for new residential land use near to transportation noise sources, the above referenced Kirklees Council guidance document refers to PPG24 and BS 8233:1999.

PPG24 was withdrawn by the Government in 2014, and BS8233 was updated in 2014. Therefore, the guidance within the latest version of the standard, BS 8233:2014, along with WHO guidelines shall form the basis of the external noise ingress assessment for the proposed development.

This corresponds with the levels presented in Appendix 1 of Kirklees Council's *"Noise Design Advice (May 2007)"* with minor deviations.

3.2 Standard guidance.

3.2.1 BS 4142:2014.

Noise egress from any plant and machinery associated with the development should not cause disturbance at nearby residential areas, therefore noise limits will be set in accordance with the guidance given in line with Kirklees Council requirements which refers to BS 4142:2014 'Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas'.

Further corrections should be applied if the plant noise contains tonal and/or impulsive characteristics. The magnitude of these corrections is dependent upon the subjective perceptibility of the tones/impulses present.

3.2.2 BS 8233:2014.

BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings'* provides guidance for control of noise in and around buildings. The British Standard advises appropriate criteria and limits for different situations including rooms for residential purposes. The advice for living accommodation (Table 4 of BS 8233:2014) is reproduced below in Table 1. These are desirable internal ambient noise levels for spaces when they are unoccupied. These values are based on the guidelines published by the WHO in *Guidelines for Community Noise*.

Table 1 BS8233 guideline indoor ambient noise levels for dwellings

Activity	Location	Daytime (07:00 to 23:00)	Night-time (23:00 to 07:00)
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

Supplementary Notes 2, 4 and 7 to Table 4 within BS 8233 are reproduced below for reference:

NOTE 2 The levels shown in Table 4 are based on the existing guidelines issued by the World Health Organization...

NOTE 4 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...

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above the WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable conditions still achieved.'

As no specific value is provided in BS 8233 for noise from individual events (see Note 4 above), it is common practice to consider the guidance from the World Health Organization 'Night noise guidelines for Europe'. The WHO document states that for a good night's sleep, a maximum sound level of L_{AFmax} 45 dB should not be exceeded more than 10-15 times per night.

With regards to external spaces such as gardens and patios, BS 8233 recommends that the external noise level in these areas does not exceed $L_{Aeq,T}$ 50 dB with a maximum guideline value of $L_{Aeq,T}$ 55 dB.

4. Environmental noise survey.

The environmental noise survey was carried out on site over a period of 5 days between 1 May 2019 and 13 May 2019. During this time, short-duration attended measurements and long-term unattended measurements were carried out. Full details of the method and equipment used, as well as weather information are provided in Appendix A.

The survey measurement positions and prevalent sound levels around the site are summarised in the annotated 3D rendered image presented in Figure 2. Positions A1 and A2 indicate the attended survey positions and position U1 indicates the unattended measurement position.

