# Acoustic Consultancy Report

08394/3/2/14

Activity Noise Assessment

## Report Prepared For

Broadtown Brewery
Broad Town Brewery
09 September 2022

## Report Author



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## i) Executive Summary

LCP has been commissioned by Broad Town Brewery to carry out an acoustic environment survey and to use the obtained data to assess the potential noise impact of activities associated with beer garden use on surrounding noise sensitive receptors.

Measurements and calculations have been made to determine activity noise levels at the nearest residential.

The results show that a 7dB(A) noise mitigation scheme is required to sufficiently reduce levels at the nearest noise sensitive receptor. Recommendations have been made to reduce noise levels and to encourage good practise.

## ii) Document History

| Issue | Date | Issue Details | Issued By |
|---|---|---|---|
| 1 | 11th February 2022 | Initial Issue | MB |
| 2 | 24th March 2022 | Response to Planning Consultation Memo added in section 7 | MB |
| 3 | 16th June 2022 | Report Update | VB |
| 4 | 23rd June 2022 | Minor Amendment | VB |
| 5 | 29th July 2022 | Mitigation update | VB |
| 6 | 12th August 2022 | Update to include:<br>• Proposed screen;<br>• Proposed noise monitors and actions;<br>• Opening months;<br>• Conclusion;<br>• Appendix E. | VB |
| 7 | 25th August 2022 | Update following comments in an email from the Council on the 19th August | VB |
| 8 | 9th September 2022 | Update following comments in an email from the Council on the 7th September | VB |

# 1 Introduction

LCP has been commissioned by Broad Town Brewery to carry out an acoustic environment survey and to use the obtained data to assess the potential noise impact of activities associated with beer garden use on surrounding noise sensitive receptors.

# 2 Survey

## 2.1 Site Description

The site layout together with the measurement positions are shown in Appendix A.

Photographs are shown in Appendix B.

## 2.2 Receiver Location

The nearest receiver to the area is approximately 40m to the North of the site. This is shown in both the site plan in Appendix A and the photograph 'looking North' in Appendix B.

## 2.3 Local Noise Climate

The predominant local noise sources were traffic on Broad Town Road and to a lesser extent, occasional construction noise, and mechanical noise from the Broad Town Cars Garage.

## 2.4 Measurements

The noise monitoring took place on 4th February 2022 to the 7th February 2022.

The measurement period was considered sufficient to establish the representative ambient sound levels corresponding to the operational period of the premises.

The proposed periods of operation are;
**Thur/Fri 11:00 – 23:00**
**Sat 12:00 – 23:00**
**Sun 12:00 – 20:00**
**Between April to September only.**
With a maximum capacity of **80 patrons**.

The weather conditions monitored during the survey are shown in the following table.

Table 1: Weather Conditions at Measurement Location

| Weather | Friday | Saturday | Sunday |
|---|---|---|---|
| Average Wind Speed | 7m/s | 7m/s | 9m/s |
| Wind Direction | WSW | SW | W |
| Average Cloud Cover | 71% | 89% | 88% |
| Average Temperature | 7°C | 9°C | 10°C |
| Precipitation | None | None | Occasional Showers |

## 2.5 Measurement Results

The measured statistical broad-band sound pressure levels are shown within Appendix C. The representative background sound level(s) obtained being as follows:

Table 2: Representative background sound levels, dB re $2x10^{-5}$ Pa

| Measurement Position | $L_{A90,\ 15\ mins}$ Friday* | $L_{A90,\ 15\ mins}$ Saturday* | $L_{A90,\ 15\ mins}$ Sunday* |
|---|---|---|---|
| MP1 | 31 | 48 | 37 |

* For the purpose of this assessment Friday is defined as between 17:00 - 22.00, Saturday 12.00 - 22.00 and Sunday 12:00 - 18:00.

