

NOISE SURVEY REPORT

LITTLE HAVEN HOTEL, SOUTH SHIELDS, NE33 1LH

REPORT REFERENCE NO. J005950-9264-LK-01

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Tel: 01925 759380

Email: enquiries@pdaltd.com

Web: www.pdaltd.com





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Client Address:	Company Address:
Pells Yeat Farm Studio Kirkby Lonsdale Cumbria LA6 2EH	PDA Ltd 3 Bridgewater Court Barsbank Lane Lymm Cheshire WA13 0ER

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	Name	Position
Prepared By	Liam Kavaney MIOA	Senior Consultant
Checked By	Chris Wright BSc(Hons), MIOA	Senior Consultant

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This report has been prepared based upon a scope of works and associated resources agreed between the client and Philip Dunbavin Acoustics Ltd (PDA). This report has been prepared with all reasonable skill, care and diligence and has been based upon the interpretation of data collected. This has been accepted in good faith as being accurate and valid at the time of the collection. This report has been based solely on the specific design assumptions and criteria stated herein.



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1.0 SUMMARY

PDA Ltd was commissioned by Tony Hills Studio Ltd to carry out an environmental noise survey for the proposed extended facilities and the construction of a new gym and a beach nursery and supporting facilities at the Little Haven Hotel located in South Shields.

A noise survey has been undertaken at positions representative of the nearest noise sensitive receivers to the hotel to assess the existing noise climate and to establish noise limits for any potential future fixed plant. The survey was carried out at the site during the likely quietest periods, when any potential plant would be expected to operate.

The local noise climate is a combination of distant road traffic noise and distant plant noise. Other intermittent noise sources included vehicle movements and parked vehicles with idling engines near to the measurement positions, people talking in the vicinity of the measurement positions, distant crashes and bangs from North Shields Fish Quay across the Tyne Estuary, the sound of the nearby sea and breaking waves as well as bird song and seagull calls. During the survey the DFDS Newcastle–Amsterdam ferry was observed passing through the Tyne Estuary in both the evening and morning periods.

Noise levels limits for external building services are proposed based upon the good practice guidance criteria of BS 4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound'.



2.0 BRIEF FOR CONSULTANCY

PDA Ltd has been engaged to carry out the following:

A. *Noise Survey*

We will travel to the site and carry out an ambient noise survey to assess the existing sound at the site. It is likely that the most impacted period of time when the plant was in operation would be in the evenings / night. We would therefore propose to undertake manned measurements between the hours of 21:00 – 02:00 hours. Alternatively if a secure location can be provided within the existing site, unmanned measurements with audio recordings over a full night time may be possible.

We will carry out all noise surveys in accordance with the provisions of BS7445 “Description and Measurement of Environmental Noise”. The measurements made will include both dBA and octave band noise levels including L_{eq} , L_{max} , and L_{90} parameters.

Utilising these measurements we can set noise limits for the proposed plant associated with the new plant and equipment.

We will prepare a report detailing the survey methodology, results and proposed noise limits. This report will be in a format suitable for submission to the local authority

3.0 SITE DESCRIPTION

The Little Haven Hotel is located off River Drive in South Shields. The proposal is to extend facilities providing a larger restaurant and the construction of a new gym and a beach nursery and supporting facilities.

The site is bounded by the Tyne Estuary to the north and east with Littlehaven beach located the east. A water activities centre and sailing club lie to the southwest of the site with River Drive beyond this. To the west of the hotel is a small harbour beach with residential apartments located along River Drive beyond this. These apartments have been identified as the nearest residential receivers to the proposed bar which are located at a approximate distance of 90m from the hotel boundary.

A site plan showing the location of the site and the surrounding local is shown in Figure 1 below.

