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NOISE IMPACT ASSESSMENT FOR PROPOSED RESIDENTIAL DEVELOPMENT:
Former Police Station Market Square, Batley, West Yorkshire WF17 5DA

Prepared for:

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Test Report Number: 1965-76-20

1.0 Introduction

1.1

Acoustic Solutions has been commissioned by Mr Abdul Rehman Hussain to undertake a noise impact assessment for the proposed development of ground and first storey dwellings at Former Police Station, Market Square, Batley.

1.2

The objectives for the noise impact assessment were as follows:

- Establish the sound level of all potential noise sources in the vicinity of the application site;
- Establish the external ambient sound levels at the application site and its surrounding environs;
- Establish the internal ambient sound levels at the application site, so to determine the potential noise impact upon future occupiers of the proposed residential dwelling in accordance with the National Planning Policy Framework Planning Practice Guidelines on Noise and other pertinent guidance;
- If appropriate, provide recommendations with respect to management and/or structural controls to mitigate and control the potential noise impact upon future occupiers of the proposed development.

1.3

This report details the methodology and results of the assessment.

1.4

This report has been prepared for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties referring to the report should consult Mr Hussain and Acoustic Solutions as to the extent to which the findings may be appropriate for their use.

1.5

A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

2.0 Site Setting And Proposed Development

2.1

The application site is a former police station (Appendix 2), a two-storey property located Batley town centre. The property is located adjacent, within a large cobbled semi-pedestrian area, next to Batley Town Hall, to the north and opposite the now closed Batley Library to the west. At the rear (east) of the property stand residential apartments an offices. A war memorial standing in its own grounds is situated to the south of the property. Market Square is used for car parking. The nearest highway of any significance is Wellington Street which is located approximately 250 metres to the south. The nearest commercial premises that may have a potential noise impact is Roberto's Italian Restaurant and Takeaway, located approximately 70 metres to the north-west.

3.0 Noise Impact Assessment Criteria

3.1

In terms of noise impact assessment criteria, Paragraph 123 of the National Planning Policy Framework states that planning policies and decisions should aim to '*avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development'.*

3.2

Planning Practice Guidance specifically dealing with noise was uploaded to the Government's Planning Portal in March 2014 as an accompaniment to the National Planning Policy Framework. This guidance is summarised herein.

3.3

The guidance states that noise needs to be considered when new developments may create additional noise. Whilst noise can override other planning concerns, neither the Noise Policy Statement for England nor the National Planning Policy Framework (which reflects the Noise Policy Statement for England) expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of proposed development.

3.4

In order to determine noise impact, local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur, and;
- Whether or not a good standard of amenity can be achieved.

3.5

In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.

3.6

In terms of Observed Effect Levels:

- No Observed Adverse Effect Level (NOAEL) – This is the level of noise exposure below which no effect at all on health or quality of life can be detected;

- Lowest Observed Adverse Effect Level (LOAEL) – This is the level of noise exposure above which adverse effects on health and quality of life can be detected, and;

- Significant Observed Adverse Effect Level (SOAEL) – This is the level of noise exposure above which significant adverse effects on health and quality of life occur.

3.7

At the lowest extreme, when noise is not noticeable, there is by definition no effect. As the noise exposure increases, it will cross the 'no observed' effect level as it becomes noticeable. However, the noise has no adverse effect so long as the exposure is such that it does not cause any change in behaviour or attitude. The noise can slightly affect the acoustic character of an area but not to the extent there is a perceived change in quality of life. If the noise exposure is at this level no specific measures are required to manage the acoustic environment.

3.8

As the exposure increases further, it crosses the lowest observed adverse effect level boundary above which the noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise).

3.9

Increasing noise exposure will at some point cause the significant observed adverse effect level boundary to be crossed. Above this level the noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as
by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused.

3.10

At the highest extreme, noise exposure would cause extensive and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be prevented from occurring.