The measured ambient broad-band sound pressure levels are shown within Appendix C. The representative ambient sound level(s) obtained being as follows:

Table 3: Representative Ambient sound levels, dB re $2x10^{-5}$ Pa

| Measurement Position | $L_{Aeq,\ T}$ Friday* | $L_{Aeq,\ T}$ Saturday* | $L_{Aeq,\ T}$ Sunday* |
|---|---|---|---|
| MP1 | 49 | 57 | 54 |

* For the purpose of this assessment Friday is defined as between 17:00 - 22.00, Saturday 12.00 - 22.00 and Sunday 12:00 - 18:00.

# 3 Evaluation of Design Criteria

## 3.1 Residential Design Criterion for General Activity

### 3.1.1 BS4142:2014

BS4142:2014 states that 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. Although not completely relevant for music/event noise it is included here for completeness as it can still be used to indicate if complaints are likely.

Table 4: BS4142 assessment based upon rating level

| Difference between background noise and rating levels | Assessment |
|---|---|
| + 10 dB | Indication of a significant adverse impact |
| + 5 dB | Indication of an adverse impact |
| 0 dB | Indication of low impact |

Certain acoustic features can increase the significance of impact. The specific sound level should be corrected if a tone, impulse or other acoustic feature is expected to be present.

Table 5: Corrections for acoustic features, subjective method

| Acoustic Feature | Correction, dB | | |
|---|---|---|---|
| | Just Perceptible | Clearly Perceptible | Highly Perceptible |
| Tonality | 2 | 4 | 6 |

| Acoustic Feature | Correction, dB | | |
|---|---|---|---|
| | Just Perceptible | Clearly Perceptible | Highly Perceptible |
| Impulsivity | 3 | 6 | 9 |
| Other Characteristics | 3 | | |
| Intermittency | 3 | | |

Typically the acoustic feature correction would not be expected to exceed 10dB.

Where the level of uncertainty could affect the conclusion, take reasonably practicable steps to reduce the level of uncertainty.

### 3.1.2 World Health Organisation Night Noise Guidelines for Europe (2009)

Not completely relevant to this scenario as events will not take place at night but included for information.

The WHO's document 'Night Noise Guidelines for Europe (NNG) states the following:

"*…it is recommended that the population should not be exposed to night noise levels greater than 40 dB of* $L_{night,\ outside}$ *during the part of the night when most people are in bed*."

It then goes on to say:

"*An interim target (IT) if 55 dB* $L_{night,\ outside}$ *is recommended in the situations where the achievement of NNG is not feasible in the short run for various reasons*."

### 3.1.3 World Health Organisation (WHO) Guidelines for Community Noise (1999)

The WHO's 'Guidelines for Community Noise' gives the following relevant noise criteria:

Table 6: Guideline values for community noise, from Guidelines for Community Noise (WHO, 1999)

| Specific Environment | $L_{Aeq,\ T}$ dB | Time Base (hours) | $L_{Amax}$, fast dB |
|---|---|---|---|
| Outdoor living area (serious annoyance, daytime and evening) | 55 | 16 | - |
| Outdoor living area (moderate annoyance, daytime and evening) | 50 | 16 | - |
| Dwelling, indoors | 35 | 16 | - |
| Inside bedrooms | 30 | 8 | 45 |
| Outside bedrooms | 45 | 8 | 60 |
| Outdoors in parkland and conservation areas* | - | - | - |

* Existing quiet outdoor areas should be preserved and the ratio of intruding noise to natural background sound should be kept low

The WHO's 'Guidelines for Community Noise' also gives the following general guidance on the expected sound insulation performance of a façade with a partly open window, it states that:

"*At night, sound pressure levels at the outside facades of the living spaces should not exceed 45 dB $L_{Aeq}$ and 60 dB $L_{Amax}$, so that people may sleep with bedroom windows open. These values have been obtained by assuming that the noise reduction from outside to inside with the window partly open is 15 dB.*"

### 3.1.4 BS8233:2014

The criteria offered in BS8233 for residential buildings are largely based on the recommendations made in the Guidelines for Community Noise.

