

Orchard Works Spen Vale Street Heckmondwike

Acoustic Planning Report
1089/APR1

16 June 2023

For:

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1.0 Introduction

Lighthouse Acoustics has been appointed by Haslam Homes Ltd to undertake an environmental sound survey at Orchard Works, Spen Vale Street, Heckmondwike and to undertake a detailed sound assessment for the proposed development.

The proposed development comprises the change of use of the existing 1st floor office space to form 2No. residential flats.

The survey methodology, results and assessment for the proposed development are presented in this report.

2.0 Objectives

To establish the Local Authority's acoustic requirements for the proposed development.

To visit site to undertake a detailed environmental sound survey in order to establish existing environmental sound levels at the proposed development.

To undertake a detailed environmental sound assessment for the proposed residential flats to establish the acoustic specification for glazing/ventilation elements in order to achieve the acoustic requirements of the Local Authority.

3.0 Site Description

The proposed development is at Orchard Works, Spen Vale Street, Heckmondwike. The site comprises a 2 storey mid-terrace building with storage/refuse space at ground floor level and office space at 1st floor level.

The site is bound by Spen Vale Street to the north, adjoining commercial premises to the east, courtyard to the south and adjoining commercial premises to the west.

The site plan below indicates the extent of the site and the surrounding environment.



Site plan indicating the extent of the site and the surrounding environment

4.0 Local Authority Requirements

Kirklees Council has requested that a noise assessment is undertaken for the proposed development since the flats are proposed in a commercial location.

It is understood that Kirklees Council require that environmental sound should achieve the levels for internal areas as specified in BS 8233: 2014, "Guidance on sound insulation and noise reduction for buildings". These levels are presented in the table below.

Location	07:00 to 23:00	23:00 to 07:00
Living room	35dB LAeq,16hour	-
Dining Room	40dB LAeq,16hour	
Bedroom	35dB LAeq,16hour	30dB LAeq,8hour

In addition, BS 8233: 2014 states the following:

"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 LAmax,F, depending on the character and number of events per night."

Based on the above it is proposed that individual noise events should not normally exceed $L_{Amax,F}$ 45dB by more than 15 times in bedrooms during the night-time period (23:00 to 07:00 hours) as per The World Health Organisation document on "Guidelines for Community Noise".

5.0 Environmental Sound Survey

5.1 Measurements

The site was attended between 11:00 and 12:00 hours on Tuesday 30 May 2023 and between 12:00 and 13:00 hours on Wednesday 31 May 2023. During these periods, the location of the various sound sources was established.

Automated environmental sound measurements were undertaken from 12:00 hours on Tuesday 30 May 2023 to 12:00 hours on Wednesday 31 May 2023. During this period the L_{Amax} , L_{Aeq} and L_{A90} sound pressure levels were measured continuously over 15 minute periods along with the corresponding octave band sound pressure levels.

5.2 Weather Conditions

At the start of the survey period there was a gentle northerly breeze (<5m/s) and the sky was overcast. There was no rainfall and road surfaces were dry. The temperature was approximately 12°C.

At the end of the survey period there was a gentle northerly breeze (<5m/s) and the sky was scattered cloud. There was no rainfall and road surfaces were dry. The temperature was approximately 13°C.

Based on publicly available weather data for the survey period we understand that weather conditions remained similar for the duration of the survey with no significant periods of rainfall or strong breezes. The weather conditions during the survey period are therefore considered to be suitable for undertaking measurements of sound levels.

5.3 Measurement Positions

Environmental sound levels were measured at 2No. positions on-site as described in the table below.

Position	Description
A	Microphone at 1 st floor level at 1m from the north façade of the existing building overlooking Spen Vale Street.
B	Microphone at 1 st floor level at 1m from the south façade of the existing building overlooking the courtyard.

The measurement positions are shown on the site plan below.



Site plan showing measurement positions

The measurement positions were selected in order to assess typical environmental sound levels incident upon the front and rear facades of the proposed development.

5.4 Equipment

The following equipment was used to undertake the environmental sound survey.

Equipment	Manufacturer	Model	Serial No.	Calibration Date
Class 1 Sound Level Meter	Casella	633C	0721320	28/09/2021
Preamplifier	Casella	495	001414	28/09/2021
Microphone	Casella	251	1025	28/09/2021
Class 1 Sound Level Meter	Casella	633C	0721319	28/09/2021
Preamplifier	Casella	495	001446	28/09/2021
Microphone	Casella	251	1996	28/09/2021
Class 1 Sound Calibrator	Casella	120/1	3864878	27/10/2022
Environmental Noise Kit	Casella	6847	-	-
Microphone Extension Cable	Casella	C6717/5	-	-
Weather Protection System	Casella	6737	-	-

Field calibration checks were performed on the sound level meters prior to and on completion of the survey and were found to be within acceptable tolerance limits.