3.11

The following table summarises noise exposure hierarchy, based on likely average response.

Table 3.1 Guideline "Absolute" Sound Level[1]

Absolute Sound Level	**Absolute Level:**	**≤40dB**	**41 - 45dB**	**46 - 50dB**	**51 - 55dB**	**56 - 60dB**	**≥60dB**
	Daytime Effect:[2]	**NOAEL**	**NOAEL**	**NOAEL**	**LOAEL**	**SOAEL**	**SOAEL+**
	Evening Effect:[3]	**NOAEL**	**NOAEL**	**LOAEL**	**SOAEL**	**SOAEL**	**SOAEL+**
	Night-time Effect:[4]	**NOAEL**	**LOAEL**	**SOAEL**	**SOAEL**	**SOAEL**	**SOAEL+**
	Effect / Impact Description:	No observed effect on health or quality of life.	Sleep disturbance in bedrooms with window open.	Speech intelligibility within living areas with windows open resulting in moderate annoyance. Greater potential for sleep disturbance and adverse health impact.	Increased potential for sleep disturbance, including significant adverse health effects. Gardens and amenity spaces affected.	Significant adverse health effects likely to all habitable rooms. Occupants unable to open windows due to noise ingress and unable to enjoy garden / amenity areas.	High risk of significant adverse health impact. Unable to use garden and amenity space or have windows open for ventilation.
Mitigation Considerations:		**A1** Use design, layout and landscaping (DLL) to create and preserve areas of amenity and tranquillity to enhance the noise environment.	**A2** Protect bedroom facades from noise through DLL. Provide minimum double-glazing with trickle vents to bedrooms.	**A3** Protect habitable room facades from noise through DLL with greater protection for bedrooms. Provide higher spec double-glazing with trickle-vents to all habitable rooms.	**A4** Bedroom facades to be protected through DLL to bring below LOAEL. Provide higher spec double-glazing with trickle vents to all habitable rooms. Protection of gardens and amenity space through DLL and acoustic fencing.	**A5** Bespoke assessment of noise mitigation needs, including consideration of alternative to open window ventilation provision to protect internal noise environment and protection of garden / amenity areas through DLL to bring below LOAEL.	**A6** Bespoke assessment of noise impact and mitigation, including DLL, protection of building envelope and provision of alternative amenity space.
Planning Consideration:		No objection	No objection subject to Approved Plans and/or conditions to include satisfactory window specification to bedrooms with facades exposed to LOAEL noise.	No objection subject to Approved Plans and/or conditions to include satisfactory window specification to all habitable rooms with facades exposed to LOAEL noise.	Details of noise mitigation to be supplied as part of planning approval process. Conditions required to implement control measures within the noise report. Refusal if noise report is inadequate.	Details of noise mitigation to be supplied as part of planning approval process. Conditions required to implement control measures within the noise report. Refusal if noise report is inadequate.	Presumption against planning permission being granted, unless detailed noise impact assessment and approved mitigation measures implemented through conditions. Post completion verification of mitigation measures required.

[1] Free-field, outdoor noise level expressed as dB LAeq(T), where T is the reference time period for the relevant Day, Evening or Night-time period.
[2] Day is from 07:00 to 19:00 and the reference time period (T) is 8 hours.
[3] Evening is from 19:00 to 23:00 and the reference time period (T) is 4 hours.
[4] Night is from 23:00 to 07:00 and the reference time period (T) is 8 hours.

3.12

The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation. These factors include:

- The source and absolute level of the noise together with the time of day it occurs;

- For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;

- The spectral content of the noise (i.e. whether or not the noise contains particular high or low frequency content) and the general character of the noise (i.e. whether or not the noise contains particular tonal characteristics or other particular features);

- The local acoustic character of the area.