Using the general guidance from above, on the expected sound insulation performance of a façade with a partly open window, the criteria shown in the table below have been adapted from the criteria offered in table 4 of BS8233 in order to obtain acceptable external noise levels.

The noise levels shown should be treated as overall noise levels, i.e., the combination of all existing noise levels at the site, and noise levels from any proposed plant or activity.

Table 7: External ambient noise levels for dwellings, based on BS8233, dB re $2x10^{-5}$ Pa

| Activity | Location | Time period | |
|---|---|---|---|
| | | 07:00 to 23:00 | 23:00 to 07:00 |
| Resting | Living Room | 50 $L_{Aeq,16\ hour}$ | - |
| Dining | Dining Room/area | 55 $L_{Aeq,\ 16\ hour}$ | - |
| Sleeping (daytime resting) | Bedroom | 50 $L_{Aeq,\ 16\ hour}$ | 45 $L_{Aeq,\ 8\ hour}$ |

In addition to the above criteria, BS8233 goes on to say:

"*For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 $L_{Aeq,\ T}$, with an upper guideline value of 55 dB $L_{Aeq,\ T}$ which would be acceptable in nosier environments*."

The above criteria are in line with the recommendations made in WHO's 'Guidelines for Community Noise'.

### 3.1.5 Local Authority

In an email from Brett Warren, a Senior Environmental Health Officer at Wiltshire Council, on the 10th June 2022, a noise criteria of 40dB(A) at the nearest residential window due to beer garden activity only was agreed.

## 3.2 Recommended Rating Levels

The absolute design noise levels associated with beer garden use to be adopted for this project are set out in the table below.

Table 8: Absolute Design rating levels, dB re $2x10^{-5}$ Pa

| Receiver Premises | Approximate Distance (m) | Maximum Level for general beer garden activity $L_{Aeq,\ 15\ minute}$ |
|---|---|---|
| Nearest Residential to the North | 40 | 40 |

# 4 Calculated Results

Calculations of the predicted noise levels have been carried out in accordance with ISO 9613 in CadnaA software, the predicted noise levels are shown in the images in Appendix E and summarised in table 9.

The CadnaA model assumes 80 patrons using the beer garden. We have assumed worst case with patrons using a raised voice achieving a noise level at 1m of 65dB. A -3dB correction has been applied to account for 50% of patrons talking at the same time, assuming the remainder 50% of patrons are listening.

The beer garden is surrounded by fields and therefor a ground absorption of 0.5 has been applied.

There is an existing hedge to the north of the site, owned by the Broad Town Brewery which butts up to the corner of the boundary line of the nearest receiver which should remain.

Table 9: Calculated noise levels from beer garden activity, dB re $2x10^{-5}$ Pa

| Receiver Premises | Approximate Distance (m) | Criteria $L_{Aeq,\ 15\ minute}$ | Calculated $L_{Aeq,\ 15\ minute}$ |
|---|---|---|---|
| Nearest Residential to the North | 40 | 40 | 47 |

## 4.1 Mitigation

A solid fence with a minimum height of 3m, installed along the northern boundary of the beer garden will sufficiently reduce the noise levels, shown in table 10.

Table 10: Mitigated noise levels from beer garden activity - screen, dB re $2x10^{-5}$ Pa

| Receiver Premises | Approximate Distance (m) | Criteria $L_{Aeq,\ 15\ minute}$ | Calculated $L_{Aeq,\ 15\ minute}$ |
|---|---|---|---|
| Nearest Residential to the North | 40 | 40 | 40 |

# 5 Comments

An environmental noise survey has been undertaken in order to establish the representative ambient sound levels local to the site.

