Crown & Anchor

Proposed New Extension Building

Noise Impact Assessment

Prepared For:

True North Brew Co

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NBAcoustics

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Revision History

Revision	Revision Date	Revision Details
dr1	24th March 2025	Draft for client review
00	26th March 2025	Final Issue

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1 Introduction

NB Acoustics Limited (NBA) have been instructed by True North Brew Co (The Client) to carry out a noise impact assessment of a proposed new extension building in the rear garden area of the Crown & Anchor public house, Barugh Lane, Barugh Green, Barnsley, S75 1LL.

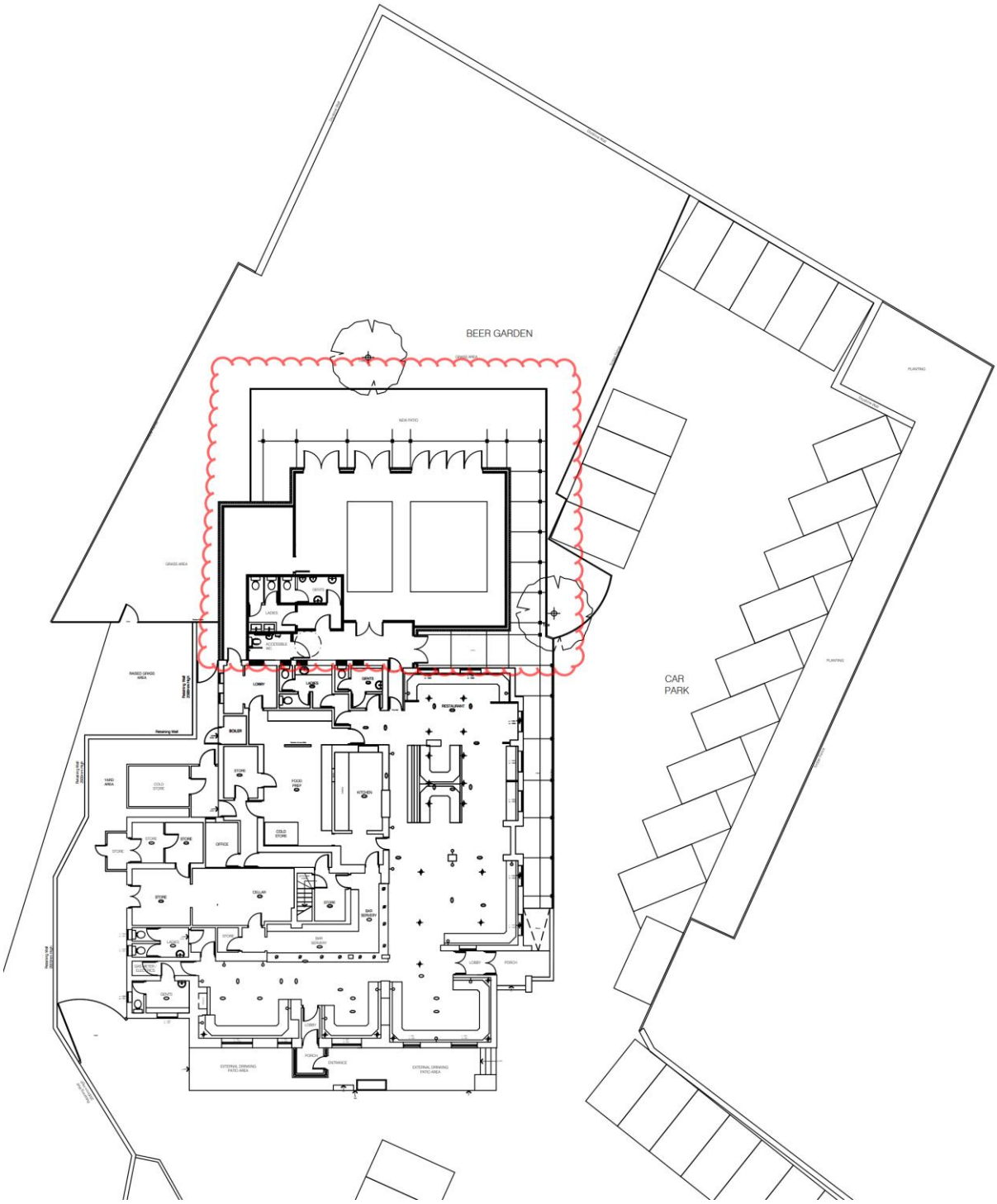
This report presents details of the baseline the noise survey carried out at the site and presents an assessment of potential noise impact of the new extension and events associated with the use on nearby residential properties.

A brief summary of sound theory and terminology used within this report is provided in Appendix A.

2 Site Description and Proposed Development

The proposed development is to build a new extension building on the rear of the Crown and Anchor pub. The site layout is shown in Figure 1 with the extension building shown inside the red clouded area.

Figure 1: Proposed site layout



The Client have informed NBA that the main day to day use of the extension will be to act as overspill space to the main restaurant for food service, with the busiest times expected to be on Sundays.

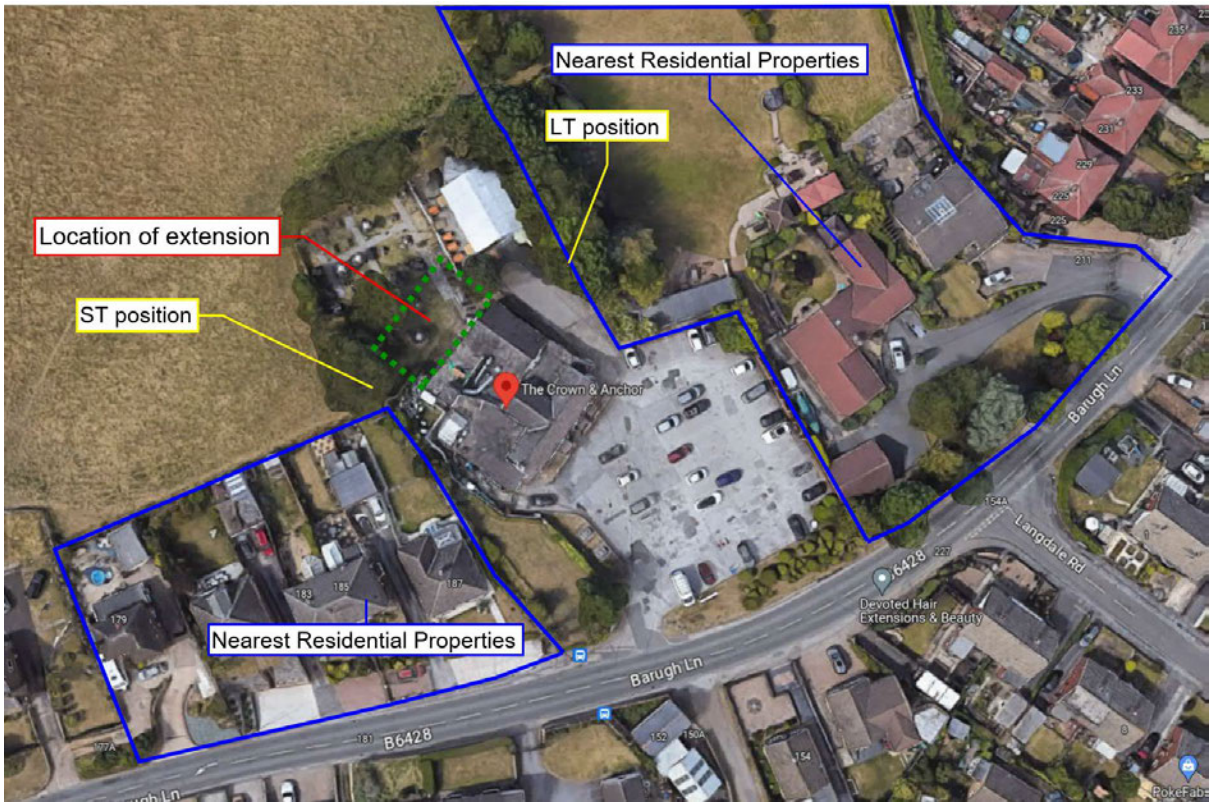
In addition to normal food service the new extension will be available for private hire for pre-booked events including Christenings, Wakes, Birthday Parties and Small Weddings. Some of these events may also have amplified and live music entertainment.

