

Hermitage Park Lepton

Acoustic Planning Report
0752/APR1
Revision 2

30 September 2022

For:

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0752/APR1 Revision 2

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1.0 Introduction

Lighthouse Acoustics has been appointed by KCS Development Ltd to undertake an environmental sound survey at the existing greenfield site at Hermitage Park, Lepton and to undertake a detailed sound assessment for the proposed residential development.

The survey methodology, results and assessments are presented in this report.

2.0 Objectives

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

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

To produce a detailed sound map of the proposed site layout based on information received from the developer/architect and the results of the environmental sound survey and to undertake a detailed sound assessment to establish the acoustic specification for glazing/ventilation/screening elements required across the proposed development in order to achieve the acoustic requirements of the Local Authority.

3.0 Site Description

The proposed development is situated at the existing greenfield site at Hermitage Park, Lepton.

The site is bound by existing residential properties to the north, woodland to the east, woodland and fields to the south and fields and existing residential properties to the west.

Rowley Lane Junior Infant and Nursey School is situated approximately 100m to the north of the site. Rowley Lane (B6433) is situated approximately 30m to the north of the site whilst Penistone Road (A629) is situated approximately 500m to the west of the site. Reliance Precision manufacturing unit is situated at Rowley Mills approximately 400m to the south west of the site on Penistone Road.

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

The Pollution & Noise Control Officer at Kirklees Council has been contacted to discuss their acoustic requirements for the proposed development.

They have confirmed that environmental sound should achieve the levels for internal and external 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
External amenity space (gardens, patios, balconies)	55dB LAeq,16hour	-

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 $L_{Amax,F}$, 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

Automated environmental sound measurements were undertaken from 14:00 hours on Wednesday 28 September 2020 to 14:00 hours on Thursday 29 September 2020. 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 westerly breeze (<5m/s) and the sky was scattered cloud. There was no rainfall and road surfaces were dry. The temperature was approximately 13°C.

At the end of the survey period there was a gentle north westerly breeze (<5m/s) and the sky was scattered cloud. There was no rainfall and road surfaces were dry. The temperature was approximately 15°C.

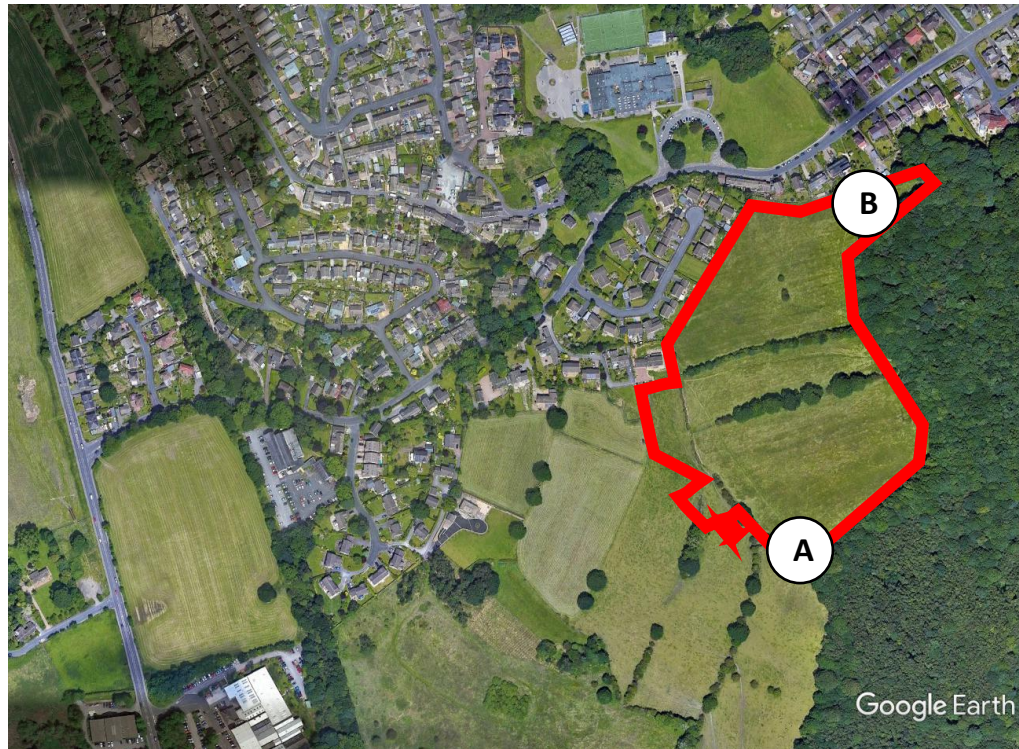
Based on publicly available weather data for the survey period it is understood that weather conditions remained similar for the duration of the survey with no significant periods of rainfall or strong breezes. The weather conditions during the survey period are therefore considered to be suitable for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