Measurements and calculations have been made to determine activity noise levels at the nearest residential. The results show that a 7dB(A) noise mitigation scheme is required to sufficiently reduce levels at the nearest noise sensitive receptor.

Broad Town Brewery will need to ensure that no more than 80 patrons use the beer garden at any one time. As this will be difficult to control, it is advised a noise monitoring device should be installed and maintained on the proposed screen on the northern boundary to check levels are within a suitable range and notify the Brewery when the noise goes above a certain level. The location of the noise monitoring devices should be installed at a minimum height of 1.5m facing into the hops gardens, this is shown in Appendix F. In order to achieve the criteria at the residential receiver, the limiting noise level at the beer garden northern boundary should not exceed **67dB(A).** Broad Town Brewery have contacted NTi Audio who have in turned provided information and quote for a NoiseScout system consisting of a Class 1 XL2 outdoor noise monitoring kit, a NetBox communication hub and a hosted web portal. Staff should be trained by NTi Audio on receiving the monitoring device to ensure that correct use and installation. The staff at Broad Town Brewery are suitably trained and, in the event when staff are alerted to the noise levels exceeding the requirements, they will take immediate action and warn patrons that levels are becoming excessive, or may even ask patrons to leave. A

record log should be used and kept as an historic record, which may be share with the Council in instances where a complaint has been made. An example form to be used by the Brewery is provided in Appendix E.

As a precaution, we would advise the use of signage around the beer garden to encourage patrons to be respectful of the neighbouring residents and to be conscious of noise levels.

# 6 Conclusion

LCP has been commissioned by Broad Town Brewery to carry out an acoustic environment survey and to use the obtained data to assess the potential noise impact of activities associated with beer garden use on surrounding noise sensitive receptors.

The results show that with the proposed mitigation, the hop gardens activity would result in an indication of low impact to existing residential amenities. Broad Town Brewery will provide an enforceable control measure should the facilities exceed the agreed dB(A) limit.

These mitigation measures at the development would prevent any urbanisation of the open countryside.