The capacity of the extension building is planned to be 70 people seated for dining service and up to 100 for people for wedding events with some furniture removed to form a dancing area if required.

The rear elevation of the extension building will have double bi-fold doors facing onto a new patio and the existing garden. The doors would be closed during any live or amplified music entertainment.

The nearest residential properties to the proposed extension are those that are immediately adjacent to Crown & Anchor boundary to the east (211 Barugh Lane) and west (179 – 187 Barugh Lane). The nearest residential properties are shown in Figure 2.

Figure 2: Nearest residential properties and noise survey monitoring locations



There will also be noise from some ventilation and air conditioning plant that will service the extension room, though exact details are not available at this stage.

3 Planning Policy and Guidance

3.1 National Planning Policy

3.1.1 National Planning Policy Framework

The National Planning Policy Framework[1] (NPPF) was introduced in March 2012 and revised in 2018, 2019 and most recently 20 July 2021. The document sets out the Government's planning policies for England and how these are expected to be applied.

The NPPF provides for the production of distinctive local and neighbourhood plans by Local Authorities, in consultation with local people, which should be developed to reflect the needs and priorities of their communities.

The NPPF must be taken into account in the preparation of local and neighbourhood plans, and is a material consideration in the determination of planning applications. Planning policies and decisions must also reflect, and where appropriate promote, relevant EU obligations and statutory requirements.

Applications for planning permission must be determined in accordance with the Local Authority development plan (which includes any local plan or neighbourhood plans which have been adopted for the area), unless material considerations indicate otherwise.

The planning system is required to contribute to and enhance the natural and local environment. Consequently, the aim is to prevent both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution.

NPPF paragraphs 174 (e), 185 (a) and (b), and 187 are copied below.

"*174. Planning policies and decisions should contribute to and enhance the natural and local environment by:*

(e) 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. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans

185. 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:

(a) 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[65];

(b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;"

187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

[1] Department for Communities and Local Government (2012) National Planning Policy Framework, DCLG, London

[65] See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)."

With regards to minimising 'adverse impacts' and avoiding 'significant adverse impacts' on health and quality of life, the NPPF refers to the Noise Policy Statement for England Explanatory Note (NPSE)[2].

3.1.2 Noise Policy Statement for England

The statement sets out the long term vision of the government's noise policy, which is to 'promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development'.

This long term vision is supported by three aims:

- 'avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- Where possible, contribute to the improvements of health and quality of life.'

The long term policy vision and aims are designed to enable decisions to be made regarding what is an acceptable noise burden to place on society.

The 'Explanatory Note' within the NPSE provides further guidance on defining 'significant adverse effects' and 'adverse effects' using the concepts:

- No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
- Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

The three aims can therefore be interpreted as follows:

- the first aim is to avoid noise levels above the SOAEL;
- the second aim considers situations where noise levels are between the LOAEL and SOAEL. In such circumstances, all reasonable steps should be taken to mitigate and minimise the effects. However, this does not mean that such adverse effects cannot occur; and
- the third aim considers situations where noise levels are between the LOAEL and NOEL. In these circumstances, where possible, reductions in noise levels should be sought through the pro-active management of noise.

The third aim seeks, where possible, to positively improve the health and quality of life through the pro-active management of noise whilst also taking account the guiding principles of sustainable development. It is considered that the protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.

The NPSE recognises that it is not possible to have single objective noise-based measures that define the SOAEL, LOAEL and NOEL that is applicable to all sources of noise in all situations. The levels are likely to be different for different noise sources, receptors and at different times of the day.

In March 2014, the Department for Communities and Local Government released its Planning Practice Guidance (PPG) web-based resource to support the NPPF. The guidance advises that local planning authorities' should consider:

- whether or not a significant adverse effect is occurring or likely to occur;

[2] Department for the Environment Food and Rural Affairs (2010) Noise Policy Statement for England, Defra

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

This guidance introduced the additional concepts of NOAEL (No Observed Adverse Effect Level), and UAEL (Unacceptable Adverse Effect Level). Full details of the Planning Practice Guidance on effects are provided in Table 1.

Table 1: PPG Guidance

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Factors to be considered in determining if noise is a concern are identified including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative impacts.

3.2 Noise Guidance Documents

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

The World Health Organisation (WHO) 'Community Noise Guidelines'[3] recommend external environmental daytime sound pressure level limits of 55 dB L_{Aeq} or less over the 16-hour daytime period (07:00 to 23:00) "to avoid minimal serious annoyance", and 50 dB L_{Aeq} "to avoid minimal moderate annoyance".

For internal spaces within dwellings at night time, WHO advises;

> "*For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times per night (Vallet & Vernet 1991),"* and*;*
>
> *"In dwellings, the critical effects of noise are on sleep, annoyance, and speech interference. To avoid sleep disturbance, indoor guideline values for bedrooms are 30 dB L_{Aeq} for continuous noise and 45 dB L_{Amax} for single events."*
>
> *"Where noise is continuous, the equivalent sound pressure level should not exceed 30 dB(A) indoors, if negative effects on sleep are to be avoided. When the noise is composed of a large proportion of low-frequency sounds a still lower guideline value is recommended, because low-frequency noise (e.g. from ventilation systems) can disturb rest and sleep even at low sound pressure levels. It should be noted that the adverse effect of noise partly depends on the nature of the source.'*
>
> *'Therefore, to avoid sleep disturbance, guidelines for community noise should be expressed in terms of equivalent sound pressure levels, as well as LAmax/SEL and the number of noise events. Measures reducing disturbance during the first part of the night are believed to be the most effective for reducing problems in falling asleep.*"

In order to achieve these limits where it is desirable for occupants to sleep with partially open windows at night time, the WHO guidelines recommend external sound pressure level limits of 45 dB $L_{Aeq,T}$ or less over the 8 hour night time period (23:00 to 07:00) and 60 dB L_{AFmax}. This assumes the reduction from outside to inside with a partly open window is 15 dB.