5.3 Measurement Positions

Environmental sound levels were measured at two positions on-site as described in the table below.

Position	Description
A	Microphone situated towards the north of the site at 1.5m above ground level in free field conditions.
B	Microphone situated towards the south of the site at 1.5m above ground level in free field conditions.

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 at the site.

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	25/09/2019
Preamplifier	Casella	495	001414	25/09/2019
Microphone	Casella	251	1025	25/09/2019
Class 1 Sound Level Meter	Casella	633C	0721319	25/09/2019
Preamplifier	Casella	495	001446	25/09/2019
Microphone	Casella	251	1996	25/09/2019
Class 1 Sound Calibrator	Casella	120/1	3864878	15/11/2019
Environmental Noise Kits	Casella	6847	-	-
Microphone Extension Cables	Casella	C6717/5	-	-
Weather Protection Systems	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 0752/THG1 and 0752/THG2 enclosed at the rear of the report.

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

In order to compare the results of the environmental sound survey with the internal noise limits 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	45	40
B	47	40

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

Position	Period	Leq Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
A	Daytime (16 hour)	51	45	38	42	43	29	22	24	45
	Night-time (8 hour)	44	35	32	37	38	22	15	21	40
B	Daytime (16 hour)	52	43	39	42	45	33	26	20	47
	Night-time (8 hour)	45	36	35	37	38	23	19	17	40

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 position are presented 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	60	63	61	61	56	41	38	34	60
	58	53	53	56	56	44	41	60	59
	59	46	45	50	55	44	52	48	56
	60	49	49	53	54	44	40	31	54
	58	46	48	48	52	42	50	45	54
	46	36	38	45	52	43	40	34	53
	60	55	52	50	52	38	31	24	53
	58	46	48	51	50	36	31	29	52
	48	40	40	49	50	35	33	29	51
	53	45	43	48	50	35	34	37	51
	53	42	37	44	50	31	25	27	50
	52	41	43	46	49	33	33	32	50
	51	44	43	45	49	38	38	32	50
	53	40	36	46	49	33	36	32	50
	50	42	39	48	48	41	40	32	49

Position	L _{max,F} Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
B	61	65	62	63	59	41	29	28	62
	67	54	56	62	55	52	47	40	60
	69	57	47	52	51	49	58	54	59
	66	50	47	52	55	45	36	27	56
	64	53	52	54	51	40	32	27	53
	55	39	38	51	51	34	26	24	53
	52	45	47	47	52	37	31	28	52
	53	42	46	49	50	42	40	38	52
	58	43	45	49	52	36	29	24	52
	46	39	36	41	47	41	47	43	52
	54	47	43	48	52	34	30	28	52
	58	50	56	52	50	35	34	27	52
	50	42	36	44	51	36	27	19	51
	60	48	48	52	49	41	39	31	51
	57	43	44	43	50	36	32	30	51

5.5.4 LA₉₀ Background Sound Levels

The lowest representative daytime and night-time LA_{90,15min} background sound levels measured during the survey period are detailed in the table below.

Position	Lowest Representative LA _{90,15min} Background Sound Levels (dB)	
	Daytime (07:00–23:00)	Night-time (23:00–07:00)
A	37	26
B	38	26

The above levels may be used in subsequent assessments of any proposed building services sound in order to comply with the acoustic requirements of the Local Authority.

5.6 Discussion of Sound Climate

At the start and end of the survey period the dominant sound source at Position A was noted to be road traffic from the distant Penistone Road (A629) to the west of the site. Birdsong also contributed towards the measured sound climate.