3.13

In addition, further useful contextual guidance is provided in:

- British Standard 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS 4142);

- British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS 8233);

- World Health Organisation (WHO) Guidelines for Community Noise (1999)

3.14

BS 4142 states:

The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs'. Typically, the greater this difference, the greater the magnitude of the impact. For example:

- *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*
- *Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact. Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the absolute level of sound. For a given*
- *difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low. Where background sound levels and rating levels are low, absolute levels might be as, or*

more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

3.15

British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS 8233: 2014) sets indoor ambient noise levels from residential dwellings (see table below). It should be noted that the daytime criteria is 5 dB lower than that required by Calderdale Council.

Table 3.2 – Indoor Ambient Noise Levels in Dwellings (BS 8233)

Activity	Location	Good Indoor Ambient Noise Levels	
Resting	Living Room	35 dB $L_{Aeq\ (0700–2300)}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq\ (0700–2300)}$	30 dB $L_{Aeq\ (2300–0700)}$

3.16

With regard to sound attenuation through the building envelope, the 'weak points' in the building façade are generally considered to be the windows. The worked example (G.1) at Annex G of BS 8233 suggests that a partially opened window would provide sound attenuation of approximately 15 dB Rw. The Standard also suggests that *"..standard insulating glass units have an insulation value of approximately 30 dB Rw"* when closed.

3.17

With respect to noise affecting external areas, i.e. gardens, BS 8233 states that *".. it is desirable that the steady noise level does not exceed 50 dB L_{Aeq}, and 55 dB L_{Aeq} should be regarded as the upper limit".*

3.18

The World Health Organisation's Guidelines for Community Noise (1999) sets indoor ambient noise levels from residential dwellings (see table below). It should be noted that the daytime criteria is 5 dB lower than that required by Calderdale Council.

Table 3.3 – Indoor Ambient Noise Levels in Dwellings (WHO 1999)

Activity	Location	Good Indoor Ambient Noise Levels	
Resting	Living Room	35 dB $L_{Aeq\ (0700–2300)}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq\ (0700–2300)}$	30 dB $L_{Aeq\ (2300–0700)}$

4.00 Baseline Noise Survey

4.1

In order to establish the ambient noise level at the application site and its surrounding environs, a baseline noise survey was undertaken on 5 & 6 October 2020.

4.2

For the purpose of the assessment, two noise monitoring positions, MP1 & MP2, were adopted (see Appendix 2). There is no garden/recreational space associated with the development.

- MP1. 3 metres from the front, western façade of the premises. The microphone was mounted upon a boom-arm and extended through a first storey window closest to Market Square (running approximately 7 metres to the east of the microphone). The microphone at MP1 measured noise emanating for all sources north, south and west of the site.
- MP2. 3 metres from the rear eastern façade of the premises. The microphone was mounted upon a tripod located outside the eastern facade of the property at ground floor level. The microphone at MP2 measured noise emanating for all sources north, south and east of the site.

4.3

At the microphone location, a series of hourly 15-minute noise measurements were undertaken using a Type 1 integrating sound level meter (Appendix 3). The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end. Daytime weather conditions were warm and sunny. Night time conditions were dry and overcast. Wind speeds throughout were between 1 and 2.5 m/s. Measurements consisted of A–weighted parameter: L_{Aeq}, and L_{Amax}.

4.4 Daytime/Evening Assessment

4.4.1 MP1

The overall external daytime time/evening sound environment, summarised in Table 4.1, could be described as moderate to quiet. The principle existing daytime/evening noise sources in the vicinity of MP1 was road traffic on Wellington Street, slow-moving cars arriving and leaving Market Square and pedestrians. Although the traffic was relatively slow-moving, the cobbled street surface exaggerated the wheel noise The Town Hall clock was heard to chime every fifteen minutes.