A reduced (more stringent) criterion may also be necessary where low frequencies are present which can include amplified music.

3.2.2 IOA Bulletin Criteria and Measurement Guidelines - Good Practice Guide on the Control of Noise from Pubs and Clubs

The criteria and measurement guidelines for the Good Practice Guide on the Control of Noise from Pubs and Clubs[4] were published in an article in the Institute of Acoustics (IOA) Bulletin in November/December 2003 to promote further debate on the subject. The suggested limits are not legally binding and are not included as part of any draft or recommended Guidance. The following contains excerpts from that article with specific reference to this reporting.

Venues where amplified music events take place more 30 times per year but not more than once per week and ends by 23:00 hours, the guidance given within paragraph A2.2 within the article states:

> "*Criteria applicable for both external and internal assessments at noise-sensitive properties:*
>
> *The L_{Aeq} of the entertainment noise should not exceed the representative background noise level L_{A90} (without entertainment noise) by more than 5 dB, and*

[3] World Health Organisation (1999) Guidelines for Community Noise

[4] Good Practice Guide on the Control of Noise from Pubs and Clubs, Institute of Acoustics (IOA) Bulletin, November/December 2003

The L_{10} of the entertainment noise should not exceed the representative background noise level L_{90} (without entertainment noise) by more than 5 dB in any 1/3rd octave band between 40 Hz and 160 Hz.

If the above criteria are met entertainment noise is generally audible but not overly intrusive inside noise sensitive property. "

Venues where amplified music events take place more than once per week or continuous beyond 23:00 hours, the guidance given within paragraph A2.3 within the article states:

"*Criteria applicable for both external and internal assessments at noise-sensitive properties:*

The L_{Aeq} of the entertainment noise should not exceed the representative background noise level L_{A90} (without entertainment noise), and

The L_{10} of the entertainment noise should not exceed the representative background noise level L_{90} (without entertainment noise) in any 1/3rd octave band between 40 Hz and 160 Hz.

If the above criteria are met entertainment noise will be virtually inaudible inside noise sensitive property. "

3.2.3 IEMA Comparative Assessment Method

The IEMA Guidelines for environmental noise impact assessment[5] provides set out a method of assessing the potential impact of change in noise levels. This assessment method is used in some circumstances where there are changes to an existing noise source, which in this case could include the use of the extension and patio/garden area. Table 2 presents typical criteria for establishing the potential noise impact.

Table 2: Impact from change in sound level

Daytime (07:00 – 23:00)	**Slight**	**Moderate**	**Substantial**	**Very Substantial**
Relative Change	≥ 1 and < 3 $L_{Aeq,1hour}$	≥ 3 and < 5 $L_{Aeq,1hour}$	≥ 5 and < 10 $L_{Aeq,1hour}$	≥ 10 $L_{Aeq,1hour}$

An increase of the existing ambient sound level of 3 dB is the 'minimum perceptible under normal conditions' and below a 3 dB change represents a 'slight' adverse impact where noise is not likely to cause any change in behaviour and should normally be acceptable.

The context of the impact including; the absolute noise level of the source; the existing ambient noise climate; time of day; frequency of occurrence; duration; character of the noise; and cumulative impacts will be considered, along with the potential benefit of mitigation where considered necessary.

3.3 BS 4142:2014 + A1:2019

British Standard 4142:2014 + A1:2019 'Methods for rating and assessing industrial and commercial sound' describes methods for rating and assessing sound of an industrial and/or commercial nature. The method compares the rating level of the sound source under consideration with the background sound level near residential locations. The relevant parameters are as follows:

[5] *Institute of Environmental Management and Assessment (IEMA), Guidelines for Environmental Noise Impact Assessment, Version 1.2, 2014*

- Residual sound level, L_r, $L_{Aeq,T}$ dB – residual sound is defined in the standard as the 'ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound'.

- Specific sound level, L_s, $L_{Aeq,Tr}$ dB – the specific sound source is defined in the standard as the 'sound source being assessed', with the specific sound level being specified at the assessment location over a given reference time interval, T_r,.

- Background sound level, $L_{A90,T}$ dB – defined in the standard as the 'A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels'.

- Rating level, $L_{Ar,Tr}$ dB – the 'specific sound level plus any adjustment made for the characteristic features of the sound'.

BS4142 attempts to account for perceivable acoustic characteristics at the receptor locations that are 'likely to attract attention' such as a tonal element, impulsivity or intermittency. BS4142 requires that this is accounted for by adding a penalty to the specific sound level in order to obtain the rating level at the sensitive receptors. The following penalties could apply:

- Tonality: up to +6 dB penalty

- Impulsivity: up to +9 dB penalty (this can be summed with tonality penalty)

- Other sound characteristics (neither tonal or impulsive but still distinctive): + 3 dB penalty

- Intermittency: + 3 dB

Specifically, with regards to tonality, the rating penalties can be applied based on a subjective professional judgement as to whether the tonality at the receptor is likely to be "just perceptible" (+2 dB), "clearly perceptible" (+4 dB), or "highly perceptible" (+6 dB).

Once any adjustments have been made, the background sound level and the rating level are compared. When considering the difference between the rating level and the background sound level, the following guidance is provided in the standard:

- 'Typically, the greater the difference, the greater the magnitude of impact.

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending upon the context.

- A difference of around +5 dB is likely to be an indication of an adverse impact, depending upon the context.

- The lower the rating level is compared to the measured background sound level, the less likely it is that the specific sound will have an 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 upon the context.'

Importantly, as suggested above, BS4142 requires that the rating level of the noise source under assessment be considered in the context of the environment when defining the overall significance of the impact. Any consideration of the magnitude of impact should also take into account other factors including:

- the absolute level of the sound;

- the character and level of the residual sound compared to the character and level of the specific sound; and
- the sensitivity of the receptor.

4 Baseline Sound Level Survey

4.1 Survey Details

NBA carried out an environmental sound level survey at the site to measure the existing environmental sound levels and to subjectively assess the existing soundscape at locations considered representative of the nearest residential properties. The nearest assessment receptor properties considered are:

- R1: 187 Barugh Lane
- R2: 211 Barugh Lane

Long term unattended monitoring was undertaken in one secure location for a period of approximately 68 hours from 14:00 Friday 12th May to 09:30 Monday 16th May 2023.

Attended short term monitoring was undertaken from 13:13 to 13:43 on Friday 12th May.

Long term monitoring was undertaken over contiguous 1 hour logging time periods but also continuous measurement at 1 second resolution. Continuous audio was also recorded to assist with sound source identification during unattended periods. The meter was set to record all relevant parameters including L_{Aeq} , L_{A90} and L_{AFmax} parameters and linear third octave band centre frequencies.

The location of the monitoring positions is shown in Figure 2.