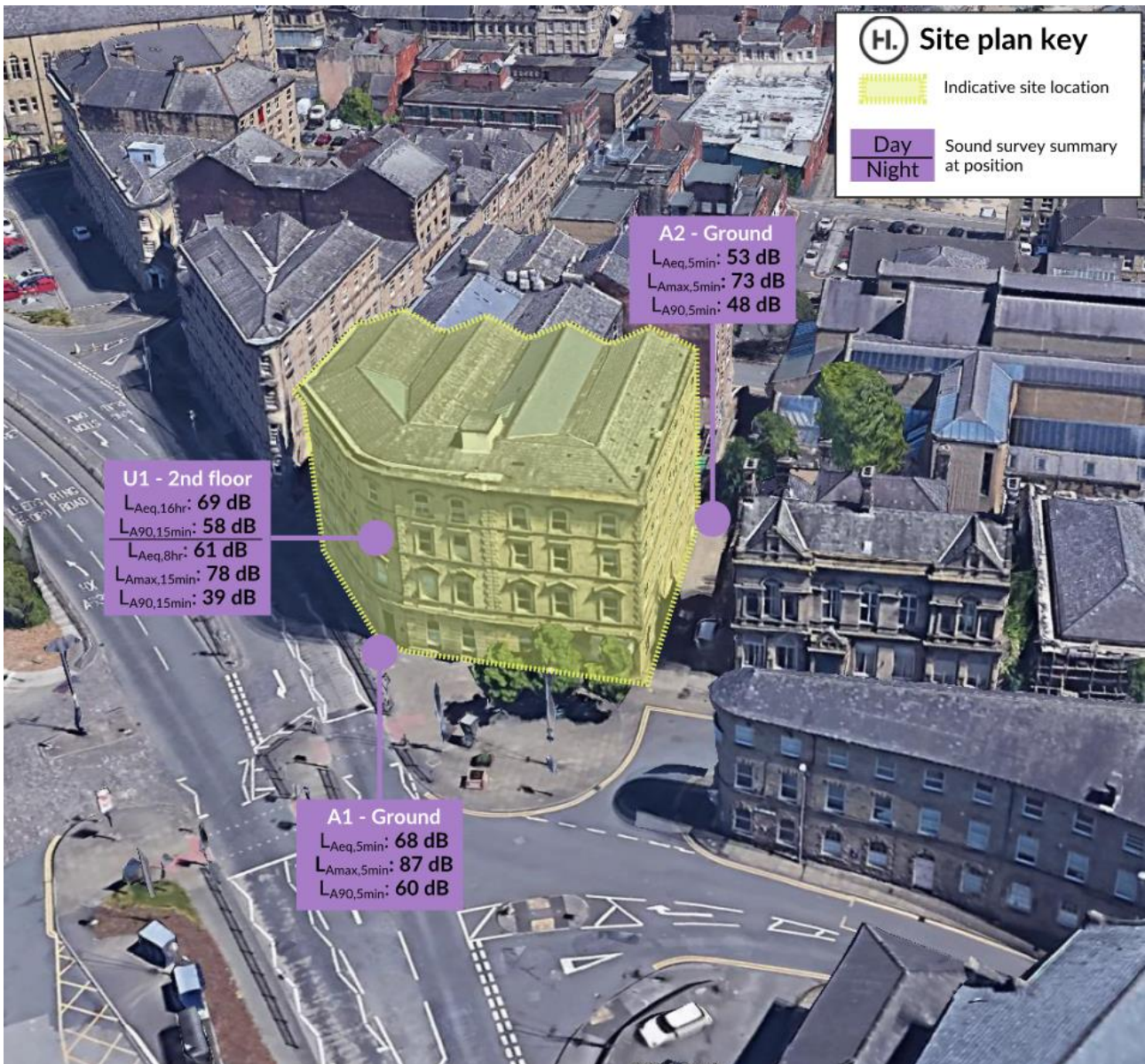


Figure 2 Annotated 3D rendered image indicating measurement positions and prevalent sound levels (courtesy of Google Earth)

4.1 Observations.

The dominant noise source on site was constant road traffic noise along Dewsbury Ring Road, with a high flow of HGVs noted. Other sources included intermittent contributions from the pelican crossing sounder system from Dewsbury train station across Dewsbury Ring Road, in addition to train passes along the railway line in the distance.

Other, less predominant noise sources included local network traffic along Bond Street, Wellington Road and Wellington Street as well as pedestrian noise along the site boundary to the north and west.

4.2 Attended measurement results.

The results of the attended measurements are summarised in Table 2 below, with reference to the measurement positions shown in Figure 2. The results of the attended measurements are considered façade levels.

Table 2 Summary of results obtained from attended sound survey

Measurement Position	Start Time	Measured sound levels (dB)			Notes
		L _{Aeq,5min}	L _{Amax,5min}	L _{A90,5min}	
A1	10:47	67	75	58	Road traffic noise along Dewsbury Ring Road dominant, train horn during pass-by
A1	10:52	67	79	59	As above
A1	10:57	67	79	59	As above
A1	11:02	69	87	61	As above but train horns now stop
A1	11:07	68	80	59	As above
A1	11:12	67	78	57	As above
A1	11:17	75	96	61	Maximum disregarded due to ambulance pass-by
A1	11:22	68	79	60	As previously, before ambulance pass-by
A1	11:27	68	80	62	As above
A1	11:32	69	83	62	As above
A1	11:37	68	79	60	As above
A1	11:42	67	76	61	As above
A2	11:57	53	67	48	Road traffic noise dominant although mostly screened, church bell tolls, this measurement not in sync with logger
A2	12:02	53	64	48	As above without church bell, measurements now synchronised with logger
A2	12:07	55	70	49	As above
A2	12:12	53	69	47	As above, short church bell ring
A2	12:17	53	65	47	As above without church bell
A2	12:22	54	73	48	As above
A2	12:27	52	68	47	As above, short church bell ring

4.3 Unattended measurement results.

The results of the unattended noise measurements are presented to follow. A graph showing the results from the unattended logging survey is provided in Appendix B. The ambient noise levels measured at position U1 are presented in Table 3.