5.5 Results

5.5.1 Time History Graphs

The results of the environmental sound survey are presented on Time History Graphs 1089/THG1 and 1089/THG2 enclosed at the rear of the report. The presented results for Positions A and B have been corrected for reflections from the façade by subtracting 3dB from the measured sound levels in order to obtain free field sound levels.

5.5.2 $L_{Aeq,T}$ Ambient Sound Levels

In order to compare the results of the environmental sound survey with the internal BS 8233: 2014 levels it is necessary to convert the $L_{Aeq,15min}$ sound levels into single figure daytime $L_{Aeq,16hour}$ and night-time $L_{Aeq,8hour}$ sound levels. This has been calculated using the following formula:

$$L_{Aeq,T} = 10 \log_{10} \left(\frac{1}{N} \sum_i^N 10^{L_{Aeq,15min}^i/10} \right)$$

The calculated daytime $L_{Aeq,16hour}$ and night-time $L_{Aeq,8hour}$ sound levels at each measurement position are presented in the table below.

Position	Daytime $L_{Aeq,16hour}$ (dB)	Night-time $L_{Aeq,8hour}$ (dB)
A	53	48
B	61	59

The presented results for Positions A and B have been corrected for reflections from the façade by subtracting 3dB from the measured sound levels in order to obtain free field sound levels.

The corresponding daytime $L_{Aeq,16hour}$ and night-time $L_{Aeq,8hour}$ sound levels at each measurement position are presented in the table below.

Position	Period	L_{eq} Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
A	Daytime (16 hour)	59	54	53	48	49	45	40	35	53
	Night-time (8 hour)	55	49	47	42	43	43	37	29	48
B	Daytime (16 hour)	61	65	62	60	54	50	44	38	61
	Night-time (8 hour)	55	60	60	59	51	50	45	43	59

The presented results for Positions A and B have been corrected for reflections from the façade by subtracting 3dB from the measured sound levels in order to obtain free field sound levels.

5.5.3 $L_{Amax,F}$ Sound Level Events

The highest 15No. individual $L_{Amax,F}$ sound level events measured during the night-time period (23:00 to 07:00 hours) over the survey period at each measurement position are detailed in the table below along with the corresponding octave band sound pressure levels.

Position	$L_{max,F}$ Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
A	74	71	73	75	78	79	72	57	83
	83	74	74	75	78	79	72	58	83
	81	77	74	75	77	77	73	66	82
	84	77	74	70	79	78	66	52	82
	75	68	61	60	72	81	71	57	81
	80	78	84	81	73	70	69	53	80
	78	72	71	70	73	74	64	53	78
	81	74	74	69	73	72	68	63	76
	75	70	69	63	69	68	60	45	73
	78	67	66	63	67	69	61	50	73
	85	72	67	64	67	65	63	52	70
	82	75	73	69	66	63	64	51	70
	65	59	67	62	65	60	49	43	67
	77	64	64	60	63	59	51	42	65
	78	74	68	61	56	55	57	47	65

The presented results for Position A have been corrected for reflections from the façade by subtracting 3dB from the measured sound levels in order to obtain free field sound levels.

Position	$L_{max,F}$ Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
B	72	72	69	77	71	75	83	79	84
	66	72	74	70	61	67	80	80	81
	66	71	69	72	81	75	64	64	80
	66	71	68	75	80	72	67	69	80
	66	72	70	68	76	72	70	61	77
	65	72	71	71	75	68	72	65	76
	67	72	70	74	77	71	57	47	75
	72	76	70	72	72	74	67	68	74
	82	74	71	72	68	72	72	59	73
	75	73	73	72	71	69	65	54	73
	77	77	74	73	70	71	70	58	72
	66	72	69	69	67	72	67	70	72
	66	72	75	71	65	69	61	59	72
	66	72	70	69	62	70	54	49	71
	66	72	70	69	61	69	64	63	71

The presented results for Position B have been corrected for reflections from the façade by subtracting 3dB from the measured sound levels in order to obtain free field sound levels.

5.5.4 $L_{A90,T}$ Background Sound Levels

The lowest representative daytime and night-time $L_{A90,15min}$ background sound levels measured at each position during the survey period are detailed in the table below.