At the start and end of the survey period the dominant sound source at Position B was noted to be frequent road traffic along Rowley Lane (B6433). During lulls of passing road traffic, road traffic from the distant Penistone Road (A629) to the west of the site contributed towards the measured sound climate along with playground noise from Rowley Lane Junior Infant and Nursey School to the north of the site and birdsong.

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 from the surrounding road network remained the dominant sound source.

6.0 Detailed Sound Assessment

6.1 Assessment Method

In order to assess environmental sound levels across the proposed residential development a three dimensional model of the site has been constructed using SoundPLAN sound mapping software.

The software uses the measured sound data to predict how environmental sound from the surrounding transportation sound sources radiates across the site returning a colour contour map showing the variations in sound levels.

The calculation method used by the software takes into account acoustic corrections such as distance propagation, ground absorption, reflections and screening.

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.

6.2 Proposed Site Layout

The assessment has been based on the following site layout drawing.

Author	Drawing No.	Revision	Date
Niemen Architects	3284-0-002	U	12.09.22

The proposals include the construction of 80No. new build houses.

6.3 Acoustic Requirements

The proposed houses comprise living room/dining room/kitchen and bedroom internal spaces along with rear garden external spaces.

Based on the requirements of the Local Authority detailed in Section 4.0, the following internal and external sound limits have been assessed to.

Location	07:00 to 23:00	23:00 to 07:00
Living Room	35dB LAeq,16hour	-
Dining Room/Kitchen	40dB LAeq,16hour	-
Bedroom	35dB LAeq,16hour	30dB LAeq,8hour 45dB LAmax,F*
Rear Garden	55dB LAeq,16hour	-

* should not be exceeded more than 10-15 times per night as per The World Health Organisation document on "Guidelines for Community Noise".

6.4 Construction Proposals

It is understood that the external walls and roof of the buildings will comprise the following typical constructions.

Element	Typical Construction
External Walls	Brickwork with cavity, insulation and internal plasterboard lining
Roof	Tiled with insulation in loft and plasterboard ceiling

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	28	34	40	45	49	49	49

6.5 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 Dimensions	Typical Room Finishes / Furnishings
Living Room	4m x 5m x 2.4m	5m ²	Carpet, curtains, sofa
Dining Room / Kitchen	4m x 5m x 2.4m	5m ²	Hard floor, curtains, table chairs
Bedroom	3m x 4m x 2.4m	2m ²	Carpet, curtains, bed

6.6 Ventilation Provision

6.6.1 Background Ventilation

In order to achieve the internal daytime and night-time requirements openable windows must remain closed in Façade Zones A and B. Background ventilation may therefore be provided by ventilators in the building façade (or other means) 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.

Façade Zone	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
A	31	34	38	43	42	34	36	38
B	31	34	39	34	41	31	33	35
C	N/A Partially Open Windows Acceptable*							

* Based on a minimum 10dB sound reduction for a partially open window.

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.

Façade Zone	Typical Open $D_{n,e,w}$ Sound Insulation Value (dB)	Typical Configuration
A	40	Acoustic Window Ventilators (e.g. Greenwood EAR42W)
B	35	Standard Window Ventilators
C	N/A Partially Open Windows Acceptable*	

* Based on a minimum 10dB sound reduction for a partially open window.

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.

Facade Zones A, B and C are indicated on the following sound maps for daytime and night-time periods at both ground floor (2.5m) and 1st floor (5.0m) heights.

6.6.2 Summer Cooling Ventilation

In addition to background ventilation it is understood that Kirklees Council require summer cooling ventilation in order to minimise 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 for Façade Zones A and B.

Where providing continuous background ventilation also, the system should achieve noise levels of $L_{Aeq} \leq 30\text{dB}$ in living rooms and bedrooms and $L_{Aeq} \leq 35\text{dB}$ 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.

6.6.3 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.