Figure 1. Site location plan and nearest noise sensitive receivers



- Nearest Noise Sensitive Receivers
- Proposed Site

4.0 NOISE ASSESSMENT CRITERIA

4.1 National Planning Policy Framework

National Planning Policy is guided by the National Planning Policy Framework (NPPF) updated in February 2025. With regard to Noise the Framework states the following;

Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.*

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

- *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

The terms 'significant adverse' and 'adverse' impacts are defined in the explanatory notes of the 'Noise Policy Statement for England (NPSE)' which states;

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The notes also offer an explanation of the term 'adverse impacts' as follows;

... refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

Although no specific noise limits for LOAEL and SOAEL have been defined, in 2014 the UK Government published a planning practice guidance document for noise which indicates where these limits fall with relation to the perception of noise, updated in July 2019. A summary is reproduced in Section 4.2 below, and the full document is published at <https://www.gov.uk/guidance/noise--2>. It is considered that guidance from other acoustic standards may be employed to determine suitable levels within the overall principal of the National Planning Policy Framework.

4.2 Planning Practice Guidance – Noise

The UK Planning Practice Guidance on noise offers further guidance on the typical levels which constitute the NOEL, LOAEL and SOAEL, reproduced in the table below.

Table 1. Planning Practice noise level guidance

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

4.3 BS4142:2014+A1:2019 Method for Rating and Assessing Industrial and Commercial Sound

The effect of mechanical services plant noise emissions on the nearest noise sensitive residences can be assessed in accordance with BS4142:2014+A1:2019 – *'Methods for rating and assessing industrial and commercial sound'*.

The standard describes a method of determining the level of a noise of commercial or industrial nature, together with procedures for assessing the impact of such a noise outside nearby noise sensitive areas.

The standard may be thought of as a procedure for comparing the noise from commercial sources with background noise levels in the absence of the commercial noise and determining the likely impact of the commercial noise on noise sensitive areas.

In accordance with BS 4142 the background noise level is the typical A-weighted sound pressure level at the assessment position that is exceeded for 90% of a given time interval (L_{A90}). The specific noise level is the equivalent continuous (L_{Aeq}) sound pressure level at the assessment position produced by the noise source over a given time interval.

Certain acoustic features can increase the impact over that expected from a simple comparison between the specific noise level and the background level. Where such features are present, these are taken into account by adding corrections to the specific noise level.

The corrections are applied based on whether the following features occur or are expected to be present. The correction values can either be determined subjectively, or by various objective measurement procedures.

- Tonality – The noise contains a distinguishable, discrete, continuous tone (whine, hiss, screech, hum, etc.), 0 – 6 dB penalty.
- Impulsivity – The noise contains distinct impulses (bangs, clicks, clatters, or thumps), 0 – 9 dB penalty.
- Intermittency – The noise is irregular enough to attract attention, 0 – 3 dB penalty.
- Other – Where the specific sound does not fit the above, but is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

From the addition of the above penalties where appropriate the rating level is established, this being the value that is compared with the background noise.

According to BS 4142 an initial estimate of the impact is given for a rating level of:

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

BS4142 indicates that the noise source should be evaluated over the appropriate time interval which is as follows:

- 1 hour during the day (07:00 – 23:00 hours)
- 15 minutes during the night (23:00 – 07:00 hours)

The above initial assessment may then be modified depending on the context to take into account;

- The absolute level of the sound.
- The character and level of the residual sound compared to the character and level of the specific sound.
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
 1. Façade insulation treatment
 2. Ventilation and / or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
 3. Acoustic screening

4.4 BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

British Standard 8233:2014, *Guidance on Sound Insulation and noise reduction for buildings*, gives guidance on internal noise levels within dwellings, flats and rooms in residential use when unoccupied. The following criteria are for Living and Dining Rooms for daytime use and Bedrooms for night time.

Table 2. BS8233 recommended indoor ambient noise levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 L _{Aeq,16hour}	—
Dining	Dining room/area	40 L _{Aeq,16hour}	—
Sleeping (daytime resting)	Bedrooms	35 L _{Aeq,16hour}	30 L _{Aeq,8hour}

It should however be stressed that the above criterion relates to steady noise, in this case from road traffic etc., excluding unusual noise events departing from the typical noise character of the area.

4.5 WHO Guidelines for Community Noise

In 1999, the WHO (World Health Organisation) published Guidelines for Community Noise, stating the following internal noise levels are applicable to dwellings.

