6-8 Nant Hall Road
Prestatyn

Acoustic Planning Report
1226/APR1
Revision 1

13 May 2024

For:

Nant Hall Developments Limited

LIGHTHOUSE ACOUSTICS

2nd Floor 3 Hardman Square
Spinningfields Manchester M3 3EB

☏ 0161 457 0515 ▪ 07415 151 901
✉ Enquiry@LighthouseAcoustics.co.uk
🌍 www.LighthouseAcoustics.co.uk

Acoustic Planning Report
1226/APR1
Revision 1

Contents

Appendices

Lighthouse Acoustics is the trading name of Lighthouse Enterprises UK Limited
Registered Office: 2nd Floor 3 Hardman Square Spinningfields Manchester M3 3EB
Registered in England and Wales Company No. 09085491

1.0 Introduction

Lighthouse Acoustics has been appointed by Nant Hall Developments Limited to undertake an environmental sound survey at 6-8 Nant Hall Road, Prestatyn and to undertake a detailed sound assessment for the proposed residential development.

The proposed residential development comprises the conversion of the existing vacant 2.5 storey building and new 5 storey rear extension to form commercial space, 5No. holiday flats and 18No. residential flats.

The survey methodology, results and assessment for the proposed residential development 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 residential development.

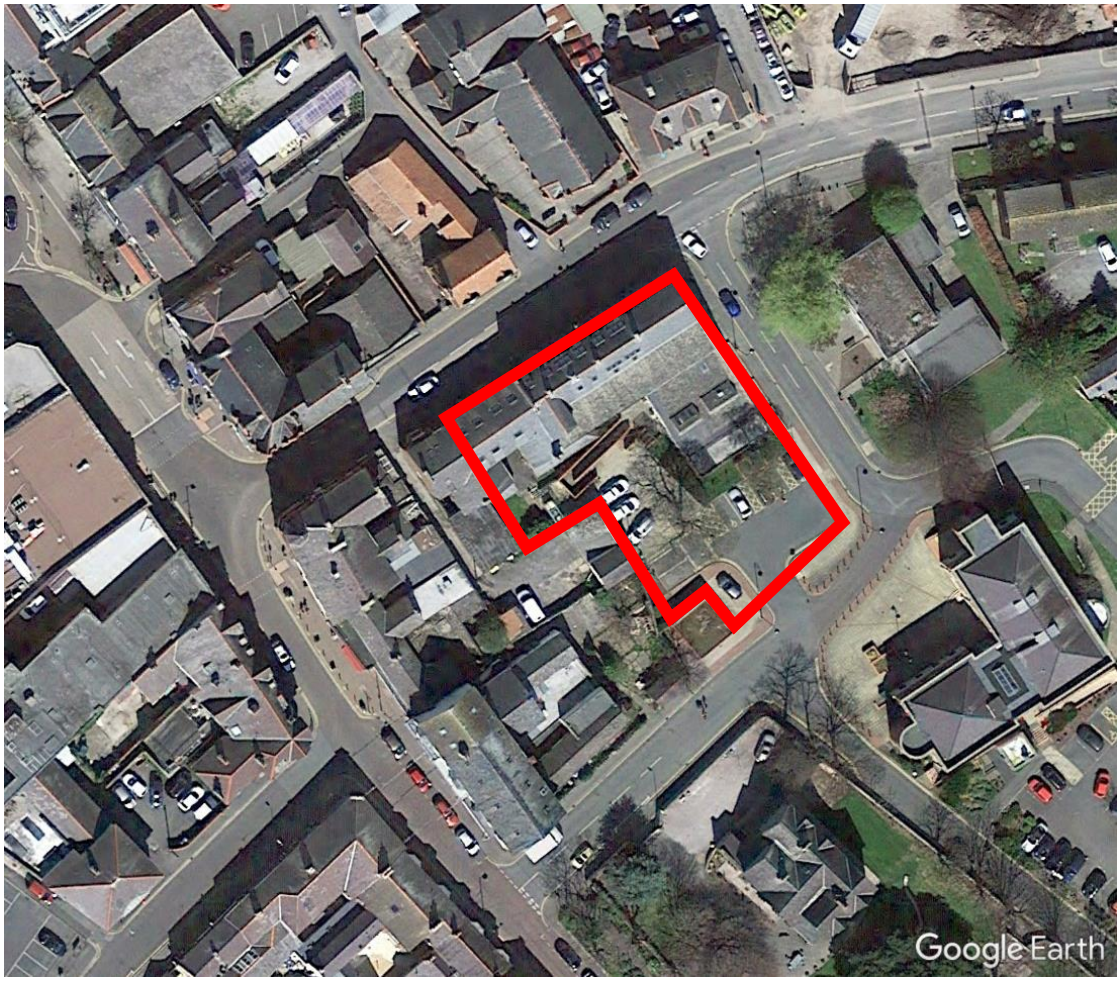
To undertake a detailed environmental sound assessment for the proposed residential development to establish the acoustic specification for glazing/ventilation elements required across the proposed residential development in order to achieve the acoustic requirements of the Local Authority.