Table 3 Ambient noise levels measured during unattended measurements

Date	Day time (07:00-23:00)	Night time (23:00 - 07:00)
	L _{Aeq,16hr} (dB)	L _{Aeq,8hr} (dB)
10/05/2019	69 ^[1]	61
11/05/2019	69	62
12/05/2019	68	60

^[1] – Measurement made over 13 hours from 10:15 until 23:00 but considered representative of the full daytime period, therefore included in the average

The average ambient sound levels measured during the unattended logging survey were L_{Aeq} 69 dB during the daytime period (07:00-23:00) and L_{Aeq} 61 dB during the night period (23:00-07:00).

The night time maximum sound level not normally exceeded at location U1 is considered to be L_{Amax,15min} 78 dB.

In line with BS 4142:2014, for the purpose of analysis and establishing representative background sound levels during the periods of interest, the background sound levels have been quantified using statistical analysis from the continuous logging measurements. These are presented in Appendix C.

From the analysis carried out, the representative background sound levels measured during the survey at position U1 were respectively L_{A90,15min} 58 dB during the daytime period, and L_{A90,15min} 39 dB during the night-time period.

5. Initial building envelope assessment.

5.1 Basis of external noise levels.

Based upon the results of the attended measurements at position A1 and A2 in Figure 2, measured spectra have been used to represent the worst-case levels anticipated at the facades with a line of sight to Dewsbury Ring Road as well as those that are acoustically screened. Due to the reduction in noise levels due to reduced traffic at night, only the daytime levels have been considered, as they will drive the façade requirements. The proposed apartments that are considered to be screened from the Ring Road are apartments 1.06, 1.07, 2.06, 2.07, 3.05, 3.06 and 3.07. All remaining apartments have been assumed to have at least partial direct line of sight to the road. The incident external noise spectra used in the initial building envelope assessment are presented in Table 4 for reference.

Table 4 Normalised L_{Zeq} octave band spectra used for façade sound insulation assessment

	Octave band centre-frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Facade unscreened from Dewsbury Ring Road, Sound pressure level, L _{Zeq} (dB)	74	71	68	66	65	61	54	46
Facade screened from Dewsbury Ring Road, Sound pressure level, L _{Zeq} (dB)	64	57	53	50	49	45	38	28

5.2 Note on existing glazing systems.

Whilst on site, the existing glazing systems were noted to be single glazed sash windows on wooden frames in varying conditions although most were noted to be in a poor condition with external noise break-in clearly audible through the frames, indicating poor sealing. It is understood that these are proposed to be replaced with new glazing systems, this has informed the assessment presented to follow.

5.3 Facades, glazing and ventilation.

An initial façade sound insulation assessment has been undertaken to give indicative performance parameters for the building envelope design. For the purposes of the calculations the following have formed the basis of the calculations:

- The existing solid elements of the building envelope have been assumed to be comprised of internally lined masonry or lightweight cladding system at this stage. For the purposes of determining the building envelope requirements, calculations have assumed a minimum sound insulation performance of at least R_w 51 dB for these elements and would need to be confirmed as the design progresses.
- Typical glazing extents have been taken from the proposed drawing packages dated 17/07/2018
- A worst-case volume of 56m³ for bedrooms 103m³ for living rooms, based on the proposed drawing packages dated 17/07/2018
- A ceiling height of 3.5 m has been assumed

During the daytime, external intrusive noise is to be limited to $L_{Aeq,16hr}$ 35 dB, and for night-time external intrusive noise is to be limited to $L_{Aeq,1hour}$ 30 dB. It is also considered that a maximum sound level of L_{AFmax} 45 dB should not be exceeded more than 15 times per night.