Table 3. WHO Guidelines for Community Noise criteria

Specific Environment	Critical Health Effect(s)	L _{Aeq} dB	Time Base (hours)*
Outdoor living area	Serious annoyance, daytime and evening	55	16
	Moderate annoyance, daytime and evening	50	16
Outside Bedrooms	Sleep disturbance, window open (outdoor values) night time	45	8

* Typically taken to be daytime/evening - 07:00 – 23:00 hours, and night time 23:00 – 07:00 hours.

WHO guidelines state, 'To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55 dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB L_{Aeq}.'

5.0 SURVEY DETAILS AND RESULTS

5.1 Survey Times and Dates

The ambient noise measurements were conducted between 16:15 hours on Thursday 4th December 2025 until 09:45 hours on Friday 5th December 2025, with measurements being made and partially attended by Liam Kavaney of PDA Ltd. The measurement periods were selected to be during the likely quietest periods, when any potential plant would be expected to operate.

5.1 Equipment Used

Throughout the survey measurements were undertaken with two NTi XL2 sound level meters and a Rion NA-28 sound level meter. The meters are precision grade Class 1 sound level meters (as per BS EN 61672-1: 2002) for which current calibration certificates are held. The meters were set to A-Weighted and fast response. The meters were calibrated directly before any measurement took place and immediately afterwards and no significant drift was observed.

5.2 Weather

The weather during the noise was predominately dry with some occasional periods of light rain observed. Wind speeds were negligible and temperatures ranged between 2 – 6 degrees centigrade, with cloud cover ranging from 10 to 100%. Despite some periods of light rain, on the whole the weather was considered conducive to undertaking noise measurements. Reviewing the measurement data indicates that the brief periods of light rain are not seen to affect the measured background noise levels.

5.3 Measurement Positions & Procedure

Measurements were undertaken at three positions at the site. The positions may be considered representative of the ambient and background noise levels at the closest residential locations to the site. A range of statistical noise indicators was measured, including L_{Aeq} and L_{A90} . Measurements were setup to log every 15-minutes. The positions are described below.

- Position 1 – microphone located on a pole approximately 1.5m above ground level located adjacent to the garden/balcony of the dwellings off River Drive.
- Position 2 – microphone located on a pole approximately 1.5m above ground level located adjacent to the car park of the hotel.
- Spot Measurement Position 3 – Sound level meter located on a tripod approximately 1.5m above ground level located on River Drive adjacent to the nearest residential receivers.

It is noted that spot measurements were undertaken at Position 3 to allow a comparison with the noise levels measured at Position 1. Reviewing the measurements indicates there was negligible variation between two locations. Therefore on this basis the microphone positions for all the sound level meters are considered to be a free field measurements. The measurement locations are highlighted within the following figure:

Figure 2. Measurement Locations



5.4 Measured Results

A summary of the noise level measurements is given below. The measurement positions on site are shown on Figure 2 above. The levels presented in the table have been rounded to the nearest decibel. The L_{Aeq} levels are the logarithmic average of all the measured noise levels. The L_{A90} levels have been shown as a minimum to maximum range as there is no valid method to average statistical noise parameters. The typical L_{A90} value for the periods measured is also shown in the table. Time history graphs of the full measured data at Position 1 and Position 2 are also presented below.

Table 4. Summary of environmental noise measurements at Position 1

Opening Hours	Time Period (hh:mm)	$L_{Aeq,T}$ (dB)	Range of L_{A90} , (dB)	Typical L_{A90} , (dB)
Daytime	16:45 – 23:00 07:00 – 07:15	50	35 – 51	46
Night time	23:00 – 07:00	47	35 – 46	40

Table 5. Summary of environmental noise measurements at Position 2

Opening Hours	Time Period (hh:mm)	$L_{Aeq,T}$ (dB)	Range of L_{A90} , (dB)	Typical L_{A90} , (dB)
Daytime	16:10 – 23:00 07:00 – 09:30	48	36 – 48	45
Night time	23:00 – 07:00	46	35 – 44	36

Table 6. Summary of sample environmental noise measurements at Position 3

Date	Time Period (hh:mm)	L _{Aeq,T} (dB)	L _{A90,15mins} (dB)
Thursday 4 th December	16:56 – 17:26	56	46
Friday 5 th December	06:33 – 07:18	46	39 – 41