To propose representative background sound levels 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.

3.0 Site Description

The proposed residential development is at 6-8 Nant Hall Road, Prestatyn and comprises an existing 2.5 storey corner building. The building is currently vacant and in a state of disrepair. The site is bound by an access road to the north east and south east, an adjoining commercial building to the south west and Nant Hall Road to the north 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

It is understood that Denbighshire County Council require environmental sound to 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 $L_{Aeq,16hour}$	-
Dining Room	40dB $L_{Aeq,16hour}$	-
Bedroom	35dB $L_{Aeq,16hour}$	30dB $L_{Aeq,8hour}$
External amenity space (gardens, patios, balconies)	55dB $L_{Aeq,16hour}$	-

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 17 April 2024 to 14:00 hours on Thursday 18 April 2024. 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 north westerly breeze (<5m/s) and the sky was scattered cloud. There was no rainfall and road surfaces were dry. The temperature was approximately 10°C.

At the end of the survey period there was a gentle westerly breeze (<5m/s) and the sky was overcast. There was no rainfall and road surfaces were dry. The temperature was approximately 11°C.

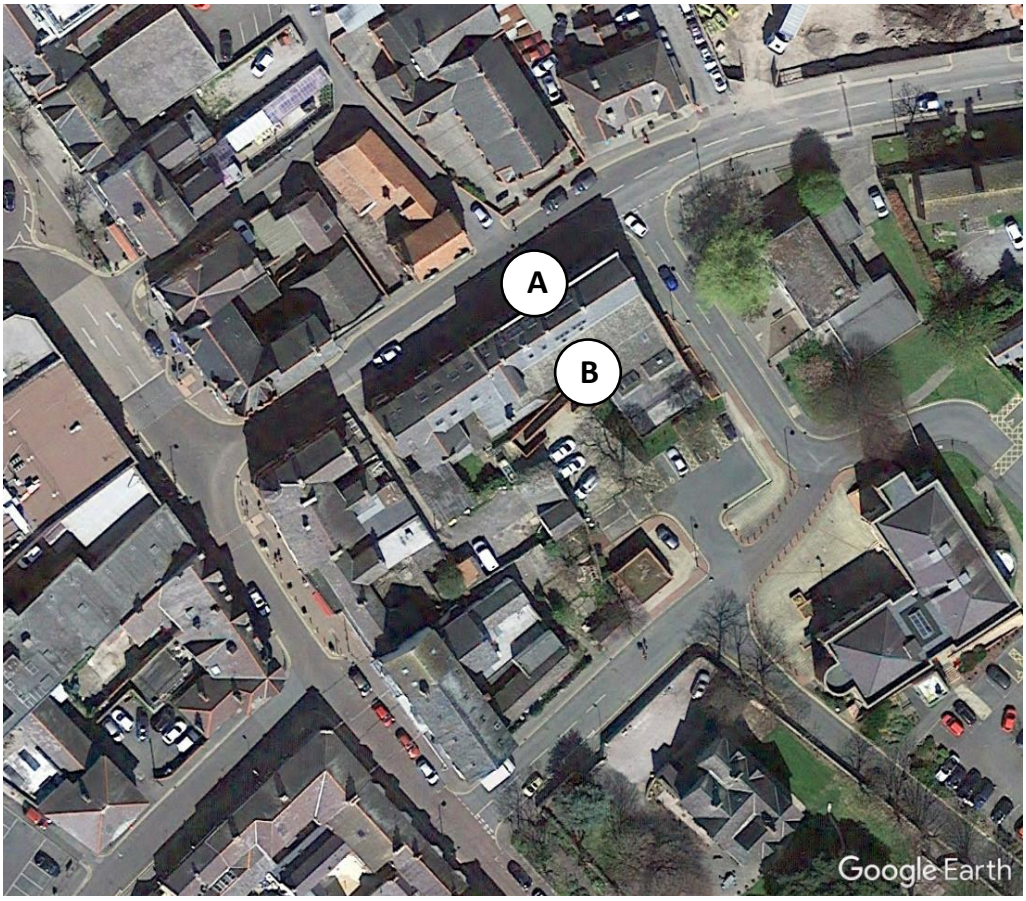
Based on publicly available weather data for the survey period we understand that weather conditions remained similar for the duration of the survey with no significant periods of rainfall or strong breezes. The weather conditions during the survey period are therefore considered to be suitable for undertaking 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 situated at 1st floor level at 1m from the north west façade of the building overlooking Nant Hall Road.
B	Microphone situated at 2nd floor level at 1m from the south east façade of the building overlooking the rear access road.