Partially open windows typically attenuate external noise by approximately 10 dB. Based upon the values measured during the noise survey presented in Table 2 and Table 3, this would lead to internal ambient noise levels of approximately 59 dB during the daytime and 51 dB during the night in rooms with facades that are unscreened from Dewsbury Ring Road. For screened facades levels of 43 dB can be expected during the daytime.

Therefore, open windows would not be expected to provide sufficient levels of sound reduction to comply with the above internal noise criteria. As such, alternative means of ventilation would be required to achieve background ventilation without resorting to openable windows, such as passive ventilation or full-house mechanical ventilation. Considering the above, the initial minimum recommended sound insulation performance requirements for the building envelope elements are presented in Table 5 below.

Table 5 Recommended performance of facade elements

Apartment facade	Room	Trickle ventilator	Glazing (including framing system)
Facade unscreened from Dewsbury Ring Road	Bedrooms and living rooms	$D_{ne,w}+C_{tr}$ 45 dB	R_w+C_{tr} 34 dB
Facade screened from Dewsbury Ring Road		$D_{ne,w}+C_{tr}$ 45 dB	R_w+C_{tr} 27 dB

The ventilator performances quoted have been determined on the assumption of one ventilator required per room and in the open position. This will need to be considered further as the design progresses. These performances could typically be achieved by high performance acoustic ventilators.

Standard thermal double glazing systems with the appropriate sound reduction ratings would be anticipated to meet the requirements along the rear elevations, with higher performance double glazing solutions required along the main elevations overlooking Dewsbury Ring Road. The recommended ratings should be achieved by the glazing system and includes the frames and associated window furniture.

The building envelope design should be reviewed in more detail as the design progresses.

6. Noise transfer between commercial and residential premises.

The adjacencies between the proposed A3 unit on the ground floor and adjacent residential units will need to be addressed to ensure a sufficient level of airborne sound insulation performance to protect residential amenity from commercial activity on the ground floor premises, including controlling flanking noise transfer. This will be progressed as the design develops but could be expected to comprise enhancements to the current floor construction as well as setting maximum permissible amplified music limits within the commercial unit.

7. Plant noise egress.

7.1 Basis of plant noise limits.

For the facades of the nearest noise sensitive receivers that have a line of sight to Dewsbury Ring Road, the background levels (L_{A90}) measured at the unattended logger position U1 as shown in Figure 2 have been considered representative. These have been used to specify plant noise limits for these facades.

Where a noise sensitive receiver façade is screened from Dewsbury Ring Road, during the daytime the background levels measured at attended position A2 have been used to specify plant noise egress limits. However, during the night-time, due to traffic flows reducing significantly, the levels measured at unattended logger position U1 have been deemed representative.

7.2 Plant noise limits.

Based on the criteria set out in Section 3.1 and the survey results, the cumulative maximum sound pressure levels for fixed plant, equipment and machinery associated with the development shall not exceed the levels presented in Table 6 at 1 m from the nearest noise sensitive premises.

Table 6 Maximum permissible sound pressure levels at 1m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1m from the nearest noise sensitive premises ($L_{Ar,T}$ dB) ^[1]	
	Elevations unscreened from Dewsbury Ring Road	Elevations screened from Dewsbury Ring Road
07:00 to 23:00 hours	53	43
23:00 to 07:00 hours	34	34

^[1] - If plant noise contains any tonal or impulsive characteristics, a further correction shall be applied to the levels set out above in accordance with BS4142:2014.

7.3 Attenuation measures.

At this stage, the design is not sufficiently advanced to specify specific attenuation measures and will need to be assessed in detail as the design progresses. However, all noise generating plant and equipment associated with the development will be designed to ensure that the noise egress limits specified above are achieved. The specific attenuation measures will depend on the type and location of the plant items but typical measures to be considered include in-duct attenuation, acoustic screening or enclosures, low noise equipment, acoustic lagging, and acoustically rated louvres.

8. Conclusion.

An environmental sound survey has been carried out at a site off Dewsbury Ring Road, Dewsbury, in order to assess its suitability for proposed residential development.

The noise survey has indicated that the internal noise level recommendations set out in BS8233 are able to be achieved with appropriately rated acoustic glazing and ventilation system.