Figure 3. Time History of Measurements at Position 1

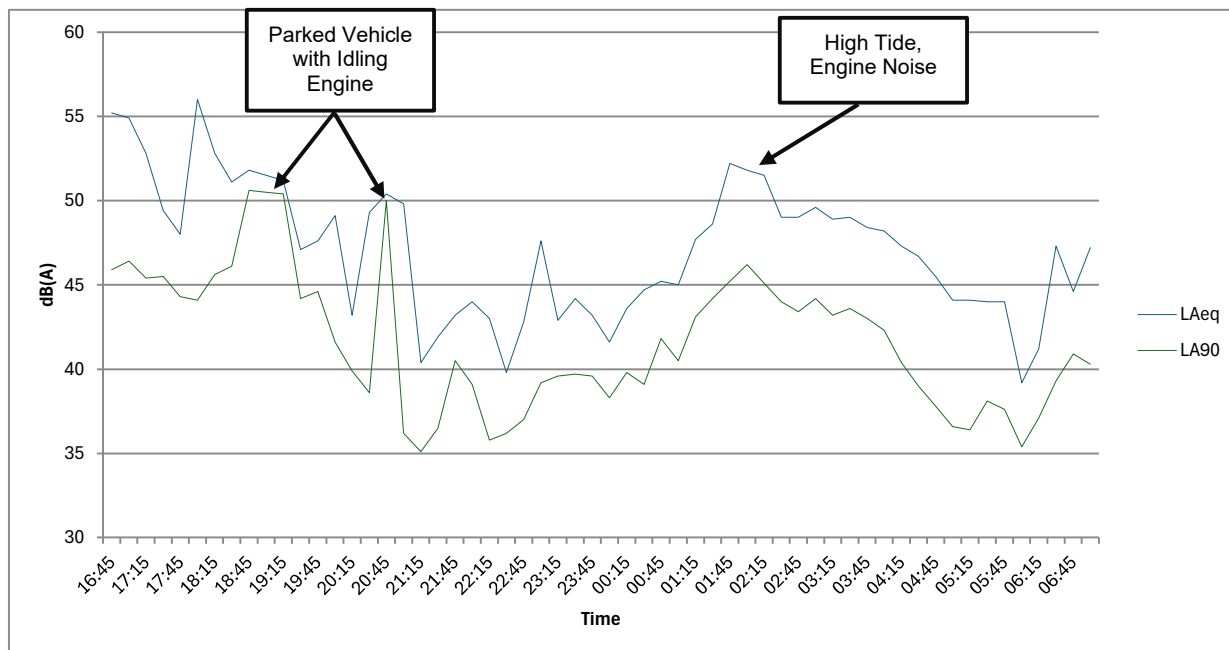
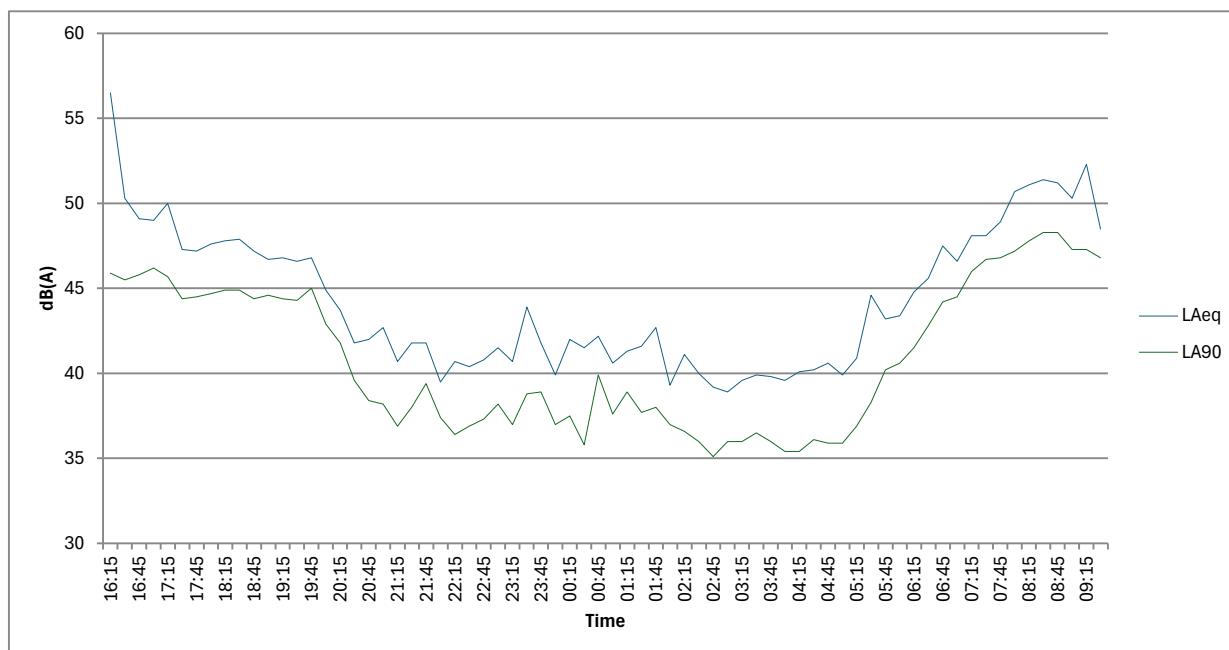