Position	Lowest Representative $L_{A90,15min}$ Background Sound Levels (dB)	
	Daytime	Night-time
A	44	38
B	52	51

The presented results for Positions A and B have been corrected for reflections from the façade by subtracting 3dB from the measured sound levels in order to obtain free field sound levels.

5.6 Discussion of Sound Climate

At the start and end of the survey period the dominant sound sources at Position A were noted to be occasional road traffic along Spen Vale Street and distant road traffic from the surrounding road network.

At the start and end of the survey period the dominant sound source at Position B was noted to be commercial sound from adjacent commercial units.

The impact of commercial sound from adjacent commercial units can be seen on Time History Graph 1104/THG2 with sound levels consistently higher than those on Time History Graph 1104/THG1.

Whilst we are unable to comment on dominant sound sources or individual sound events during the survey period, based on the surrounding environment it is likely that road traffic and commercial sound remained the dominant sound sources.

6.0 Detailed Sound Assessment

6.1 Assessment Method

In order to establish the acoustic specification for glazing/ventilation elements required to achieve the internal daytime $L_{Aeq,16hour}$, night-time $L_{Aeq,8hour}$ and night-time $L_{Amax,F}$ requirements an assessment has been undertaken in accordance with the more rigorous calculation method detailed in BS 8233:2014, "Guidance on sound insulation and noise reduction for buildings".

This calculation method takes into account the external sound pressure level, the sound reduction indices of the façade elements, the area of the facade and the absorption within the room at octave band centre frequencies.

Detailed calculation sheets for living rooms, dining rooms and bedrooms are enclosed at the rear of the report.

6.2 Proposed Development

The assessment has been based on the following drawings.

Author	Drawing No.	Revision	Date
JGD Architecture and Design	(22114)14	-	Dec 22
	(22114)15	-	Dec 22

The proposals include the change of use of the existing 1st floor office space to form 2No. residential flats.

6.3 Acoustic Requirements

The proposed residential apartments comprise living room/kitchen and bedroom spaces. Based on the requirements of the Local Authority detailed in Section 4.0, the following internal sound limits have been assessed to.

Room Type	07:00 to 23:00	23:00 to 07:00
Living Room/Kitchen	35dB LAeq,16hour	-
Bedroom	35dB LAeq,16hour	30dB LAeq,8hour 45dB LAmax*

* should not be exceeded more than 15 times per night.

6.4 Room Assumptions

The following typical dimensions and finishes/furnishings have been assumed for the purpose of the assessment.

Room Type	Typical Room Dimensions	Typical Window Area	Typical Room Finishes / Furnishings
Living Room/ Kitchen	5m x 4m x 2.4m	4m ²	Wood/vinyl floor, curtains, sofa, table, chairs
Bedroom	4m x 3m x 2.4m	4m ²	Carpet & underlay, curtains, bed

Should the proposed dimensions/finishes/furnishings differ from those detailed above a re-assessment may be required.

6.5 Construction Proposals

It is understood that the existing external walls and roof that will form the proposed dwellings will comprise the following constructions.

Element	Typical Construction
External Walls	Masonry with cavity, insulation and internal plasterboard lining
Roof	Tiles with insulation in void and 2No. layers internal plasterboard lining

The following typical Sound Reduction Indices have been assumed for the various elements.

Element	Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
External Walls	32	40	44	45	51	56	56	56
Roof	20	35	50	50	50	50	50	50

6.6 Glazing Specifications

In order to achieve the internal daytime and night-time requirements the glazing system as a whole including glass, frame, seals and openings shall provide the following minimum sound insulation performance when tested in accordance with BS EN ISO 10140-2: 2010.

Facade	Room Type	Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Front (Spen Vale Street)	Bedroom	23	27	29	36	41	42	52	56
Rear	Living Room/ Kitchen	23	27	29	36	41	42	52	56

The table below presents typical configurations and R_w sound insulation values which may be expected to achieve the sound insulation performance specified above.

Facade	Room Type	Typical R_w Sound Insulation Value (dB)	Typical Configuration
Front (Spen Vale Street)	Bedroom	40	10mm/16mm/6.4mm
Rear	Living Room/ Kitchen	40	10mm/16mm/6.4mm

*Secondary glazing is also a potential option if preferred.

Acoustic test data for the proposed glazing systems should be forwarded for review.