6.7 Glazing Specifications

In order to achieve the internal daytime and night-time requirements the glazing/external door 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 Zone	Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
A	20	24	20	25	34	37	35	39
B	20	24	20	25	34	37	35	39
C	20	24	20	25	34	37	35	39

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

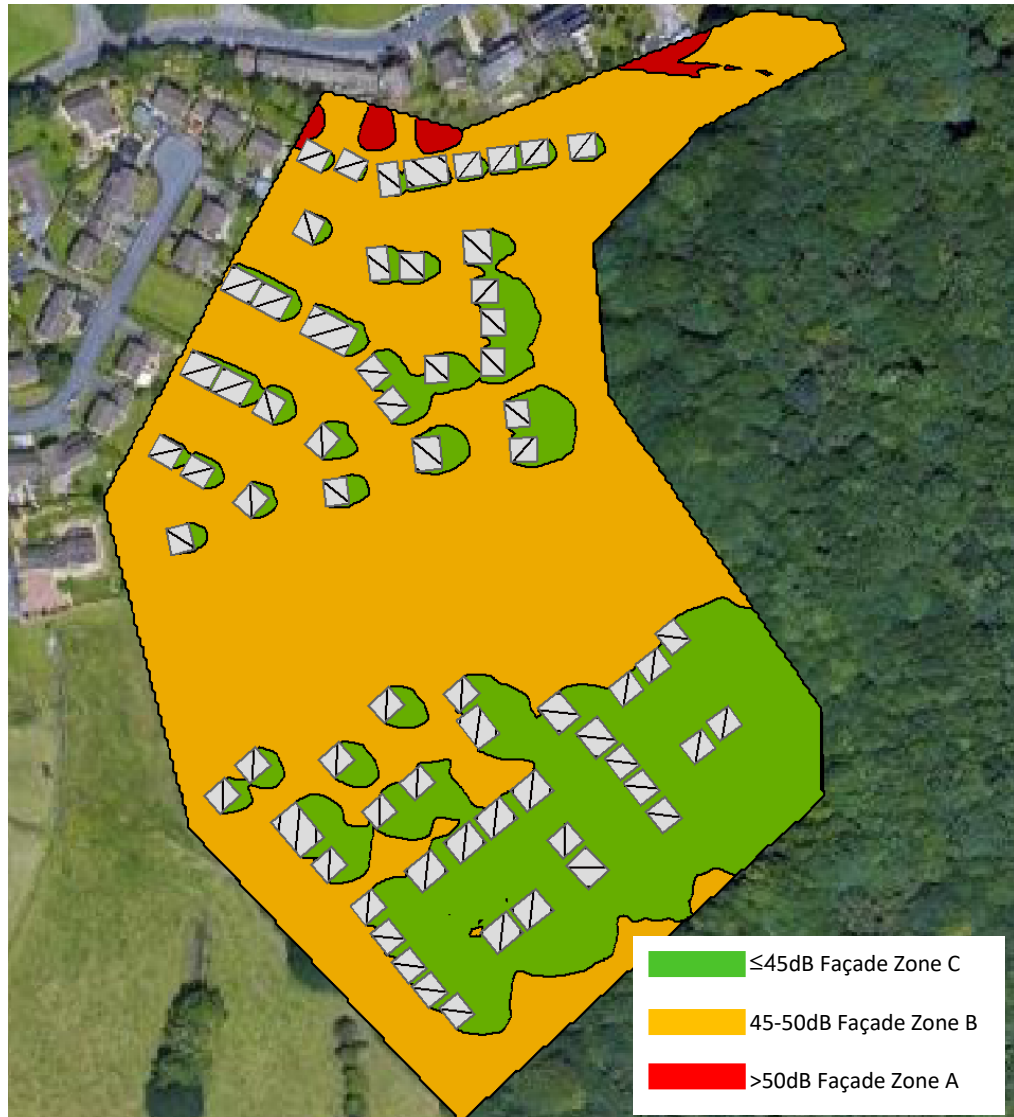
Facade Zone	Typical R_w Sound Insulation Value (dB)	Typical Configuration
A	30	6mm/16mm/4mm
B	30	6mm/16mm/4mm
C	30	6mm/16mm/4mm

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

Facade Zones A, B and C are indicated on the following sound maps for daytime and night-time periods at both ground floor (2.5m) and 1st floor (5.0m) heights.