A description of all measurement positions is given in Table 3.

Table 3: Sound level measurement positions

Measurement Position Reference	Position Description
ST	Microphone was mounted in free field conditions on a tripod at 1.2m above ground. This position was chosen to measure sample daytime environmental sound levels in a location representative of the residential properties on R1.
LT	Microphone was mounted in free field conditions on a pole at 1.5m above ground. This position was chosen to measure the existing environmental sound levels in a location considered representative of R1 and R2.

4.2 Measurement Results

The sound level measurement results are presented in Table 4 (ST) and Table 5 (LT).

Table 4: Short term measurement results

Position	Description of Sound Climate	Start Time (hh:mm) / Duration	Ambient Sound Level $L_{Aeq,T}$ (dB)	Maximum Sound Level L_{AFmax} (dB)	Background Sound Level $L_{A90,T}$ (dB)
ST	Constant Road Traffic on M1 and local road networks. Kitchen extraction plant running	13:13 / 30min	55.3	67.1 (aircraft)	54.3

Table 5: Long term monitoring results summary

Start Date	Period	Time Duration	Ambient Sound Level [1] $L_{Aeq,T}$ (dB)	Background Sound Level $L_{A90,T}$ (dB) [2]
Friday 12/05/2023	Daytime	(14:00 - 23:00)	53	48
	Night-time	(23:00 - 07:00)	46	38
Saturday 13/05/2023	Daytime	(07:00 - 23:00)	54	46
	Night-time	(23:00 - 07:00)	44	36
Sunday 14/05/2023	Daytime	(07:00 - 23:00)	51	45
	Night-time	(23:00 - 07:00)	50	41
Monday 15/05/2023	Daytime	(07:00 – 09:30)	54	52

[1]. *Logarithmic average of all measurement durations within the period*
[2] *Arithmetic average of all measurement durations within the period*

The daytime survey results at LT over the proposed operating times of the extension for regular events are presented in Table 6, Table 7 and Table 8.

Table 6: LT - Friday 12th May – baseline levels from 14:00 to 23:00

Date	Start Time	Time Duration (hh:mm)	Ambient Sound Level $L_{Aeq,T}$ (dB)	Background Sound Level $L_{A90,T}$ (dB)
Friday 12/05/2023	14:00	01:00	54.2	52.5
	15:00	01:00	54.7	52.7
	16:00	01:00	54.9	52.7
	17:00	01:00	54.6	52.6
	18:00	01:00	54.0	51.6
	19:00	01:00	52.6	49.8
	20:00	01:00	51.0	47.9
	21:00	01:00	51.4	45.9
	22:00	01:00	49.1	44.7

Audible sound during this Friday period included road distant and local road traffic, voices of patrons outside the pub, vehicle movement in the car park and low-level amplified music from inside the pub.

Table 7: LT - Saturday 13th May – baseline levels from 12:00 to 23:00

Date	Start Time	Time Duration (hh:mm)	Ambient Sound Level $L_{Aeq,T}$ (dB)	Background Sound Level $L_{A90,T}$ (dB)
Saturday 13/05/2023	12:00	01:00	54.0	47.2
	13:00	01:00	49.6	46.2
	14:00	01:00	49.9	46.6
	15:00	01:00	50.1	47.0
	16:00	01:00	56.6	53.6
	17:00	01:00	57.8	53.9
	18:00	01:00	58.3	54.4
	19:00	01:00	57.5	53.3
	20:00	01:00	53.0	49.1
	21:00	01:00	49.2	42.8
	22:00	01:00	45.5	41.2

Audible sound during this Saturday period included amplified music from inside the pub, voices of patrons outside the pub, road distant and local road traffic and vehicle movement in the car park.

Table 8: LT - Sunday 14th May – baseline levels from 12:00 to 23:00

Date	Start Time	Time Duration (hh:mm)	Ambient Sound Level $L_{Aeq,T}$ (dB)	Background Sound Level $L_{A90,T}$ (dB)
Sunday 14/05/2023	12:00	01:00	49.3	45.3
	13:00	01:00	48.6	45.8
	14:00	01:00	50.0	46.8
	15:00	01:00	53.3	49.6
	16:00	01:00	53.9	50.3
	17:00	01:00	52.9	49.8
	18:00	01:00	54.2	51.3
	19:00	01:00	53.6	50.6
	20:00	01:00	52.1	48.8
	21:00	01:00	48.8	44.2
	22:00	01:00	46.3	43.7

Audible sound during this Sunday period included amplified music from inside the pub, voices of patrons outside the pub, road distant and local road traffic and vehicle movement in the car park.

The maximum noise event levels and audible sources of the 15 highest noise events measured during each daytime and evening period are detailed in Table 9.

Maximum levels attributed to birdsong close to the microphone have not been included in Table 9.

Table 9: LT evening maximum sound levels (5 minute time periods)

Rank order of noise event (high-low)	Friday 12th May 14:00 – 22:00		Saturday 13th May 12:00 – 22:00		Sunday 14th 12:00 – 22:00	
	Time (hh:mm)	L_{AFmax} (dB)	Time (hh:mm)	L_{AFmax} (dB)	Time (hh:mm)	L_{AFmax} (dB)
1st	19:10	77.7 (loud exhaust)	17:10	82.3 (motorbike carpark)	17:40	78.6 (dog bark)
2nd	21:40	73.9 (voices of patrons)	17:55	79.1 (dog Bark garden)	16:40	75.6 (voices of patrons)
3rd	21:45	73.7 (voices of patrons)	17:15	78.5 (motorbike carpark)	15:45	74.9 (voices of patrons)
4th	16:30	71.9 (loud exhaust)	18:15	78.1 (voices of patrons)	15:50	74.5 (car door slam)
5th	22:25	69.0 (loud exhaust)	19:50	77.0 (dog Bark garden)	19:00	73.6 (aircraft)
6th	21:15	67.2 (loud exhaust)	14:45	75.7 (loud car exhaust)	16:10	73.5 (car in car park)
7th	20:40	66.7 (car in car park)	18:10	74.9 (dog Bark garden)	21:35	73.4 (car door slam)
8th	16:15	66.1 (car door slam)	16:15	73.9 (voices of patrons)	17:00	72.5 (dog Bark garden)
9th	19:35	65.9 (car door slam)	13:05	73.6 (voices of patrons)	19:30	72.4 (loud car exhaust)
10th	21:20	64.9 (voices of patrons)	18:00	73.3 (voices of patrons)	16:35	72.2 (car door slam)
11th	22:35	64.9 (voices of patrons)	16:40	72.9 (car in car park)	18:05	71.4 (voices of patrons)
12th	22:40	64.9 (voices of patrons)	13:10	72.6 (voices of patrons)	16:55	71.2 (car door slam)
13th	17:25	64.4 (distant road traffic)	14:00	72.6 (voices of patrons)	13:00	69.8
14th	17:50	63.9 (distant road traffic)	12:20	72.2 (loud car exhaust)	18:10	69.6
15th	14:50	63.8 (pub door close)	19:35	72.2 (loud car exhaust)	12:40	69.3

4.3 Meteorological Conditions

Weather conditions over the monitoring periods were relatively calm with no rain. Average wind speeds ranged 1 – 3 m/s throughout all survey period and temperatures raged from 5 °C at night to 17 °C during the day.