## Appendix A: Site Plan



## Appendix B: Photographs



Looking North



Looking South



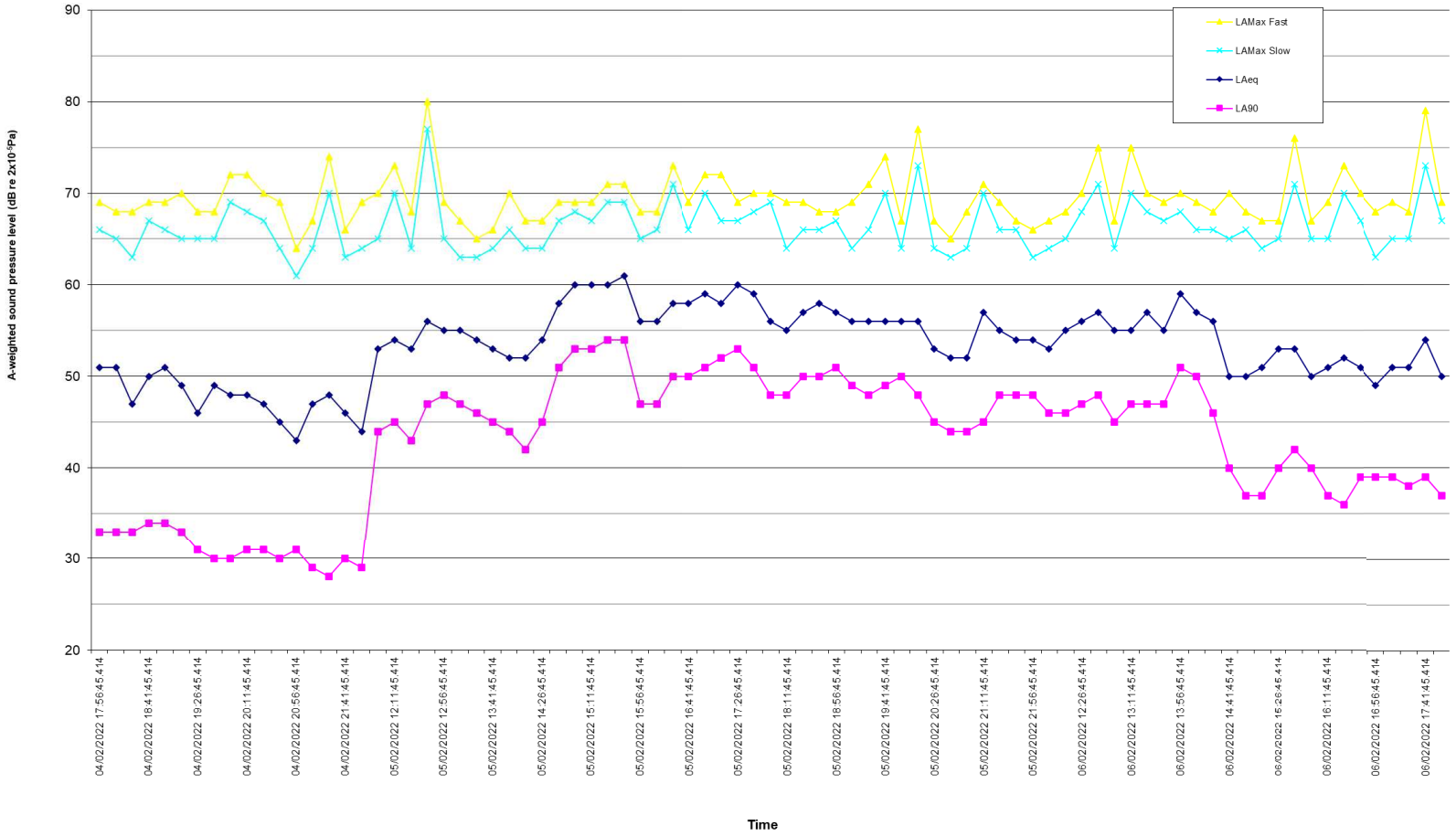
Looking East



Looking West

## Appendix C: Existing Ambient Noise Measurement Data

Showing 15 minute intervals for Friday evening, Saturday day and evening, and Sunday day at MP1