The measurement positions are shown on the site plan below.



Site plan showing measurement positions

Measurement Position A was selected in order to assess typical environmental sound levels incident upon the front north west facade of the existing building.

Measurement Position B was selected in order to assess typical environmental sound levels incident upon the rear south east facade of the existing building.

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	07/11/2023
Preamplifier	Casella	495	001414	07/11/2023
Microphone	Casella	251	1025	07/11/2023
Class 1 Sound Level Meter	Casella	633C	0721319	07/11/2023
Preamplifier	Casella	495	001446	07/11/2023
Microphone	Casella	251	1996	07/11/2023
Class 1 Sound Calibrator	Casella	120/1	3864878	01/11/2023

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 1226/THG1 and 1226/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	63	56
B	53	49

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 $L_{Aeq,8hour}$ octave band sound pressure 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)	70	64	61	57	60	55	48	43	63
	Night-time (8 hour)	58	53	52	50	52	48	44	40	56
B	Daytime (16 hour)	58	53	50	47	50	45	37	26	53
	Night-time (8 hour)	49	47	43	44	44	42	37	31	49

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 tables 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	85	87	83	84	85	80	78	76	86
	91	85	79	78	80	77	70	62	83
	86	78	80	80	81	75	72	70	83
	91	84	87	81	79	68	58	48	82
	87	84	80	77	77	75	70	61	81
	86	78	71	72	80	70	64	55	80
	86	84	83	75	78	72	64	56	79
	88	75	73	73	78	70	60	53	78
	91	82	80	76	76	71	65	67	77
	82	79	80	75	75	71	64	55	77
	85	72	69	68	75	70	62	51	77
	76	69	70	70	75	69	60	53	76
	48	45	45	47	72	72	68	45	75
	84	76	73	72	74	68	63	58	75
	84	71	71	68	73	68	57	48	74

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	46	48	65	68	71	65	72	69	76
	73	70	75	73	72	71	63	58	72
	66	67	53	58	68	68	58	47	70
	64	59	52	60	69	64	55	44	69
	73	64	62	57	70	62	61	59	68
	58	53	53	46	62	68	57	39	67
	70	67	69	59	63	68	66	53	67
	80	72	64	67	65	57	45	41	67
	71	69	67	63	63	54	42	30	66
	72	70	70	66	62	49	38	39	65
	71	64	62	61	61	65	51	41	65
	72	66	64	56	63	63	59	44	64
	66	65	63	57	62	62	56	45	61
	60	55	52	46	61	47	38	22	60
	60	57	53	49	58	48	34	23	59

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 (07:00–23:00)	Night-time (23:00–07:00)
A	45	30
B	43	30

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 above levels may be used in subsequent assessments of any proposed mechanical ventilation system 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 frequent road traffic along Nant Hall Road. During lulls in road traffic along Nant Hall Road, road traffic from the surrounding road network 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 occasional road traffic along the access road. During lulls in road traffic along the access road, road traffic from the surrounding road network contributed towards the measured sound climate.