Noise limits for plant items associate with the proposed development have been set in order to protect the amenity of the existing residents and those future occupants of the development.

Appendix A: Survey and equipment details.

Attended Measurements.

Attended noise measurements were carried out around the site on 1 May 2019; the measurement locations are indicated as Positions A1 and A2 in Figure 2.

Measurements were conducted over 5 minute periods with a Rion Sound Level Meter (SLM). The SLM was mounted on a tripod approximately 1.2m above ground level and at least 3 m from any other reflective surface. The microphone of the SLM was fitted with a windshield. The meter was calibrated before and after the survey and no significant drift was noted. A photograph of attended position A1 is presented in Figure A1.



Figure A1 Photograph of attended measurement position A1

Unattended Measurements.

Unattended noise measurements were carried out between 10:10hrs on 10 May 2019 and 12:25hrs on 13 May 2019.

The microphone was fitted with a windshield. The meter was calibrated before and after the survey and no significant drift was noted. A photograph showing the unattended monitoring position is presented in Figure A2 and the measurement location is indicated as position U1 in Figure 2.



Figure A2 Photograph of unattended measurement position U1

Equipment details.

Table B1 summarises the details of the equipment used during the environmental noise survey. All equipment used was within dates of calibration and calibration certificates are available on request.

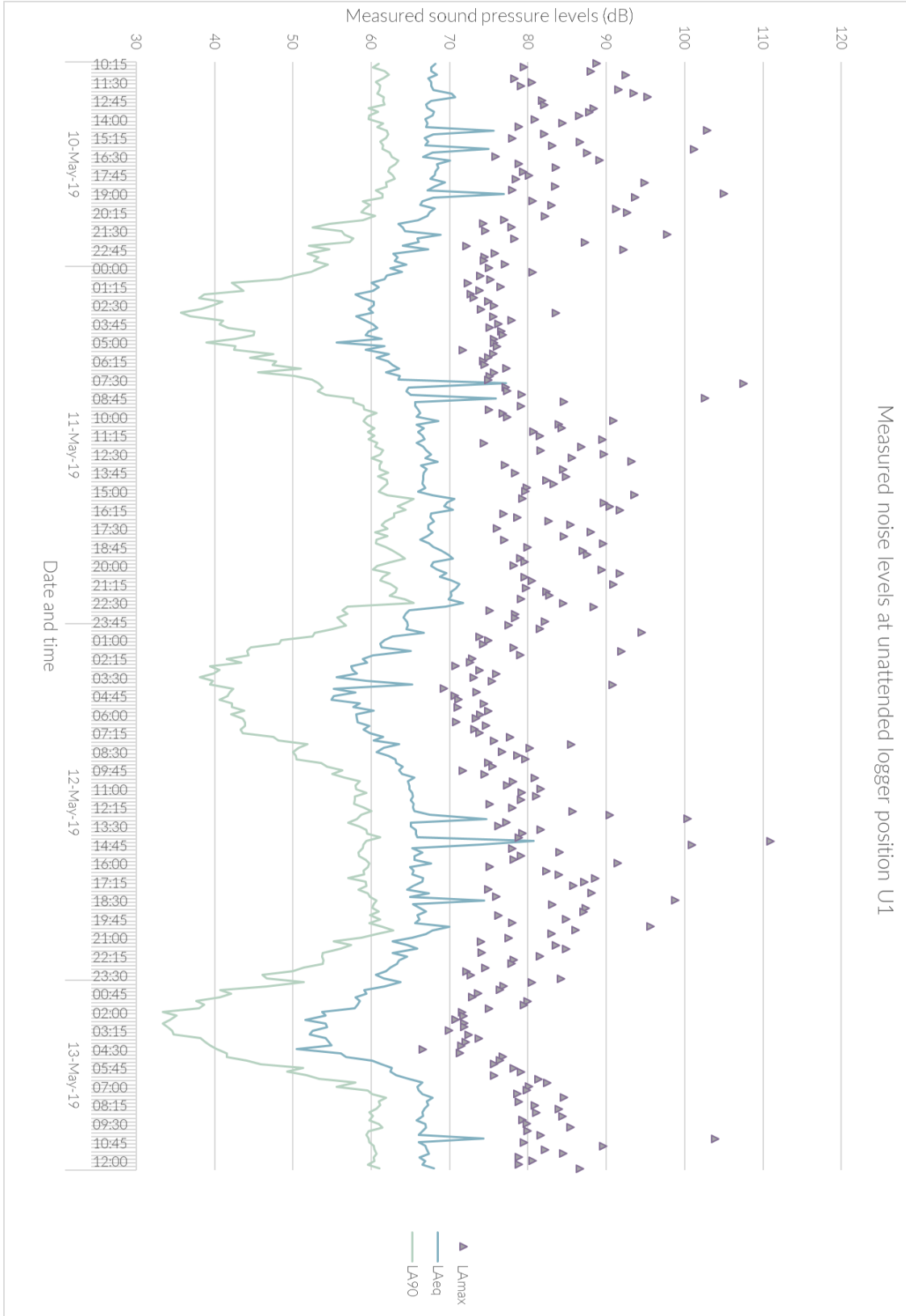
Table B1 Equipment used during environmental noise survey