6.8 Internal Daytime Requirements

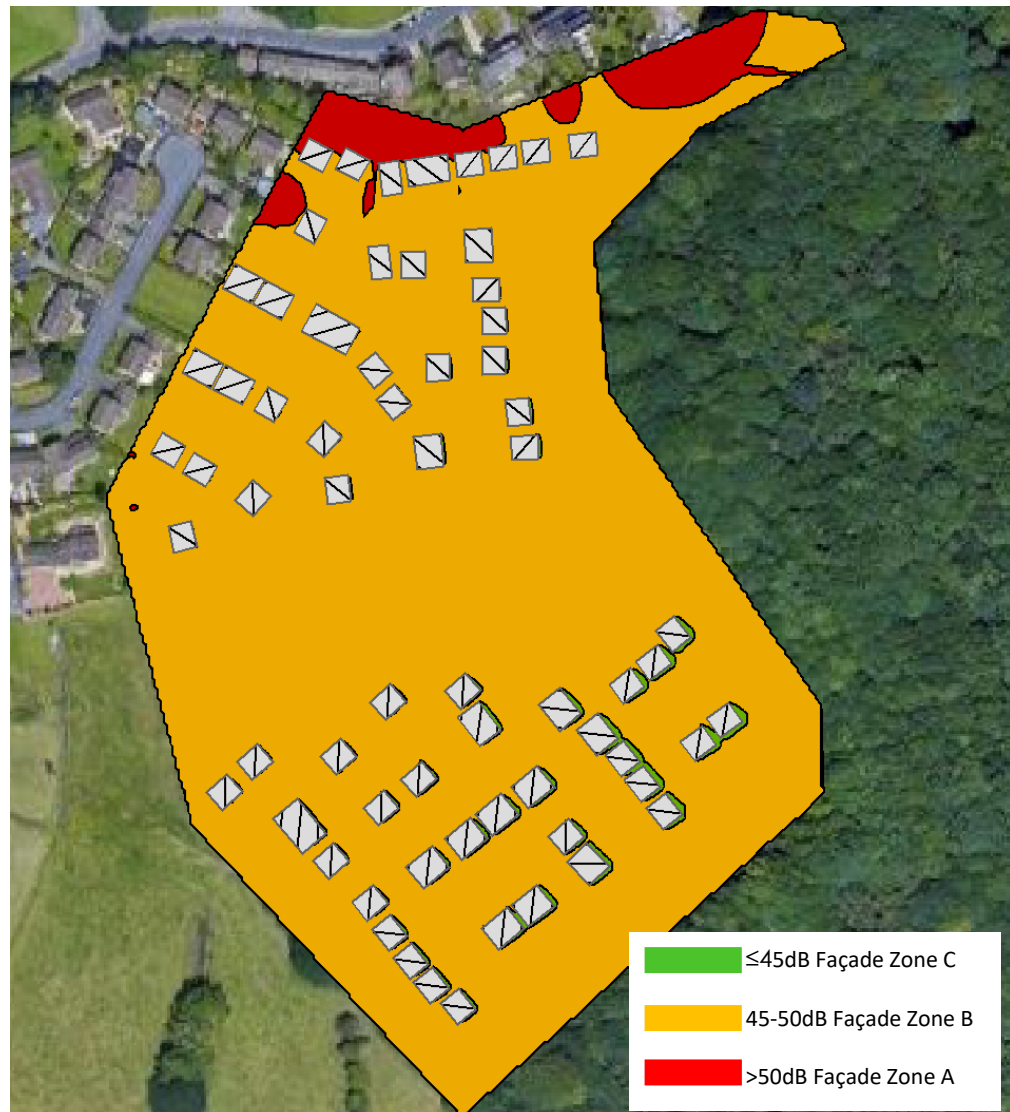
The sound map below indicates the external daytime $L_{Aeq,16hour}$ environmental sound levels across the proposed site at Ground floor level (2.5m) and the Façade Zones required in order to achieve the internal daytime requirements.



Sound map indicating the external daytime $L_{Aeq,16hour}$ environmental sound levels at Ground floor level (2.5m)

As can be seen, the vast majority of the site should fall within Façade Zones B and C at Ground floor level. Only facades to the north of the site are likely to fall within Façade Zone A.