Figure 4. Time History of Measurements at Position 2



5.5 Description of Noise Sources

Position 1

The local noise climate at this position was a combination of distant road traffic noise, distant plant noise, the sound of the nearby sea and breaking waves, and intermittent bird song and seagull calls. It is noted that the background noise at this location was deemed to vary with the tide. In addition during high tide engine noise was observed which has been assumed to be from a nearby boat.

It was observed that for a period during the survey a campervan was parked up near to the measurement position. Analysis of the audio recordings indicates that the vehicle occasionally had its engine running for short periods (see Figure 3 above).

Other intermittent noise sources included vehicle movements along River Drive, vehicles parking with associated doors opening and closing, people occasionally talking in the vicinity and distant crashes and bangs emanating from North Shields Fish Quay across the Tyne Estuary. During the survey the DFDS Newcastle–Amsterdam ferry was observed passing through the Tyne Estuary in both the evening and morning periods at this position.

Position 2

The local noise climate at this position was a combination of distant road traffic noise, distant plant noise, the sound of the nearby sea and breaking waves, and intermittent bird song and seagull calls. Other intermittent noise sources included vehicle movements within the hotel car park, as well as vehicles parking and associated door opening and closing.

5.6 Summary of background noise survey measurements

Typical background noise levels during the day and night have been established so that a noise break-out limit can be set for any fixed mechanical plant noise sources proposed to be installed on the site. It is important to note that as the project is at planning stage we currently do not have any information to determine the time periods any fixed plant may be operating. Therefore our assessment considers both the typical background during daytime (07:00 – 23:00) hours and night time (23:00 – 07:00) hours.

The following statistical analysis is based on the measurement data acquired from all measurement data which is considered to be representative of background noise levels to the closest residential receivers to the proposed development.

Figure 5. Statistical analysis of typical daytime background noise levels at Position 1

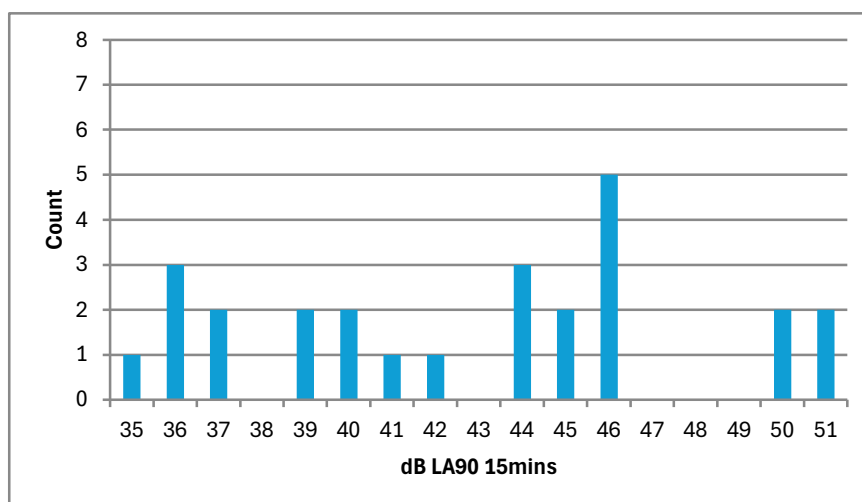


Figure 6. Statistical analysis of typical nighttime background noise levels at Position 1