6.7 Ventilation Provision

6.7.1 Background Ventilation

In order to achieve the internal daytime and night-time requirements openable windows must remain closed. Background ventilation shall therefore be provided by ventilators in the building façade and shall provide the following minimum element normalised level differences in the open position when tested in accordance with BS EN ISO 10140-2: 2010.

Facade	Room Type	Element Normalised Level Difference, $D_{n,e}$ (dB) in Open Position at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Front (Spen Vale Street)	Bedroom	27	33	39	39	43	50	50	50
Rear	Living Room/ Kitchen	27	33	39	39	43	50	50	50

Should more than one ventilator be required per room the above element normalised level differences shall be increased by the following values:

Number of Ventilators Required Per Room	Additional Performance Required Per Ventilator (dB)
1	0
2	+3
3	+5
4	+6

The table below presents typical configurations and $D_{n,e,w}$ sound insulation values which may be expected to achieve the sound insulation performance specified above.

Facade	Room Type	Typical Open $D_{n,e,w}$ Sound Insulation Value (dB)	Typical Configuration
Front (Open Vale Street)	Bedroom	40	Acoustic Window Ventilator (e.g. Greenwood EAR42W)
Rear	Living Room/ Kitchen	40	Acoustic Window Ventilator (e.g. Greenwood EAR42W)

Should acoustically treated mechanical ventilation be considered to provide continuous background ventilation, the system should achieve noise levels of $L_{Aeq} \leq 30$ dB in living rooms and bedrooms and $L_{Aeq} \leq 35$ dB in kitchens and bathrooms where providing continuous background ventilation.

A ventilation engineer should be consulted to ensure that a suitable system is proposed that satisfies the requirements of Approved Document F, "Ventilation". Acoustic test data for the proposed ventilators (or other means) should be forwarded for review acoustically.

6.7.2 Summer Cooling Ventilation

In addition to background ventilation, summer cooling ventilation is required in order to minimize the need for occupants to open windows during hot summer days/nights.

In order to provide this, mechanical ventilation featuring a user controllable 'boost' function which delivers increased air flow at the occupants discretion (or other means) should be considered. Where providing continuous background ventilation also, the system should achieve noise levels of $L_{Aeq} \leq 30$ dB in living rooms and bedrooms and $L_{Aeq} \leq 35$ dB in dining rooms, kitchens and bathrooms.

A ventilation engineer should be consulted to ensure that a suitable system is proposed that satisfies the requirements of Approved Document O, "Overheating". Detailed proposals should be forwarded for review acoustically.

6.7.3 Purge Ventilation

Purge ventilation (to aid removal of high concentrations of pollutants and water vapour released from occasional activities such as painting and decorating or accidental releases such as smoke from burnt food or spillage of water) may be provided via openable windows at the occupants discretion. As such, the internal daytime and night-time requirements may potentially be exceeded during purge ventilation conditions.

A ventilation engineer should be consulted to ensure that a suitable system is proposed that satisfies the requirements of Approved Document F, "Ventilation". Detailed proposals should be forwarded for review acoustically.

7.0 Mechanical Ventilation

Proposals for the mechanical ventilation systems are not known at this stage of the development. As such, it is not possible to assess atmospheric sound emissions from the proposed mechanical ventilation systems to the nearest noise sensitive receptors.

Once details for the proposed mechanical ventilation systems are known, an assessment of atmospheric sound emissions from the proposed mechanical ventilation systems to the nearest noise sensitive receptors should be undertaken. This will determine whether any attenuation measures are required in order to achieve the acoustic requirements of the Local Authority.

The assessment should be undertaken in accordance with BS 4142:2014 and be assessed against the lowest representative daytime and night-time $L_{A90,15min}$ background sound levels measured at each position during the survey period as detailed in the table below.

Nearest Noise Sensitive Receptor	Lowest Representative $L_{A90,15min}$ Background Sound Levels (dB)	
	Daytime	Night-time
Front (Spen Vale Street)	44	38
Rear	52	51

8.0 Conclusions

The Local Authority's acoustic requirements for the proposed development have been established.

A detailed environmental sound survey has been undertaken in order to establish existing environmental sound levels at the proposed development.