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 remained the dominant sound source.

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 indicies of the façade elements, the area of the facade and the absorption within the room at octave band centre frequencies.

6.2 Proposed Development

The assessment has been based on the following drawings.

Author	Drawing No.	Revision	Date
Cassidy & Ashton	12203 NHR-CAA-XX-00-DR-A-2010	P2	18.03.24
	12203 NHR-CAA-XX-01-DR-A-2011	P2	18.03.24
	12203 NHR-CAA-XX-02-DR-A-2012	P2	18.03.24
	12203 NHR-CAA-XX-03-DR-A-2013	P2	18.03.24
	12203 NHR-CAA-XX-04-DR-A-2014	P2	18.03.24
	12203 NHR-CAA-XX-XX-DR-A-2165	P1	08.03.24

The proposals include the conversion of the existing vacant 2.5 storey building and new 5 storey rear extension to form commercial space, 5No. holiday flats and 18No. residential flats.

6.3 Acoustic Requirements

The proposed residential development comprises 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 $L_{Aeq,16hour}$	-
Bedroom	35dB $L_{Aeq,16hour}$	30dB $L_{Aeq,8hour}$ 45dB L_{Amax}*

* 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	4m x 6m x 2.4m	$4m^2$	Wood/vinyl floor, table. chairs
Bedroom	3m x 4m x 2.4m	$3m^2$	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 external walls and roof of the building comprise the following constructions.

Element	Typical Construction
Masonry Walls	Brickwork with cavity, insulation and internal plasterboard lining
Roof	Tiled with insulation in loft and 2No. layers plasterboard ceiling

The following typical Sound Reduction Indicies 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
Masonry 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 & Side (Nant Hall Road)	Living Room/ Kitchen	21	25	22	33	40	43	44	48
	Bedroom	23	27	29	36	41	42	52	56
Rear (Access Road)	Living Room/ Kitchen	20	24	20	25	34	37	35	39
	Bedroom	21	25	22	33	40	43	44	48

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 & Side (Nant Hall Road)	Living Room/ Kitchen	35	10mm/16mm/4mm
	Bedroom	40	10mm/16mm/6.4mm
Rear (Access Road)	Living Room/ Kitchen	30	4mm/16mm/4mm
	Bedroom	35	10mm/16mm/4mm

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 & Side (Nant Hall Road)	Living Room/ Kitchen	42	48	46	49	54	65	65	65
	Bedroom	42	48	46	49	54	65	65	65
Rear (Access Road)	Living Room/ Kitchen	27	33	39	39	43	50	50	50
	Bedroom	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 & Side (Nant Hall Road)	Living Room/ Kitchen	50	Acoustic Wall Ventilator (e.g. Greenwood MA3051) Or Mechanical Ventilation
	Bedroom	50	
Rear (Access Road)	Living Room/ Kitchen	40	Acoustic Window Ventilator (e.g. Greenwood EAR42W)
	Bedroom	40	

Where acoustically treated mechanical ventilation is required to provide continuous background ventilation, the system should achieve noise levels of L_{Aeq} ≤30dB in living rooms and bedrooms and L_{Aeq} ≤35dB 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} ≤30dB in living rooms and bedrooms and L_{Aeq} ≤35dB 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 & Side (Nant Hall Road)	45	30
Rear (Access Road)	43	30

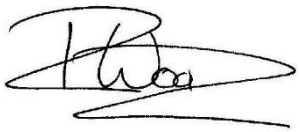
8.0 Conclusions

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.

A detailed environmental sound assessment for the proposed residential 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.