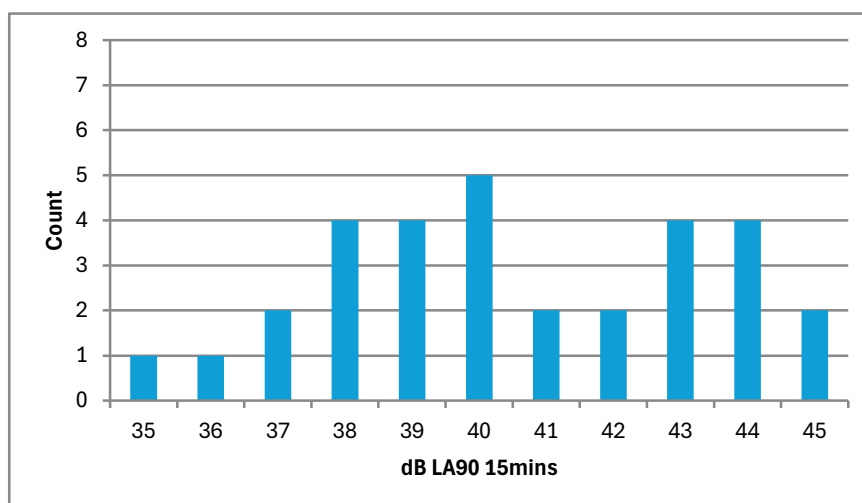


Figure 7. Statistical analysis of typical daytime background noise levels at Position 2

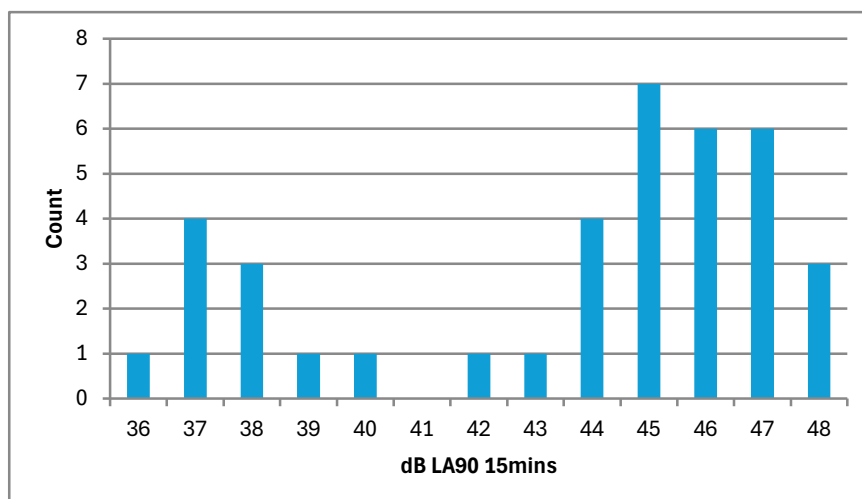
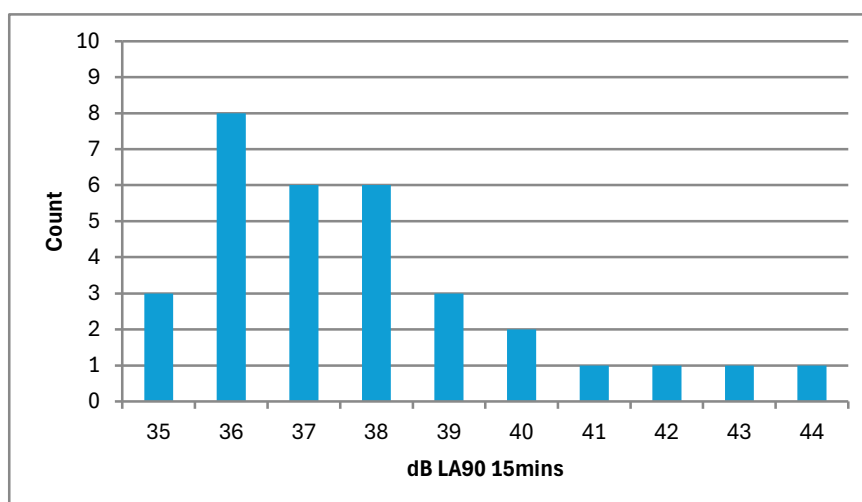