The sound map below indicates the external daytime $L_{Aeq,16hour}$ environmental sound levels across the proposed site at 1st floor level (5.0m) and the Façade Zones required in order to achieve the internal daytime requirements.

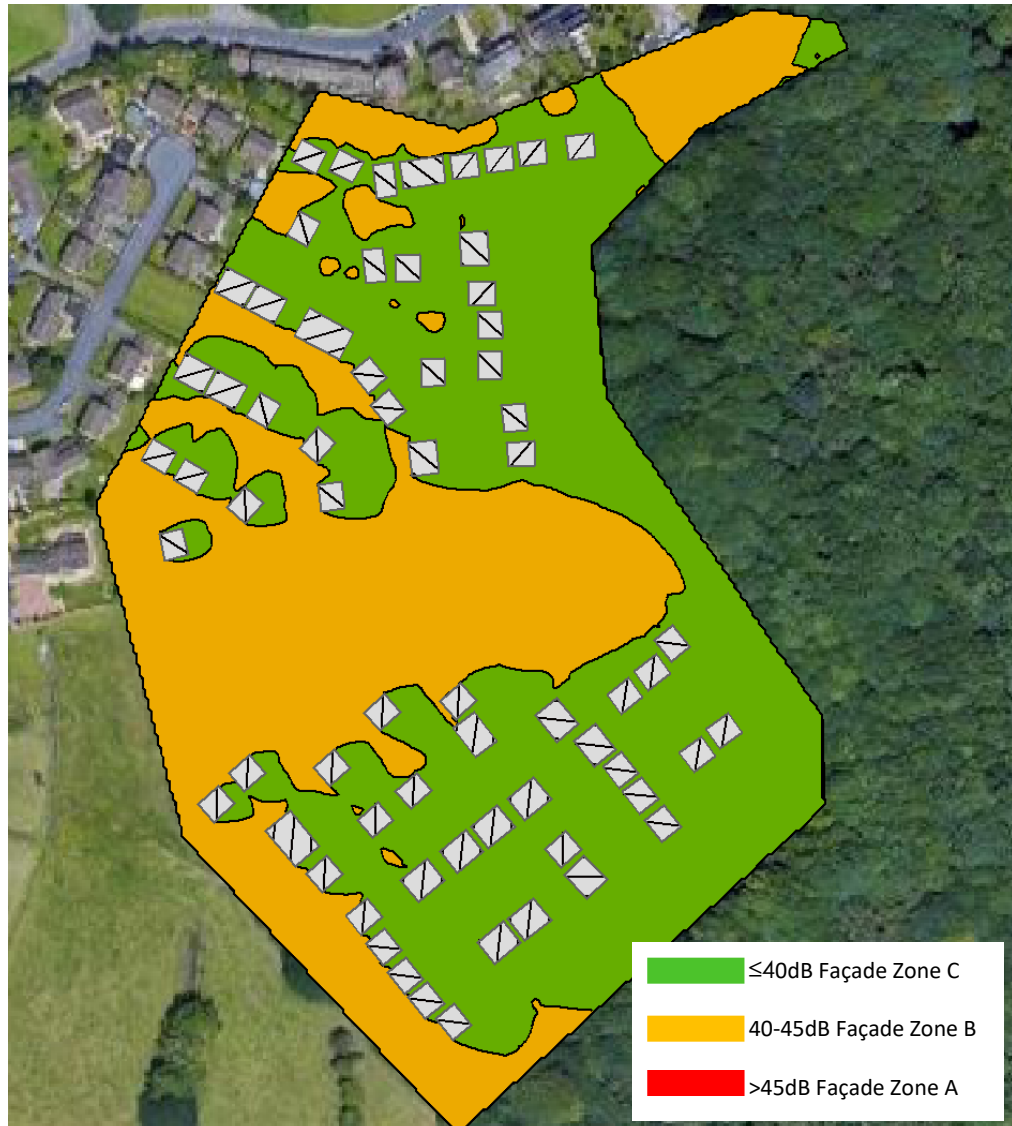


Sound map indicating the external daytime $L_{Aeq,16hour}$ environmental sound levels at 1st floor level (5.0m)

As can be seen, the vast majority of the site should fall within Façade Zone B at 1st floor level. Only facades to the north of the site are likely to fall within Façade Zone A.