Table 4.1 MP1 Measured External Sound Levels, Daytime/Evening

Start Time	Measured Noise Level, dB, $L_{Aeq, 15\ min}$	Measured Noise Level, dB $L_{Amax, 15\ min}$
07:00	47.8	68
08:00	54.9	78.3
09:00	57.5	76
10:00	55	76.4
11:00	56.9	74.7
12:00	54.6	77.1
13:00	56.1	75.9
14:00	55.3	76.2
15:00	55.7	77
16:00	56.6	75.6
17:00	58	79
18:00	57.4	77.5
19:00	55.1	76.2
20:00	53.3	69.2
21:00	52	64.8
22:00	51.5	65.3
Average/Max	55	79

4.4.2 MP2

The overall external daytime/evening time sound environment, summarised in Table 4.2, could be described as quiet. Road traffic using Wellington Street was

audible as an indistinct distant roar. Traffic arriving at and departing from Market Square was inaudible for the most part. No pedestrians were audible.

Table 4.2 MP2 Measured External Sound Levels, Daytime/Evening

Start Time	Measured Noise Level, dB, $L_{Aeq, 15\ min}$	Measured Noise Level, dB $L_{Amax, 15\ min}$
07:00	43.6	54.9
08:00	53.4	62.6
09:00	49	61.1
10:00	48.9	58.7
11:00	49.6	59.9
12:00	52.4	61.1
13:00	51.3	57.4
14:00	50.9	60.1
15:00	51	58.4
16:00	51.6	57.7
17:00	52.1	62
18:00	49	60.8
19:00	46.4	57.5
20:00	44.7	58
21:00	45	56.7
22:00	43.3	54.8
Average/Max	49	63

4.5 Night Time Assessment

4.5.1 MP1

The overall external night time sound environment, summarised in Table 4.3, could be described as quiet. By 20:00 hours, traffic volume on Wellington Street had reduced significantly. The restaurant on Market Square was inaudible. The most significant noise source was the Town Hall clock.

Table 4.3 MP1 Measured External Sound Levels, Night

Start Time	Measured Noise Level, dB, $L_{Aeq, 15\ min}$	Measured Noise Level, dB $L_{Amax, 15\ min}$
23:00	53.1	72.5
00:00	51.6	66
01:00	46.5	59.9
02:00	43.6	57
03:00	44	58.2
04:00	43.9	58
05:00	42.4	57.4
06:00	43	58.2
Average/Max	46	73

4.5.1 MP2

The overall external night time sound environment, summarised in Table 4.4, could be described as quiet. The dominant noise source from this point onwards was intermittent road traffic on Wellington Street and the chiming of the Town Hall clock.

Table 4.4 MP2 Measured External Sound Levels, Night

Start Time	Measured Noise Level, dB, $L_{Aeq, 15\ min}$	Measured Noise Level, dB $L_{Amax, 15\ min}$
23:00	42.5	53.2
00:00	40.5	49.7
01:00	41.3	48.5
02:00	40.2	49
03:00	39.8	48.3
04:00	40.3	49.2
05:00	40	49
06:00	41.4	50.1
Average/Max	41	53

4.6

For the purposes of the Noise Policy Statement for England assessment, Table 4.5 summarises the average measured Daytime, Evening and Average external sound levels, L_{Aeq}.

Table 4.3 Average measured Daytime, Evening and Average external sound levels at MP1 & MP2

Time	MP1	MP2
Ave Day	55	50
Ave Eve	53	45
Ave Night	45	41
Max Day	79	66
Max Eve	69	66
Max Night	73	53

5.0 Discussion

5.1 External Sound Levels

With reference to the National Planning Policy Framework Planning Practice Guidance on Noise, Table 5.1 summarises daytime, evening and night time noise levels at MP1 & MP2, and presents their relative Observed Effect Levels.

Table 5.1 Observed Effect Levels at MP1 & MP2

Location	Predicted Daytime Observed Effect Level	Predicted Evening Observed Effect Level	Predicted Night Time Observed Effect Level
MP1	LOAEL	SOAEL	LOAEL
MP2	NOAEL	LOAEL	LOAEL

5.2 Internal Sound Levels

With reference to internal noise levels, given open windows affording 15 dB attenuation. Tables 5.2 & 5.3 indicate that WHO & BS8233 criteria will be exceeded at the front and rear facades of the development during the daytime, evening and night time.