The conditions were considered suitable for environmental sound level measurements.

4.4 Instrumentation

Details of the instrumentation used to undertake the sound level measurements are provided in Table 10.

Table 10: Sound measurement equipment

Location	Manufacturer	Equipment Type	Model	Serial Number	Calibration Due
All positions	NTi	Type 1 Sound level meter	XL2-TA (Type 1)	A2A-18413-E0	26/11/2026
	Larson Davies	Field Calibrator	CAL200	17894	26/11/2025

The calibration of the equipment was checked prior to and after the monitoring periods. No significant drift was noted. Copies of equipment calibration certificates can be provided on request.

5 Predictions of Event Sound Propagation

5.1 Source Noise Levels and Scenarios

For normal food services which are not associated with a specific event are not expected to cause any significant increase in noise emissions over and above current food service operations. This use has not therefore been assessed quantitatively with regards to noise from additional patrons inside the building. Noise from patrons seated outside in the garden areas is not expected to change significantly from the current use. Indeed, the proposed new 70 people indoor dining capacity and building may reduce the number of people seated outside as it will reduce the existing outdoor seating area.

Therefore, the most significant sources of noise associated with the proposed extension will be organised events. Noise sources of expected organised events will include voices of patrons inside and use a PA system for amplified music breaking out of the building.

There may also be noise from the proposed building services plant associated with the extension to provide ventilation and air conditioning. This noise source is assessed separately in section 7.

Predictions of people talking outside in the patio/garden area have been undertaken based on a potential of up to 30 people talking with normal vocal effort. Each person has been represented by a point source set to a reference sound level of 60 dB $L_{Aeq,T}$ at 1m (free field) and with a typical human speech octave band frequency spectrum.

For larger events such as small weddings which are likely to have a DJ or live singer with larger PA system, a higher sound power level of 100 dB L_{WA} has been assumed.

For events such as Birthdays and Christenings use of a single powered PA speaker has been assumed playing recorded pop/dance type music with a lower sound power level of 85 dB L_{WA}. This scenario is not included in the quantitative assessment.

The PA equipment will only be located inside the event room and only be used with all doors closed.

Noise egress from the following scenarios have been predicted:

A. Event with up to 100 people; no amplified music; assumes upto 30 people talking simultaneously outside in the patio and garden area with normal vocal effort.

B. Event with up to 100 people; foreground level music provided by a DJ using a full range PA system with doors closed; assumes upto 30 people talking simultaneously outside in the patio and garden area with normal vocal effort.

Maximum (L_{AFmax}) levels have also been predicted based on a scenario of up to 10 people using raised voices simultaneously. The point sources are placed in random positions within the beer garden. These have been represented by each source having a reference level of 80 dB $L_{AF,max}$ at 1m and with a typical raised voice octave band frequency spectrum.

The source sound power levels used in the predictions are included in Appendix B.

5.2 Model of Sound Propagation

A 3D computer noise model[6] of the proposed extension building and outdoor area has been used to predict the sound level egress during the given scenarios at the nearest residential properties.

The model uses a number of area sound sources to represent the roof, rooflights and external walls. The sound power levels have been set based on the minimum recommended sound reduction indices of the building envelope and the predicted internal reverberant sound pressure levels. Based on the higher foreground music PA sound power level, the assumed internal reverberant sound pressure levels used for envelope sound power level predictions are presented in Table 11.

Table 11: Predicted indoor reverberant sound pressure levels during small wedding event with foreground music playing

Event description	A-Weighted Value $L_{Aeq,T}$ (dB)	Sound reduction index (R) / Octave Band Centre Frequency (Hz) 63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Small Wedding with DJ/live singer (PA System Foreground Dance Music level) (ref: Table 18)	92	101	99	80	85	73	76	86

Further details on the model settings are included in Appendix B.

The sound reduction indices used will form part of the mitigation recommendations for the detailed design of the building envelope construction.

The predicted equivalent sound levels at the assessment receptor locations are presented in Table 12.

Table 12: Predicted equivalent sound levels at the receptor locations

Receptor	Scenario	Ambient Sound Level $L_{Aeq,1hour}$ (dB)
R1: 187 Barugh Lane	A – (30 people talking outside, no Music)	43.5
	B – (30 people talking outside, Foreground music inside)	44.3
R2: 211 Barugh Lane	A – (30 people talking, no Music)	38.3
	B – (30 people talking outside, Foreground music inside)	39.8

The Scenario B predicted levels and noise contours are shown in Figure 3.

Figure 4 presents the predicted maximum sound level of 10 people simultaneously using raised voices within the new patio and garden areas. The predicted maximum levels are 58 dB L_{AFmax} at R1 and 53 dB L_{AFmax} at R2. These levels are considered to be relatively low. When compared to the measured levels in Table 4 (R1) and Table 9 (R2), the predicted level of 58 dB from raised voices would be in keeping the existing sound character of the beer garden. L_{Afmax} levels are not assessed further in this report.

[6] Noise model has been produced using dBmap.net v1.7 Noise Mapping Tool

Figure 3: Scenario B equivalent sound level map - $L_{Aeq,1hour}$

Figure 4: Predicted maximum sound levels of 10 people simultaneously using raised voices in the Patio and Garden areas - L_{AFmax}

6 Assessment of Event Noise Impact

6.1 Comparative Change in Level - IEMA Guidance

An assessment of the likely increase in ambient sound levels ($L_{Aeq,T}$) resulting from the different assessment scenario uses has been undertaken using the IEMA guidance in Table 2. Each assessment has included an assessment at sample times through the day including 14:00, 19:00 and 21:00.

The predicted increase in levels for scenario A are presented in Table 13.

Table 13: Scenario A: Impact assessment of events with no music

Receptor	Typical Ambient Level [1] $L_{Aeq,1hour}$ (dB)	Predicted Level $L_{Aeq,1hour}$ (dB)	Cumulative Level $L_{Aeq,1hour}$ (dB)	Increase in Level $L_{Aeq,1hour}$ (dB)	Impact
R1: 187 Barugh Lane	51.4 (14:00)	43.5	52.0	0.7	Negligible
	54.6 (19:00)		54.9	0.3	Negligible
	49.8 (21:00)		50.7	0.9	Negligible
R2: 211 Barugh Lane	51.4 (14:00)	38.3	51.6	0.2	Negligible
	54.6 (19:00)		54.7	0.1	Negligible
	49.8 (21:00)		50.1	0.3	Negligible

[1] *The typical level is taken to the average of the three hourly measurements at the same time on each day*

The predicted increase in sound level due to scenario A concludes in a Negligible impact at the nearest receptors. The impact would reduce further with increasing distance from the patio and garden area. Events commensurate with Scenario A are therefore likely to prove acceptable with no significant effects and without need for additional mitigation.