6.9 Internal Night-time Requirements

The sound map below indicates the external night-time $L_{Aeq,8hour}$ environmental sound levels across the proposed site at Ground floor level (2.5m) and the Façade Zones required in order to achieve the internal daytime requirements.



Sound map indicating the external night-time $L_{Aeq,8hour}$ environmental sound levels at Ground floor level (2.5m)

As can be seen, the vast majority of the site should fall within Façade Zone C at Ground floor level. Only facades to the north and west of the site are likely to fall within Façade Zone B.

The sound map below indicates the external night-time $L_{Aeq,8hour}$ environmental sound levels across the proposed site at 1st floor level (5.0m) and the Façade Zones required in order to achieve the internal daytime requirements.



Sound map indicating the external night-time $L_{Aeq,8hour}$ environmental sound levels at 1st floor level (5.0m)

As can be seen, the vast majority of the site should fall within Façade Zone B at 1st floor level. Only facades facing to the east of the site are likely to fall within Façade Zone C.

6.10 External Daytime Requirements

The sound map below indicates the external daytime $L_{Aeq,16hour}$ environmental sound levels across the proposed site at head height (1.8m).



Sound map indicating the external daytime $L_{Aeq,16hour}$ environmental sound levels at head height (1.8m)

As can be seen, external daytime $L_{Aeq,16hour}$ environmental sound levels across the site are likely to achieve the external daytime requirement of $L_{Aeq,16hour} \leq 55dB$ in rear gardens.

7.0 Construction Noise & Vibration

The construction proposals are not known at this stage. Once the proposals are known, an assessment of construction noise and vibration should be undertaken to the surrounding noise sensitive receptors (including Reliance Precision which is understood to be sensitive to external noise and vibration) in accordance with the guidance provided in BS 5228-1: 2009+A1:2014 "Code of practice for noise and vibration control on construction and open sites – Part 1: Noise".

8.0 Proposed Pumping Station

A pumping station is proposed to the south west of the site approximately 25m from the south west facades of Plots 048 to 053. The exact details are not known at this stage.

Based on typical noise data for a similar pumping station to that proposed, a preliminary assessment of noise due to the operation of the pumping station has been undertaken based on the following:

- 2No. submersible pumps each generating a sound pressure level of L_{Aeq} 77dB at 1m (free field);
- 2No. submersible pumps situated within a concrete underground chamber (8m deep, 4m dia.) with a sealed solid steel manhole cover;
- A +6dB rating penalty for a highly perceptible tone (unlikely) as per BS 4142:2014;
- Distance of 25m from manhole cover to nearest façade;
- Lowest representative night-time $L_{A90,15min}$ background sound level of 26dB.

The preliminary assessment indicates a calculated rating level of L_{Aeq} 21dB at the nearest façade which is 5dB below the lowest representative night-time $L_{A90,15min}$ background sound level of 26dB. This is therefore an indication of a low impact based on the guidance of BS 4142:2014.

Once the exact proposals are known, a detailed assessment of noise due to the operation of the pumping station should be undertaken to the surrounding noise sensitive receptors.

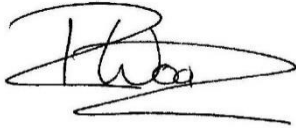
9.0 Conclusions

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

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

A detailed sound map of the proposed site layout has been produced based on information received from the developer/architect and the results of the environmental sound survey and a detailed sound assessment has been undertaken and glazing/ventilation/screening specifications have been provided in order to achieve the internal daytime and night-time requirements of the Local Authority.