Table 5.2 Predicted Daytime and Evening Internal Noise Levels at Former Police Station, Market Square

Location	External SPL , dB	Closed Window Attenuation, dB	Predicted Internal SPL, dB	WHO & BS8233 35 dB Criteria met?
West Facing	55	15	40	No
East Facing	49	15	34	Yes

Table 5.3 Predicted Night Time Internal Noise Levels at Former Police Station, Market Square

Location	External SPL, dB	Closed Window Attenuation, dB	Predicted Internal SPL, dB	WHO & BS8233 30 dB Criteria met?
West-Facing	46	15	31	No
East-Facing	41	15	26	Yes

For west-facing rooms, a noise reduction of at least 5 dB is required to meet these internal noise criteria, although it should be noted that for west-facing rooms, the night time criteria is exceeded by just +1 dB. For east-facing rooms, daytime evening and night time criteria are met.

6.0 Recommendations

6.1 Internal. Front, West-Facing Rooms

All habitable ground and first storey west facing rooms should have glazing of 6.4mm laminated glass, 12mm air-filled cavity, 8.8mm toughened glass. Optional acoustic vents. The Pilkington datasheet (Pilkington, 2019, see Appendix 6) cites an insulation value of 32 dB, Rw (window closed) for this approximate specification. Open-window ventilation may result in excessive internal sound levels during daytime hours; therefore closed-window mechanical ventilation should be available.

The glazing must incorporate sufficient ventilation so to prevent overheating. ProPG calls for glazing with 'good ventilation'. In terms of temperature, this report interprets this as ventilation sufficient to provide a range of between 15-210C. It is thought that this can only be provided by means of mechanical ventilation. Given the windows' west-facing aspect, the risk of overheating should be prevented by means of controllable mechanical ventilation, with a control range extending from background/trickle through to purge, see Appendix 6 for ventilation details.

Where mechanical ventilation is required, it is recommended that ventilation be provided by 1x Solace Decentralised Mechanical Ventilation Unit (dMEV) per room (Titon, 2019).

Table 5.1.b of Approved Document F, 'Approved means of ventilation' (2010) prescribes a whole dwelling ventilation rate of 13 l/s per bedroom. The dMEV meets this criteria. Additionally, its sound rating at 13 l/s is 23 dB @ 3 metres. Assuming an existing night time internal sound level of 30 dB, an additional 23 dB would increase the SPL to 31 dB: an imperceptible increase.

6.2 Internal. Rear, East-Facing Rooms

The windows of all habitable ground and first storey rooms should be fitted with glazing with the following specification: 6 mm / 16 mm argon / 6.8 mm Pilkington Optiphon™. The Pilkington datasheet (Pilkington, 2020) cites an insulation value of 32 dB, Rw (window closed) for this approximate specification. Furthermore, the glazing must incorporate sufficient ventilation

so to prevent overheating. ProPG calls for glazing with ‘good ventilation’. Open-window ventilation is acceptable.

APPENDICES

Appendix 1
Glossary of Acoustic Terms

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 µPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$L_p = 20 \log_{10}(p/p_0)$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p0 = reference sound pressure (20 µPa).

A-weighting Network

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified period of time. In other words, L_{Aeq} is the level if a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. L_{Aeq} is increasing being used as the preferred parameter for all forms of environmental noise.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