The predicted increase in levels for scenario B are presented in Table 14.

Table 14: Scenario B: Impact assessment of events with foreground music entertainment

Receptor	Typical Ambient Level $L_{Aeq,1hour}$ (dB)	Predicted Level $L_{Aeq,1hour}$ (dB)	Cumulative Level $L_{Aeq,1hour}$ (dB)	Increase in Level $L_{Aeq,1hour}$ (dB)	Impact
R1: 187 Barugh Lane	51.4 (14:00)	44.3	52.1	0.8	Negligible
	54.6 (19:00)		55.0	0.4	Negligible
	49.8 (21:00)		50.9	1.1	Slight
R2: 211 Barugh Lane	51.4 (14:00)	39.8	51.7	0.3	Negligible
	54.6 (19:00)		54.7	0.1	Negligible
	49.8 (21:00)		50.2	0.4	Negligible

[1] *The typical level is taken to the average of the three hourly measurements at the same time on each day*

The predicted increase in sound level due to scenario B concludes in a Slight adverse impact at the nearest receptor R1 and Negligible impact at R2.

When assessing the likely effects of the scenario B impact on residents at R1 the following context is considered:

- Provided doors remain closed whilst amplified music is playing, the dominant noise source is predicted to be voices of patrons who might congregate in the patio and garden area. The existing sound climate already includes this type of source from current use.
- The type of events like small Weddings that use a DJ or live amplified music with a full range PA system are not expected to occur regularly.
- The most regular events would be Birthdays and Christenings where the patrons would use the Crown and Anchors in house PA system for background music. Which would not be as high powered as that used in Scenario B. The impact of the most regular type of events would therefore be lower.
- There are already regular events which include amplified music inside the pub building and therefore the existing sound climate already includes this type of source.

6.2 Assessment Against the IOA Pubs and Clubs Guidance

The assessment of scenario B is presented in Table 15.

Table 15: Scenario B: Impact assessment of events with foreground music

Receptor	Background Sound Level [1] $L_{A90,1hour}$ (dB)	Predicted Level with music $L_{Aeq,1hour}$ (dB)	Exceedance over Background $L_{Aeq,1hour} - L_{A90,1hour}$ (dB)	Criteria	Meets Criteria
R1: 187 Barugh Lane	48.6 (14:00)	44.3	-4.3	≤ +5	Yes
	51.2 (19:00)		-6.9		Yes
	44.3 (21:00)		0.0		Yes
R2: 211 Barugh Lane	48.6 (14:00)	39.8	-8.8	≤ +5	Yes
	51.2 (19:00)		-11.4		Yes
	44.3 (21:00)		-4.5		Yes

[1] *The background level is taken to the average of the three hourly measurements at the same time on each day*

The predicted entertainment sound level of scenario B would be less than 5 dB above the existing background sound level which indicates the entertainment noise should not be intrusive.

Based on this assessment it is concluded that the worst case less regular small Wedding events are predicted to be acceptable provided the music level is adequately controlled.

The most regular events would be Birthdays and Christenings where the patrons would use the Crown and Anchors in house PA system for background music which would not be as high powered as that used in Scenario B. The impact of the most regular type of events would therefore be lower.

6.3 Mitigation

The impact assessment concludes in a slight adverse impact. There is no additional mitigation considered necessary at this stage over and above ensuring the building envelope can achieve the recommended minimum sound reduction performances given in Table 16.

Table 16: Minimum sound reduction performance requirements – Façade Elements

Envelope element Typical unit / description	Weighted Value R_w (dB)	Sound reduction index (R) / Octave Band Centre Frequency (Hz) 125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Glazing - Roof lights Minimum Acoustic Performance Example unit: 6mm / 16mm cavity / 6.8mm Laminated double glazed units [1]	38	23	24	34	42	43	52
External Walls - All Minimum Acoustic Performance Composite panel cladding (Such as Kingspan KS1000 AWP) / sealed cavity with 50mm mineral wool insulation / SFS Frame / Plasterboard lining 19mm Gypsum Plank & 12.5mm Wallboard. [1] Or 100mm Block twin leaf cavity wall construction [1]	45	23	35	44	49	50	61
Roof - All Minimum Acoustic Performance Example unit: 60mm composite roof panel (Such as Kingspan KS 1000LS) on steel joists with suspended MF ceiling of 1x 15mm Plasterboard with 50mm mineral wool in ceiling void [1]	47	25	37	45	49	56	57
Doors - All Doors (including glazed patio doors) Minimum Acoustic Performance Applies to whole system including door, frames and seals.	38	23	24	34	42	43	52

[1] *product and construction descriptions are for example purposes only. Different configurations/ units can be used provided they can achieve the minimum performance requirements given.*

In addition to the building envelope construction, general mitigation that could be adopted include the following:

- Establish noise limits for amplified music events at the site boundary and install a music noise limiter inside event room.
- Preparation of a noise management plan which includes the following key elements:
    - Minimise impact of noise disturbance to local residents
    - To satisfy the Licensing Authority
    - The identification of the range of potential noise sources relating to the premises and the acceptable levels of noise arising from the events
    - A list of steps taken to manage noise pollution
    - A programme of noise monitoring during the event to monitor to check compliance is being maintained
    - A Complaints Procedure

Where small Wedding events are expected to occur more regularly than currently assumed, or produce louder amplified music levels (such as regular full live bands which include electric bass and drums kits) higher than that assumed in this assessment, further assessment may be required to ensure the building envelope sound insulation performance is sufficient.

7 Assessment of Mechanical Plant Noise

At this stage there are no details about the mechanical ventilation or air conditioning building services plant that might be associated with the proposed extension building. Therefore, a cumulative operational noise limit has been derived based not exceeding the measured pre-development background sound level at the NSR locations in line with the guidance given in BS 4142.

Clause 3.8 of BS4142 notes that the assessment reference time interval is 1 hour during the daytime from 07:00 to 23:00 and 15 minutes during the night-time from 23:00 to 07:00. As the extension is proposed to operate during the daytime and will close before 11pm the appropriate assessment reference time interval is 1 hour.

The survey results presented in section 4.2 show the representative *background sound level* at the proposed latest operational time periods during the evening. From the survey results NBA considers the appropriate *background sound level* to be 44 dB $L_{A90,1hour}$.

The BS4142 methodology states that character corrections (or penalties) should be applied to the *specific sound level* where it contains distinguishable acoustic characteristics (e.g.tonality, impulsivity, intermittency etc.) at the NSR location as discussed in Section 3.3.

The total cumulative noise rating level limit is 44 dB $L_{Ar,Tr}$ when assessed using the BS 4142 methodology. This applies to all fixed plant associated with the new extension.

It is recommended that at this stage mechanical ventilation should allow for the inclusion of attenuators on the atmospheric supply and exhaust sides. The terminal grilles should ideally be in facades that do not face directly towards any residential dwellings. The exact specifications and attenuator sizes would need to be developed during detailed design to ensure the overall predicted impact does not increase from that stated in the previous sections 6.1 and 6.2.