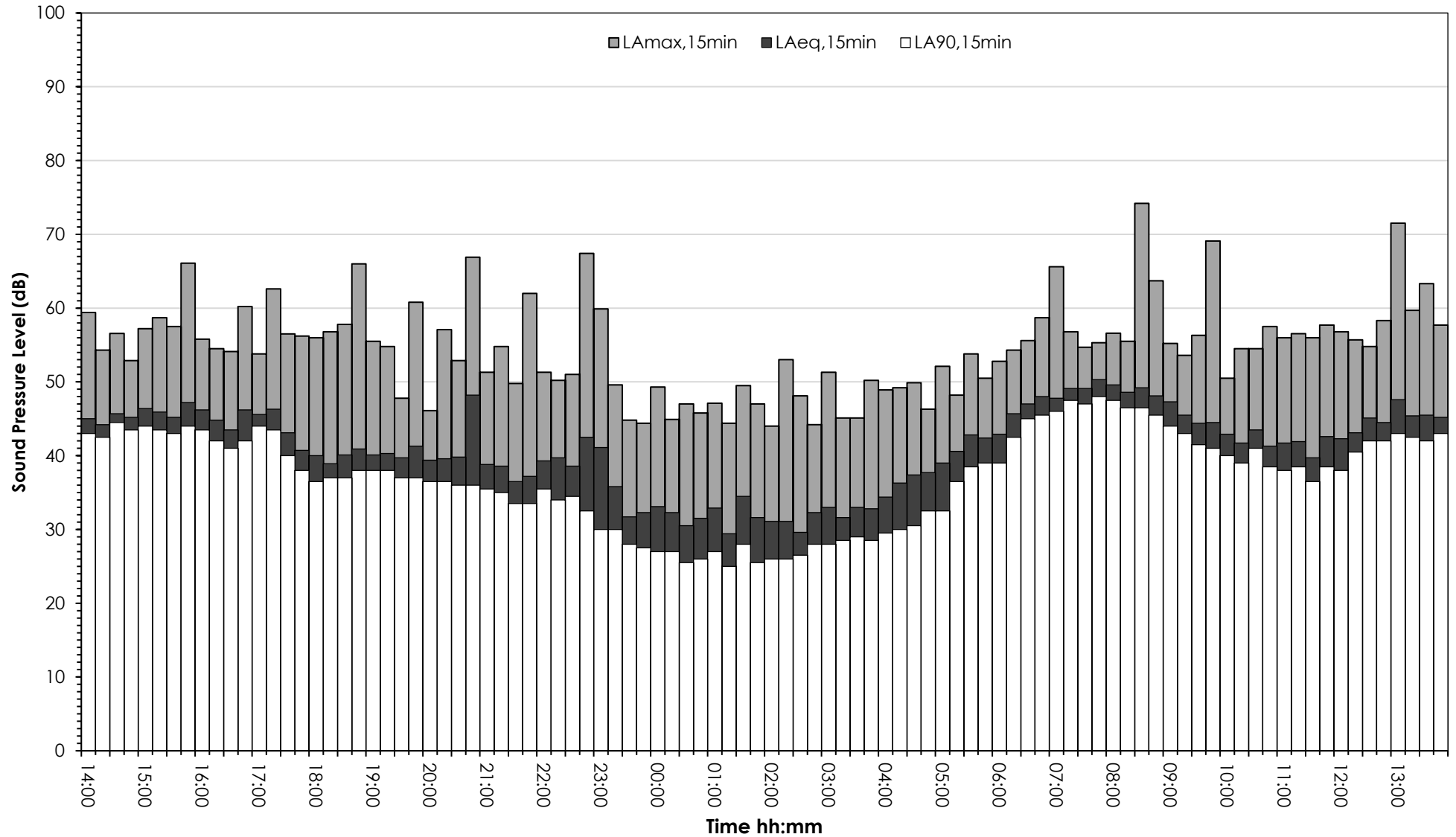
Additionally, the detailed sound assessment indicates that the external daytime requirement in rear gardens is likely to be achieved across the site.

A handwritten signature in black ink, appearing to read 'R Wood', with a large, sweeping horizontal stroke underneath.

Robin Wood
LIGHTHOUSE ACOUSTICS

0752/THG1

Hermitage Park, Lepton
Time History Graph - Wednesday 28 September 2020 to Thursday 29 September 2020
 $L_{Amax,15min}$, $L_{Aeq,15min}$ & $L_{A90,15min}$ Noise Levels at Position A



Hermitage Park, Lepton
Time History Graph - Wednesday 28 September 2020 to Thursday 29 September 2020
 $L_{Amax,15min}$, $L_{Aeq,15min}$ & $L_{A90,15min}$ Noise Levels at Position B