$L_{A\ max}$

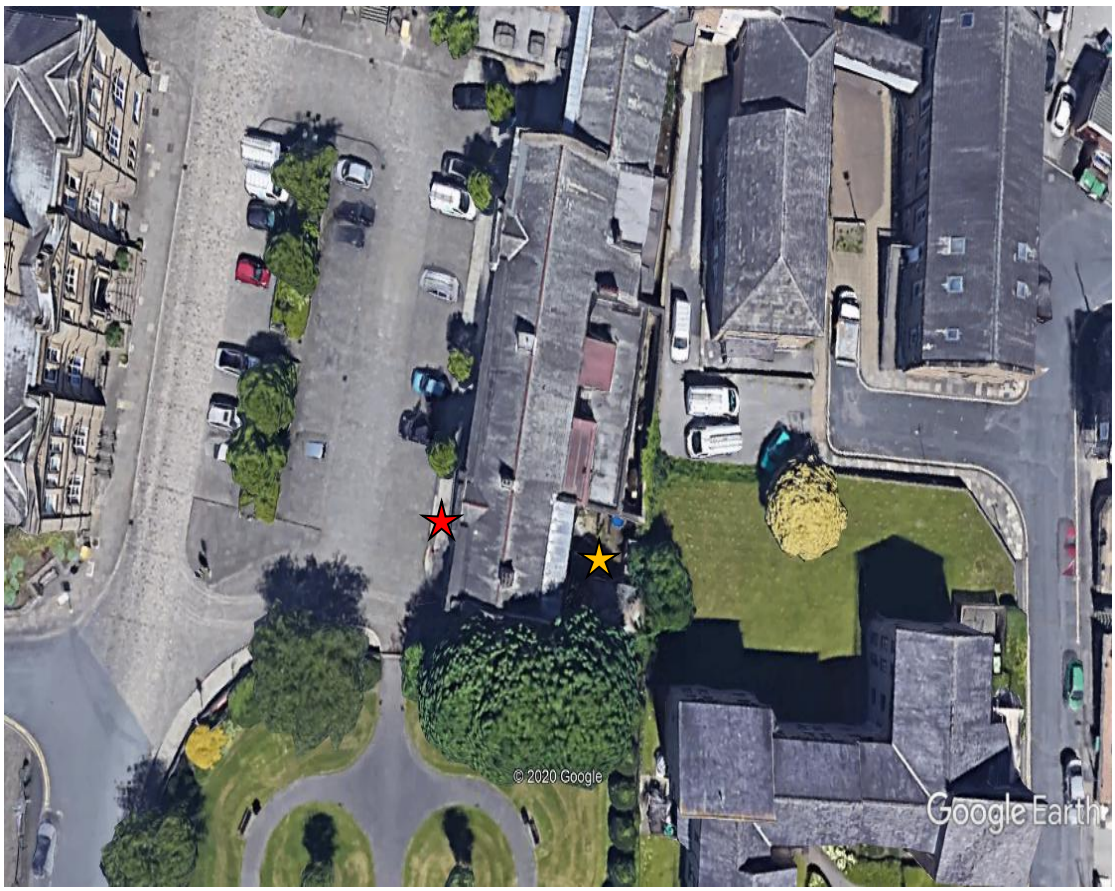
The maximum A-weighted noise level recorded during the measurement period.

Hz

The unit of frequency. The number of cycles (in the context of acoustics, the number of complete sound waves generated) per second.

Appendix 2

Location Plan and Noise Monitoring Position



MP1
MP2

Appendix 3

Equipment Used

B & K 2260 Model integrating sound level meter, Serial Number 172181
Certificate Number 12308
Last Laboratory Calibrated 13/2/20

B & K Microphone 4189 Model, Serial Number 1783702

B & K 4230 Model calibrator, Serial Number 724157
Last Laboratory Calibrated 13/2/20