It is also recommended that air conditioning condensers are mounted in a position which provides screening from the nearby residential dwellings.

8 Assessment Uncertainty

All assessments have a degree of uncertainty which could influence the outcome.

Any measurement of ambient sound levels will also be subject to a degree of uncertainty. Environmental sound levels vary between days, weeks, and throughout the year due to variations in source levels and conditions, meteorological effects on sound propagation and other factors. Hence, any measurement survey can only provide a sample of the ambient levels. Every effort is made to ensure that measurements are undertaken in such a way as to provide a representative sample of conditions, such as avoiding periods of adverse weather conditions, and school holiday periods (which are often considered to result in atypical sound levels). However, a small degree of uncertainty will always remain in the values taken from such a measurement survey this has been minimised as follows:

- use of suitable Class 1 sound level meters which comply with the relevant standards and have been calibrated at a UKAS accredited laboratory within the previous 2 years;

- field calibration of the measurement system on site at the start and end of each monitoring period; and

- consideration of weather conditions through on-site observations, the measurements were all completed during still conditions.

It should be noted than any predictions of sound levels have an associated degree of uncertainty. Modelling and measurement processes have been carried out in such a way to reduce such uncertainty, it is unavoidable that some remains. In particular, the following sources of uncertainty have been noted:

- Predictions of sound pressure levels according to ISO 9613 are based on an assumption of moderate downwind propagation, and hence could be considered as a worst-case calculation. However, the standard also indicates an estimated accuracy of ±3 dB(A) in predicted levels.

9 Conclusion

NB Acoustics Limited (NBA) have been instructed by True North Brew Co (The Client) to carry out a noise impact assessment of a proposed new extension building in the rear garden area of the Crown & Anchor public house, Barugh Lane, Barugh Green, Barnsley, S75 1LL.

A baseline sound level survey has been undertaken at the site which includes a full weekend period to measure the existing environmental sound levels, and to subjectively assess the noise climate at locations considered representative of the nearest residential properties.

The dominant sound sources in the area was from road traffic. Other sources included amplified music from inside the pub, voices of patrons outside the pub and vehicle movement in the pub car park.

Sound propagation from the extension building and new patio / garden has been predicted at the nearest residential properties.

Two different event type scenarios have been considered which include:

A. Event with up to 100 people; no amplified music; assumes upto 30 people talking simultaneously outside in the patio and garden area with normal vocal effort.

B. Event with up to 100 people; foreground level music provided by a DJ using a full range PA system with doors closed; assumes upto 30 people talking simultaneously outside in the patio and garden area with normal vocal effort.

Maximum (L_{AFmax}) levels have also been predicted based on a scenario of up to 10 people using raised voices simultaneously.

The predicted levels have been assessed against the IEMA guidelines (Section 3.2.3) and The Noise from Pubs and Clubs guidance (Section 3.2.2).

The overall impact of the expected worst case event, small Weddings, which include amplified music entertainment is predicted to result in a Slight adverse impact though the effects are unlikely to be significant.

Mitigation is discussed in Section 6.3. Where small Wedding events are expected to occur more regularly or produced louder amplified music levels (such as regular full live bands including electric bass and drums kits), significantly higher than that assumed in this assessment, further assessment may be required to ensure the building envelope sound insulation performance remains sufficient.

The most regular events would be Birthdays and Christenings where the patrons would use the Crown and Anchors in house PA system for background music which would not be as high powered as that used in Scenario B. The impact of the most regular type of events would therefore be lower.

A cumulative operational noise limit has been derived based not exceeding the measured pre-development background sound level at the NSR locations in line with the guidance given in BS 4142. The total cumulative noise rating level of all fixed plant associated with the new extension should not exceed 44 dB $L_{Ar,Tr}$ when assessed using the BS 4142 methodology.

Appendix A Perception and Terminology

Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal, Pa). Because if this wide range a noise level scale based on logarithms is used in noise measurement called the decibel (dB) scale. Audibility of sound covers a range of approximately 0 to 140 dB.

The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure noise is weighted to represent the performance of the ear. This is known as the 'A weighting' and annotated as dB(A).

Table 17 lists the sound pressure level in dB(A) for common situations.

Table 17: Noise Levels for Common Situation

Typical Noise Level dB(A)	Example
0	Threshold of hearing
30	Rural area at night, still air
40	Public library, refrigerator humming at 2m
50	Quiet office, no machinery
60	Normal conversation
70	Telephone ringing at 2m
80	General factory noise level
90	Powered lawn motor, operators ear
100	Pneumatic drill at 5m
120	Discotheque – 1m in front of loudspeaker

The noise levels at a measurement point are rarely steady, even in rural areas, and vary over a range dependant upon the effects of local noise sources. Close to a busy motorway, the noise levels may vary over a range of 5 dB(A), whereas in a suburban area this may increase up to 40 dB(A) and more due to the multitude of noise sources in such areas (cars, dogs, aircraft etc.) and their variable operation. Furthermore, the range of night-time noise levels will often be smaller and the levels significantly reduced compared with daytime levels. When considering environmental noise, it is necessary to consider how to quantify the existing noise (the ambient noise) to account for these second to second variations.

Human subjects are generally only capable of noticing changes in steady levels of no less than 3 dB(A). It is generally accepted that a change of 10 dB(A) in an overall, steady noise level is perceived to the human ear as a doubling (or halving) of the noise level. (These findings do not necessarily apply to transient or non-steady noise sources such as changes in noise due to change in road traffic flow, or intermittent noise sources).

Most environmental noise measurements and assessments are undertaken for 'free-field', away from any existing reflecting surfaces (other than the ground). However, it is sometimes necessary to measure noise levels immediately external to a façade when considering the impact on residents inside properties and this requires the correction of 3 dB(A) to the measured (or predicted) facade level due to sound reflection from the façade. The assessment of road traffic noise, for example, is based on predicted (or measured) façade noise level (using the L_{A10} statistical parameter).

L_p	The instantaneous sound pressure level (L_p)
L_{pA} (or L_A)	The A-weighted instantaneous sound pressure level (L_{pAp} or L_A) This is the root mean square size of the pressure fluctuations in the air. This level can fluctuate wildly even for seemingly steady sounds. To make sound level meters easier to read the values on the display are smoothed or damped out. This is effectively done by taking a rolling average of the previous 0.125 s (FAST time constant) or the previous 1 s (SLOW time constant).