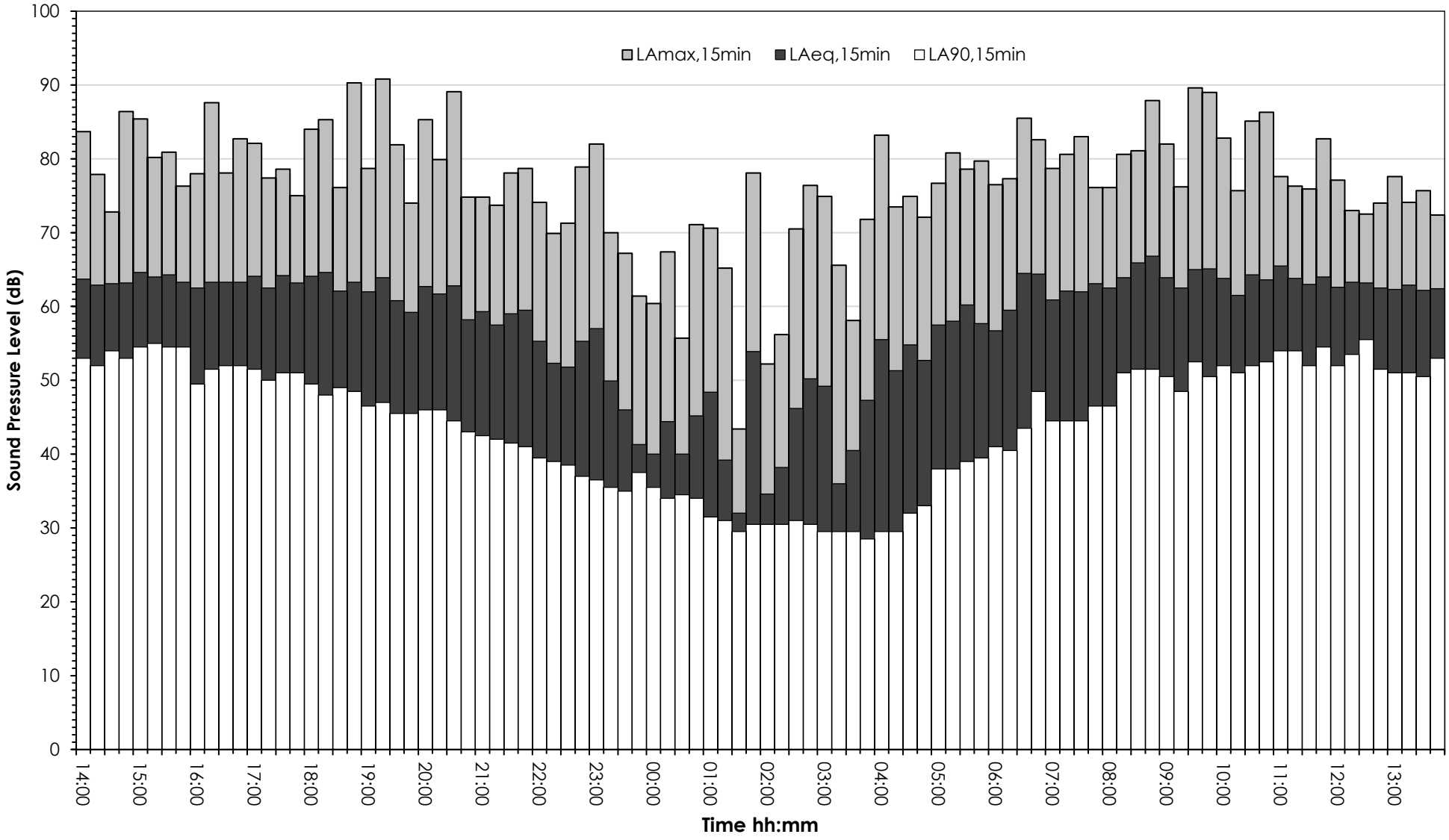
Robin Wood
LIGHTHOUSE ACOUSTICS

1226/THG1

6-8 Nant Hall Road, Prestatyn

Time History Graph - Wednesday 17 April 2024 to Thursday 18 April 2024

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



1226/THG2

6-8 Nant Hall Road, Prestatyn

Time History Graph - Wednesday 17 April 2024 to Thursday 18 April 2024

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