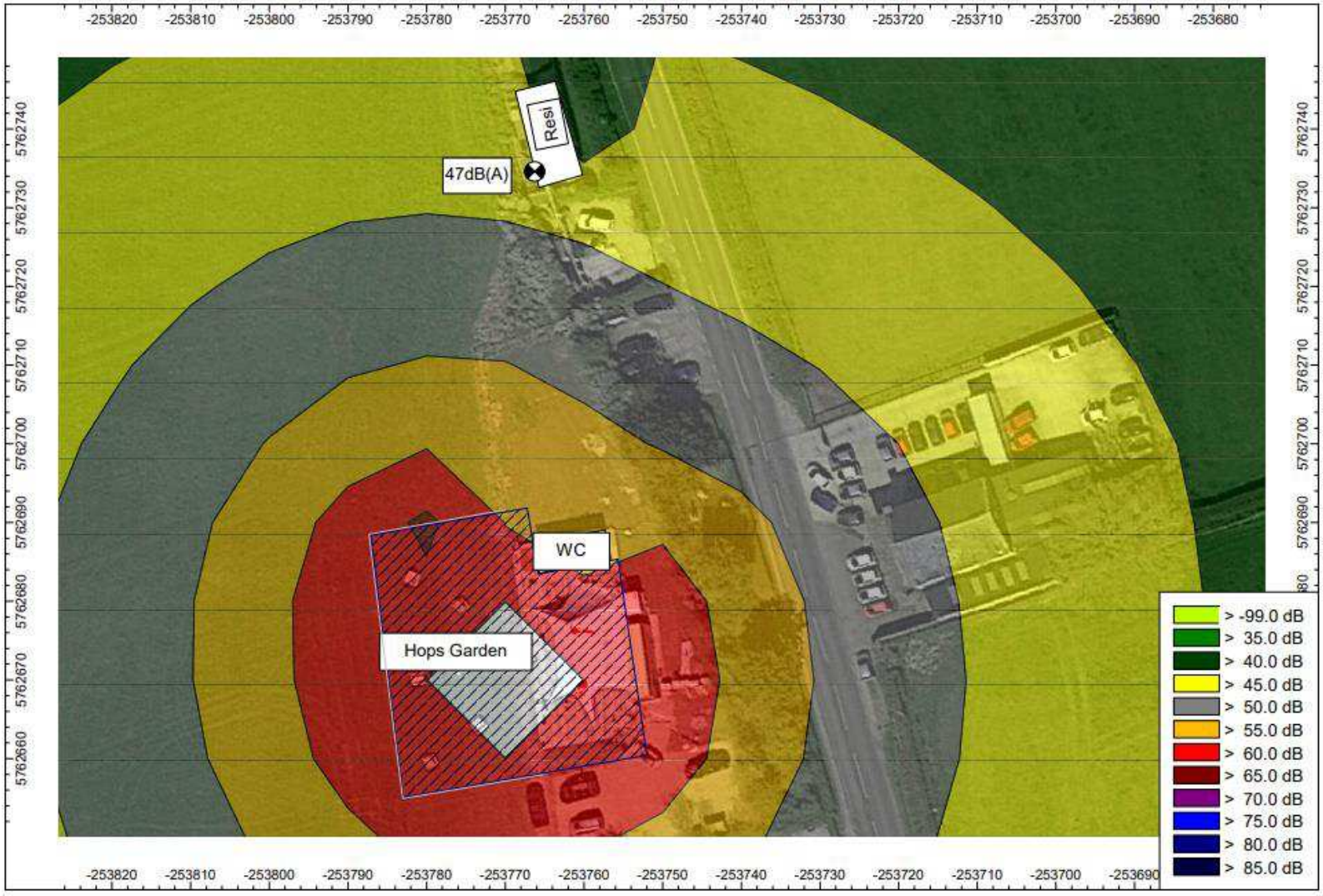

Sound pressure level measurements were obtained using the following instrumentation complying with the Class 1 specification of BS EN 61672:2003

- Svantek 979 Sound Level Meter S/N: 92925 (next cal due 16/05/23) Start gain -0.84 End gain -0.91
- Svantek pre-amplifier SV17 S/N: 106525 with GRAS microphone capsule 40AE S/N: 376416