L_{AF}, L_{AS}	The letters F or S are added to the subscripts in the notation to indicate when the FAST or SLOW time constant has been used. These are often omitted but it is good practice to include them.
L_{max} L_{Amax} L_{AFmax} L_{min} , L_{Fmin}	The maximum instantaneous sound pressure level (L_{max}), The A-weighted maximum instantaneous sound pressure level (L_{Amax}) The A-weighted maximum instantaneous sound pressure level with a FAST time constant (L_{AFmax}). This is the highest instantaneous sound pressure level reached during a measurement period. The opposite of the L_{max} is the minimum instantaneous sound pressure level or L_{min} etc. It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value.
$L_{N,T}$ $L_{AN,T}$ $L_{AFN,T}$ $_N$ = %age value, 0-100 $_T$ = measurement time e.g. L_{A90}, L_{A10}, $L_{AF90,\ 5\ min}$	The percentage exceedence sound pressure level ($L_{N,T}$), The A-weighted percentage exceedence sound pressure level ($L_{AN,T}$), the A-weighted percentage exceedence sound pressure level with a FAST time constant ($L_{AFN,T}$). This is the sound pressure level exceeded for *N*% of time period *T*. E.g. If an A-weighted level of x dB is exceeded for a total of 6 minutes within one hour, the level will have been above x dB for 10% of the measurement period. This is written as $L_{A10,1hr}$ = x dB. L_{A0} (the level exceeded for 0 % of the time) is equivalent to the L_{Amax} and L_{A100} (the level exceeded for 100 % of the time) is equivalent to the L_{Amin}. It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value.
$L_{eq,T}$ $L_{Aeq,T}$ $_T$ = measurement time e.g. $L_{Aeq,5min}$	The equivalent continuous sound pressure level over period *T* ($L_{eq,T}$), The A-weighted equivalent continuous sound pressure level over period T ($L_{Aeq,T}$). This is effectively the average sound pressure level over a given period. As the decibel is a logarithmic quantity the L_{eq} is not a simple arithmetic mean value. The L_{eq} is calculated from the raw sound pressure data. It is not appropriate to include a reference to the FAST and SLOW time constants in the notation
L_n (NB. different from L_N see above)	The normalised impact sound pressure level The value is a measure of the performance of a floor system and its ability to attenuate foot fall or impact noise under laboratory conditions. The L_n is the level of noise produced by a standard tapping machine measured in the room below the floor being tested. The lower the L_n the better the impact isolation achieved. L_n values are measured and quoted in third-octaves between 100 Hz and 3.15 kHz
L'_{nT}	The standardized impact sound pressure level The value is a measure of the performance of an in situ floor system and its ability to attenuate foot fall or impact noise. The value takes into account the quantity of acoustic absorption within the receiving room. The lower the L'_{nT} the better the impact isolation achieved. L_{nT} values are quoted in third-octaves between 100 Hz and 3.15 kHz
$L'_{nT,w}$	The normalised weighted impact sound pressure level A single value of the $L'_{n'T}$ derived from the third octave values using the method described in BS EN ISO 717-2.
D	The level difference The difference between two measured sound pressure levels. In building acoustics this is usually the difference between the levels in tow adjacent rooms measured to determine the sound insulation performance of the partition between them. In this context *D* values are usually quoted in third-octave bands between 100 and 3150 Hz.
R	The sound reduction index This a measure of the sound insulation performance a material or construction measured under laboratory conditions in accordance with BS EN ISO 140-3. *R* differs from *D* in that it takes account of the area of the construction under test as well as the absorption in the receiving room, both of these factors influence the measured *D*. Taking into account these factors allows the *R* for different constructions to be compared on a like for like basis. *R* values are quoted in third-octaves between 100 Hz and 3150 Hz
R_w	The weighted sound reduction index A single value of the *R* derived from the third octave values of *R* using the method described in BS EN ISO 717-1. Partitioning and building board manufacturers commonly use this index to describe the inherent sound insulation performance of their products.
DnT	The standardised level difference There are occasions when neither D nor R' are the most appropriate descriptors for in situ measurements. An alternative is the DnT, which is D corrected to allow for the reverberation time within the receiving room. Measurements are made in accordance with BS EN ISO 140-4.

DnTw	The weighted standardised level difference A single value of the DnT derived from the third octave values using the method described in BS EN ISO 717-1.
Absorption Coefficient *α*	The ratio of the sound absorbed by a surface to the sound incident upon it. A value of 0 means that no sound is absorbed and a value of 1 means that all sound is absorbed. The sound absorption of a surface is frequency dependent so it is usual to quote values of α in octave or third-octave bands
Reverberation Time T *T60, T30, T20* *RT*	The length of time in seconds it takes for the sound pressure level to decay by 60 dB in an enclosed space after the source has stopped. It is not always possible to measure a full 60 dB sound decay, so reverberation time is often measured by multiplying the times taken to decay by 20 dB or 30 dB to give the equivalent of 60 dB decay time (these are often called T20 and T30 values). The longer the reverberation time the more reverberant the space. Different types of spaces have different ideal reverberation times.
Tmf	The reverberation time is frequency dependant and is usually presented in octave or third-octave bands. On some occasions it is useful average the level in several frequency bands. The mid frequency reverberation time is the arithmetical average of the T60 values in the 500, 1000 and 2000 Hz octave bands.

Appendix B Noise Model Details

Modelling of sound levels from the development have been undertaken using dBmap.net (version 1.5.3) acoustic modelling software. This software implements the sound propagation calculation methodology set out in ISO 9613-2.

Acoustic modelling input data

Data sources used for this modelling include:

Data	Source file	Received from	Comments
Aerial photo	Google		
Site plan, Proposed Elevations	MR + P Architects	True North Brew Co	

Sound power level spectrum for sources included in the acoustic model are set out in Table 18 below.

Table 18: Source sound power level

Source	**Sound Power Level (octave bands) (dB)**								
	63Hz	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**Total A-weighted**
Normal Voice Effort	57.2	63.2	69.2	71.8	53.5	60.8	55.8	50.6	72
Raised Voice Effort	76.5	79.5	85.5	89.6	86.3	80.8	75.3	66.6	91
Small Powered PA Speaker (Dance Music)	94	92	74	78	60	68	79	81	85
Larger DJ PA System (Dance Music)	109	107	89	93	80	83	94	96	100
Roof Construction (L_{WA}/m^2)	71.0	55.9	38.9	33.5	12.7	11.9	11.9	13.1	46
Roof-Light (glazing) (L_{WA}/m^2)	65.0	57.9	51.9	44.5	19.7	24.9	16.9	18.1	48
External Walls (L_{WA}/m^2)	65.0	57.9	40.9	34.5	12.7	17.9	7.9	9.1	44
Patio Doors (L_{WA}/m^2)	65.0	57.9	51.9	44.5	19.7	24.9	16.9	18.1	48

Acoustic model settings

Acoustic modelling has been undertaken using the following model settings:

- Maximum number of reflections: 2
- Noise predictions carried out at a height of 1.5m (daytime) and 4m (night time) to represent ground floor and first floor levels as applicable to the assessment being undertaken.
- Side diffraction enabled (this setting includes calculation of sound travel not only over an obstacle but also around the sides of it).
- Heights of existing buildings estimated based on aerial photography or assumed to be 6m for 2 storey and 4m for 1 storey. Number of storeys for existing buildings determined from Google ‘Streetview’ and site visit.

- Ground absorption has been set as below:
    - All intervening ground is half acoustically soft and hard ground (G=0.5)

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