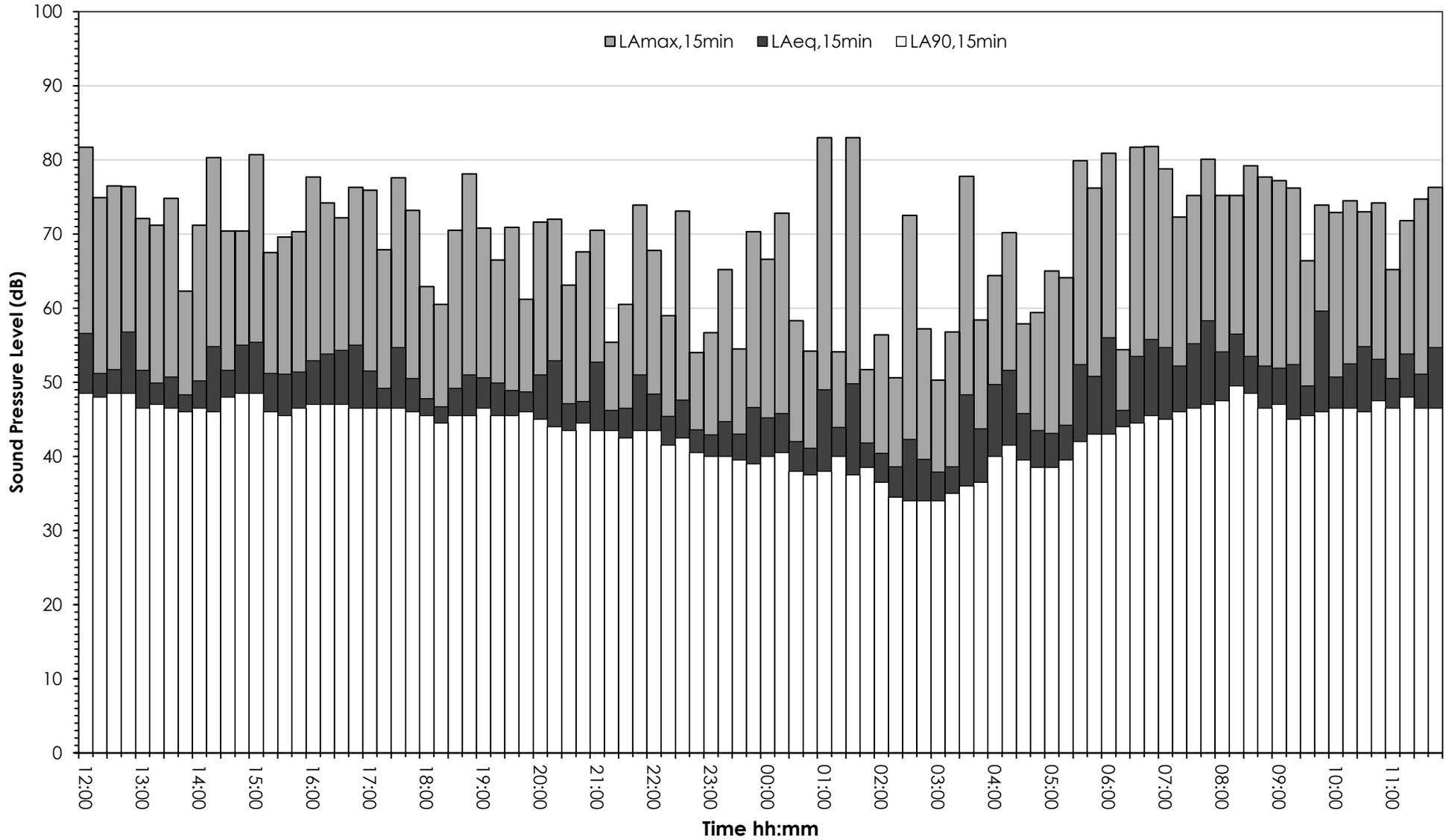
A detailed environmental sound assessment for the proposed residential element of the development has been undertaken and acoustic specifications for glazing/ventilation elements have been provided in order to achieve the requirements of the Local Authority.

Representative background sound levels have been proposed at the nearest noise sensitive receptors for subsequent use in assessing atmospheric sound emissions from mechanical ventilation systems in order to comply with the acoustic requirements of the Local Authority.

KODIN WOOD
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Orchard Works, Spen Vale Street, Heckmondwike Time History Graph - Tuesday 30 May 2023 to Wednesday 31 May 2023

$L_{Amax,15min}$, $L_{Aeq,15min}$ & $L_{A90,15min}$ Noise Levels at Position A



Orchard Works, Spen Vale Street, Heckmondwike Time History Graph - Tuesday 30 May 2023 to Wednesday 31 May 2023

$L_{Amax,15min}$, $L_{Aeq,15min}$ & $L_{A90,15min}$ Noise Levels at Position B