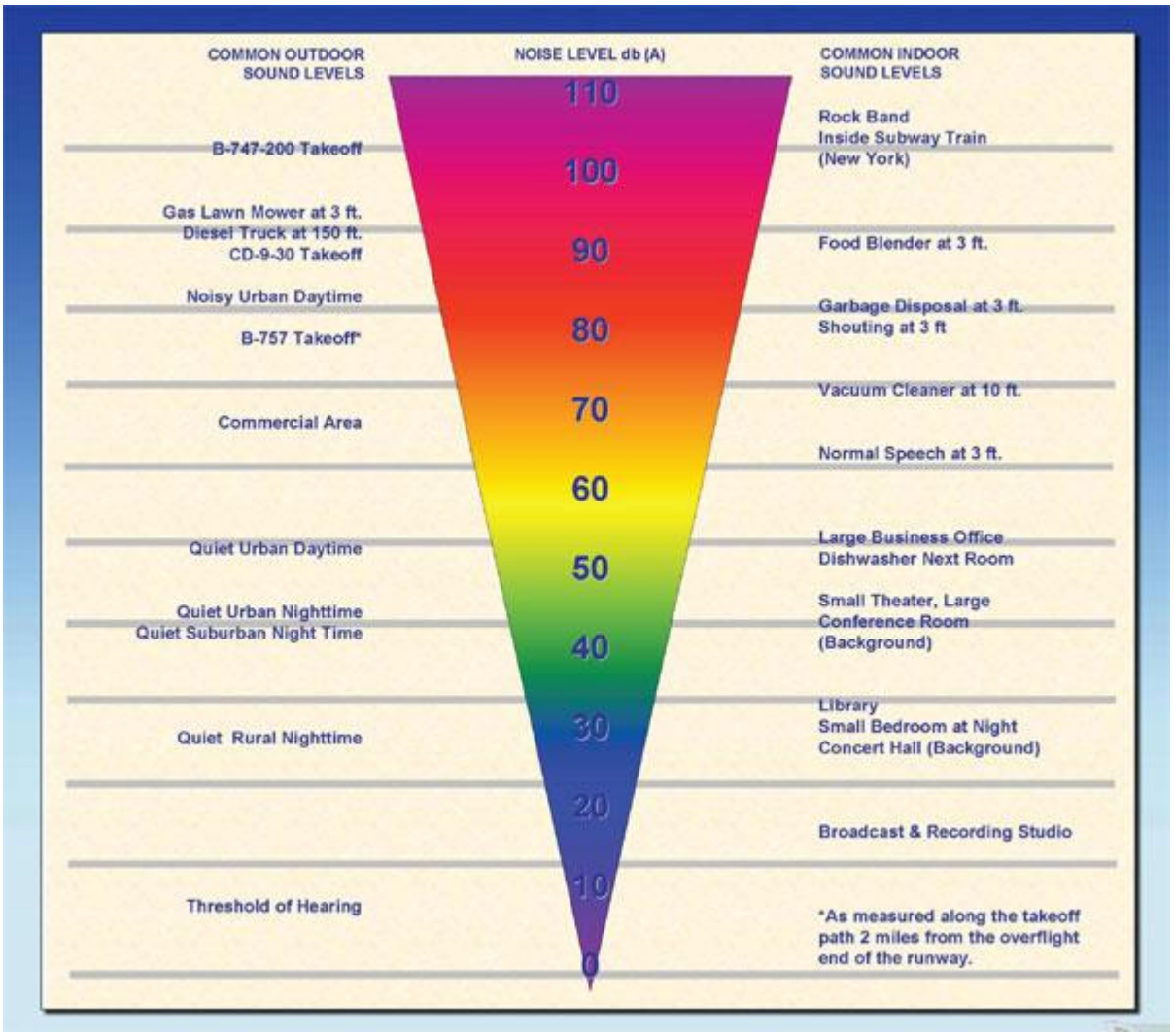
Microphone windshield
Tripod
Anemometer/Thermometer, Serial Number EA931486

The Sound Level Meter was calibrated before and after all measurement periods, with no significant change in calibration. All calibrations took place on site.

The SLM met the requirements of BS EN 60651: 1994 and BS EN 60804: 2001 IEC 60804: 2000. It was capable of simultaneously measuring Leq and Ln values. Batteries for the SLM and calibrator were checked prior to all measurements.

Appendix 4

Sound Level Comparison Chart



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