Figure 8. Statistical analysis of typical nighttime background noise levels at Position 2



6.0 EXTERNAL BUILDING SERVICES NOISE LIMITS

Noise emission from the development (i.e. mechanical plant) will need to be controlled to achieve acceptable levels of environmental noise in the surrounding areas. Therefore in order to avoid an adverse impact being initially indicated in accordance with BS 4142 (before the consideration of context) the document would recommended that noise egress from plant based sources do not exceed the typical background noise level at the nearest NSR's during the day or night-time periods.

As a result of the statistical analysis above the typical background sound level during the daytime measurement periods at Position 1 is considered to be 46dB(A) $L_{90, 15min}$. However, it is noted that the background noise at this location has been observed to vary with the tide. We have therefore taken the period between 21:00 to 23:00 when there was a low tide to determine a more robust background noise limit. During this period the typical background sound level was 36dB(A) $L_{90, 15min}$. In addition it is considered that this evening time period is likely to be the most impacted period of time when the plant will be in operation during the daytime.

Based on the statistical analysis of the night time measurement periods the typical background sound level at Position 1 is considered to be 40dB(A) $L_{90, 15min}$. Again it is noted that the night time noise levels varied due to the tide. We have therefore used the 36dB(A) $L_{90, 15min}$ noise limit to coincide with the daytime period. In addition this correlates with Position 2 where the typical background sound level during the full night time period was also 36dB(A) $L_{90, 15min}$, and where noise levels were not deemed to be significantly affected by the variation of the tide as at Position 1.

Based upon the noise measurements from the ambient noise survey and the background noise measurement procedure as detailed above, the noise level limits are detailed in the table below.

Table 7. Limit on noise due to any plant at the nearest noise-sensitive receivers

Operation Period (hh:mm)	Noise limit at receiver, dBA
Daytime operational plant (07:00 – 23:00)	36
Night time operational plant (23:00 – 07:00)	36

BS4142 guidance would suggest, *'where the rating level does not exceed the background level, this is an indication of the specific sound source having a low impact.'*

Therefore a daytime plant noise limit of 36 dB L_{Aeq} and night time plant noise limit of 36 dB L_{Aeq} are likely to be suitable when measured at the closest residential receivers, assuming no 'feature correction' is applicable.

If a feature correction is apparent (see Section 4.3), these limits should be reduced in accordance with BS4142 requirements. The noise limits above relate to the cumulative noise level of all plant items. The closest noise sensitive receiver has been identified in Figure 1 as being the dwellings on River Drive.

The requirements of the Local Authority should be checked to ensure that the plant noise egress design meets with their requirements.



7.0 CONCLUSIONS

PDA Ltd was commissioned by Tony Hills Studio Ltd to carry out an environmental noise survey for the proposed extended facilities and the construction of a new gym and a beach nursery and supporting facilities at the Little Haven Hotel located in South Shields.

A noise survey has been undertaken at positions representative of the nearest noise sensitive receivers to the hotel to assess the existing noise climate and to establish noise limits for any potential future fixed plant. The survey was carried out at the site during the likely quietest periods, when any potential plant would be expected to operate.

The local noise climate is a combination of distant road traffic noise and distant plant noise. Other intermittent noise sources included vehicle movements and parked vehicles with idling engines near to the measurement positions, people talking in the vicinity of the measurement positions, distant crashes and bangs from North Shields Fish Quay across the Tyne Estuary, the sound of the nearby sea and breaking waves as well as bird song and seagull calls. During the survey the DFDS Newcastle–Amsterdam ferry was observed passing through the Tyne Estuary in both the evening and morning periods.

Noise levels limits for external building services are proposed based upon the good practice guidance criteria of BS 4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound'.