Item	Description	Serial Number	Calibration Date
Attended Sound Level Meter	Rion - Sound Level Meter: NA-28 Rion - Microphone: UC-59 Rion - Pre-amplifier: NH-23	01260199 05710 60102	05/03/2018
Unattended Sound Level Meter	Rion - Sound Level Meter: NL-31 Rion - Microphone: UC-53A Rion - Pre-amplifier: NH-21	00610338 320324 36703	24/11/2017

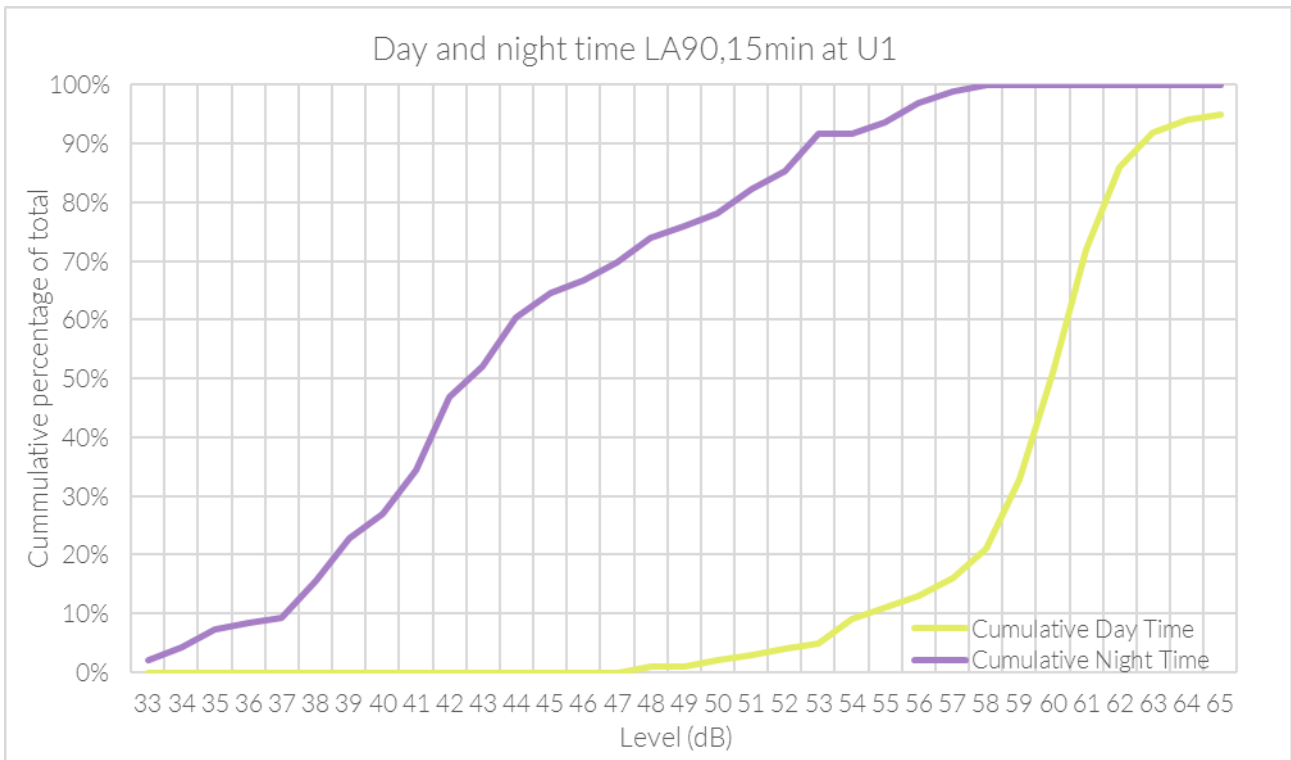
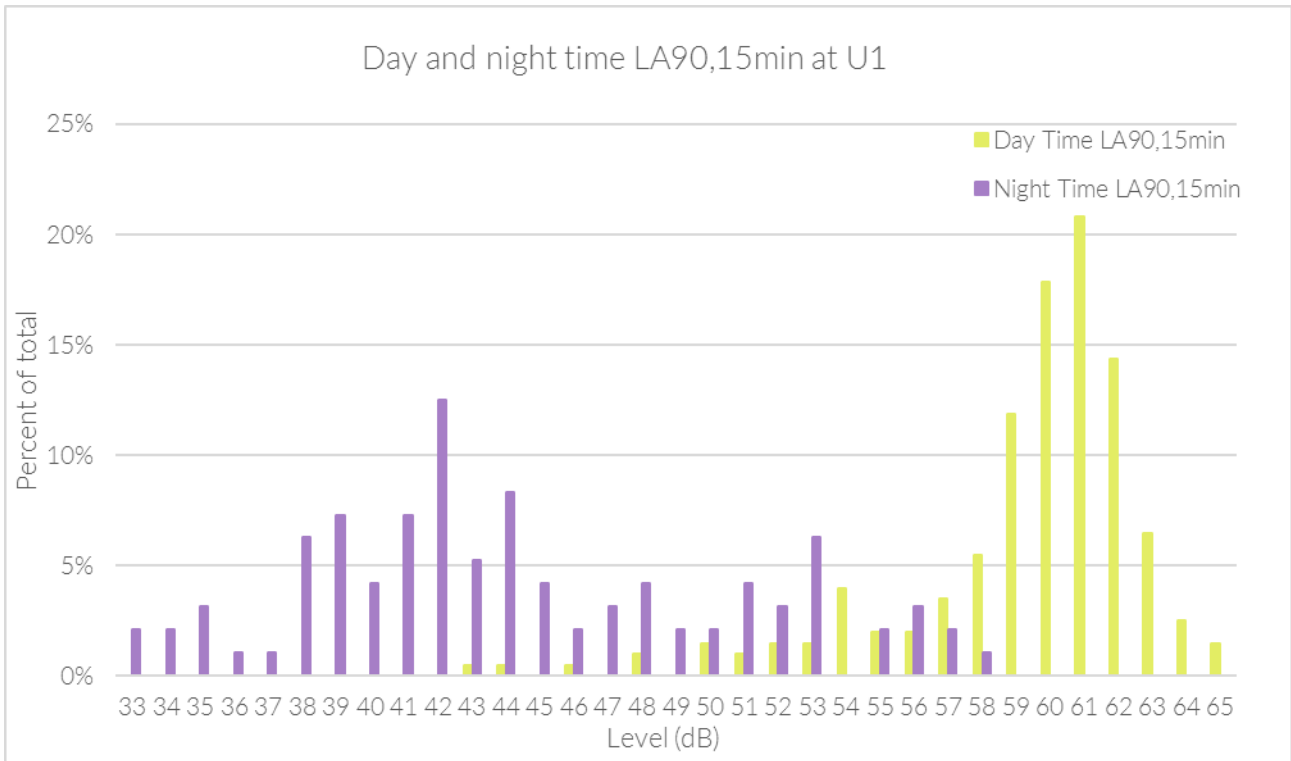
Weather information.

Weather reports for the area indicate that temperatures ranged between 3 °C to 17 °C. Wind speeds were consistently low across the measurement period and while most of the period remained dry, there were some scattered showers on Saturday 11 May 2019. This is not thought to have contributed adversely, therefore the measured data is considered suitable as being representative of typical conditions.

Appendix B: Time History of unattended measurements.



Appendix C: Statistical analysis of background sound levels.





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