APPENDIX A – NOTES FOR QUALITY CONTROL

1. Blockwork

All blockwork is to be mortared to an almost fair faced standard both horizontally and vertically. Only perfect blocks may be used with no pitting or cracks. The blockwork must seal effectively to the underside of the soffit.

Where blockwork walls form a cavity wall, care should be taken to avoid rubble and snots from bridging the cavity. This is especially important where one or more of the leaves is floating.

2. Plasterboard

All plasterboard joints are to be butted tight. The rule of thumb is that the joint should be tight enough over its entire length to prevent a normal business card from being inserted. Multiple layers should be fitted with staggered joints.

Base details and deflection heads are to be as per the British Gypsum White Book unless otherwise stated, and copious amounts of mastic to be used when fitting to the walls, floor and ceiling respectively.

3. Mineral Fibre

Mineral fibre slabs are to be butted tightly together and to boundary structures, to form a homogeneous layer.

4. Windows

All window frames are to be a good tight fit into the building structure with any gaps to be filled both internally and externally with a non-setting mastic in addition to the usual weather proofing seal to the exterior. Any gaps between the frame and building that are greater than 5 mm are to be packed with a dense mineral fibre prior to mastic sealing.

5. Electrical Sockets

Electrical sockets must not be fitted back to back and removed areas of blockwork and plasterboard should be kept to an absolute minimum.

6. Water Pipes

All water pipes (and any other pipework) are to be resiliently mounted to avoid “water hammer”. This is particularly important for plasterboard walls.

7. Penetrations

Penetrations are to be dealt with as described in this report. Details for specific services penetrations may be supplied upon request.

8. Approved Samples and Inspections

Samples of each individual acoustic element should be provided for inspection at the beginning of its installation. Once approved, the Clerk of Works must ensure that the same level of quality continues throughout construction.

APPENDIX B – DEFINITION OF ACOUSTIC TERMS

The decibel

This is the basic unit of noise, denoted dB.

A Weighting

This is a weighting process which simulates the human ear's different sensitivity at different frequencies. A weighting can be shown two typical ways, 50 dB(A) L_{eq} or 50 dB L_{Aeq} . Both mean the same thing. (See below for a definition of L_{eq}). The dB(A) level can be regarded as the overall level perceived by human beings.

L_{eq} and $L_{eq(s)}$

This is the equivalent continuous noise level which contains the same acoustic energy as the actual time-varying sound. In other words it is a kind of average noise level. It is denoted dB L_{eq} or, for A-weighted figures dB(A) L_{eq} or dB L_{Aeq} . It can also be expressed in terms of frequency analysis (see later). $L_{eq(s)}$ is the sample L_{eq} level.

L_n

This is the level exceeded for n% of the time. It is denoted dB L_n or, for A-weighted figures dB(A) L_n or dB L_{An} . It can be expressed in terms of frequency analysis (see later). L_{90} is the level exceeded for 90% of the time and is a measure of the lowest level typically reached. L_{10} is the level exceeded for 10% of the time and is the highest level typically reached. L_{50} is the level exceeded for 50% of the time and, mathematically, it is the median.

L_{max}

This is the maximum level reached during a measurement period. The "time constant", or the ability of the equipment to respond to impulses is usually expressed along with it, e.g. "Fast", "Slow", etc. It is denoted dB L_{max} or, for A-weighted figures dB(A) L_{max} , dB L_{Amax} , etc. It can also be expressed in terms of frequency analysis.

Frequency Analysis

Whereas dB(A) gives a very useful overall figure, it has its limitations in that it cannot be used to model or predict the effect of noise control and mitigation as this nearly always has radically different performance at different frequencies.

Frequency analysis expresses an overall noise level at each frequency or band of frequencies in the audible range. Octave band analysis divides the audible range into 10 bands from 31.5 Hz to 16 kHz and the noise level in each band can be expressed in any form e.g. L_{eq} , L_{90} , L_{max} etc. One third octave band analysis uses 30 bands.

Narrow band analysis takes the process to resolutions of less than 1 Hz. This is useful for identifying the existence of tones (whines, hums, etc.) and in pin-pointing the sources.