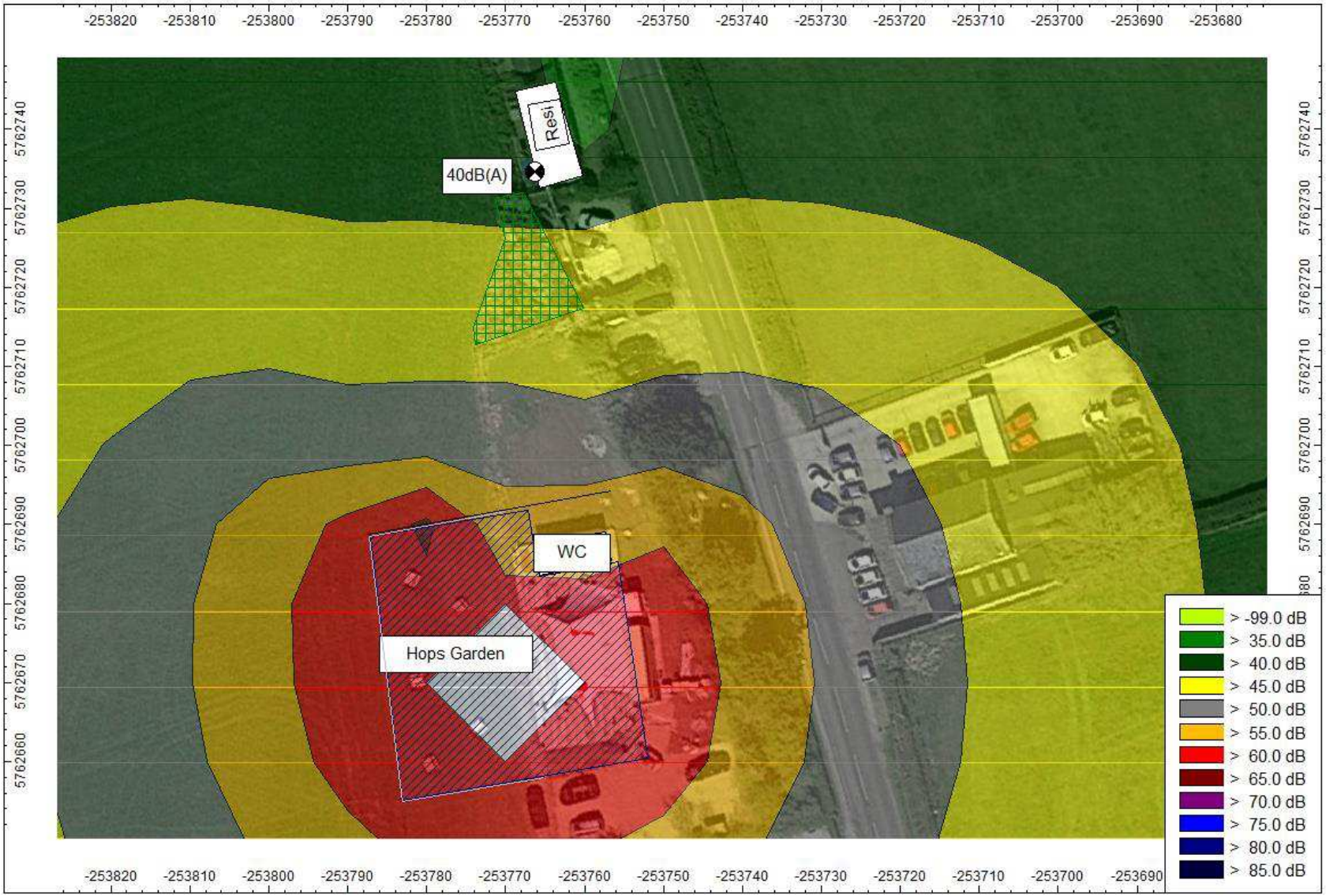
Calibration checks were made prior to and after completion of measurements using a Bruel & Kjaer 4231calibrator, S/N: 2191291 (next cal due 05/01/23) complying with Class 1 specification of BS EN 60942:2003, calibration level 94.0 dB @ 1.0 kHz. All acoustic instrumentation carried current manufacturer's certificates of conformance.

## Appendix D: CadnaA Model

No Mitigation



Mitigation


-253820
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5762700
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5762670
5762660
Resi
40dB(A)
WC
Hops Garden
> -99.0 dB
> 35.0 dB
> 40.0 dB
> 45.0 dB
> 50.0 dB
> 55.0 dB
> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB

## Appendix E: Noise Monitoring Form

As good practise a noise monitor is to be installed on the northern boundary of the beer garden and alert staff when noise exceed a certain level. The proposed noise monitor should be installed on the northern boundary of the hops garden, installed at a minimum height of 1.5m facing into the hops gardens. An indicative location has been provided in Appendix F. A record log should be used and kept as an historic record, which may be share with the Council in instances where a complaint has been made. An example log to be used by Broad Town Brewery has been provided below.

| Date | Time | Action taken Y/N | Resolved Y/N | Initial* | Comments |
|---|---|---|---|---|---|
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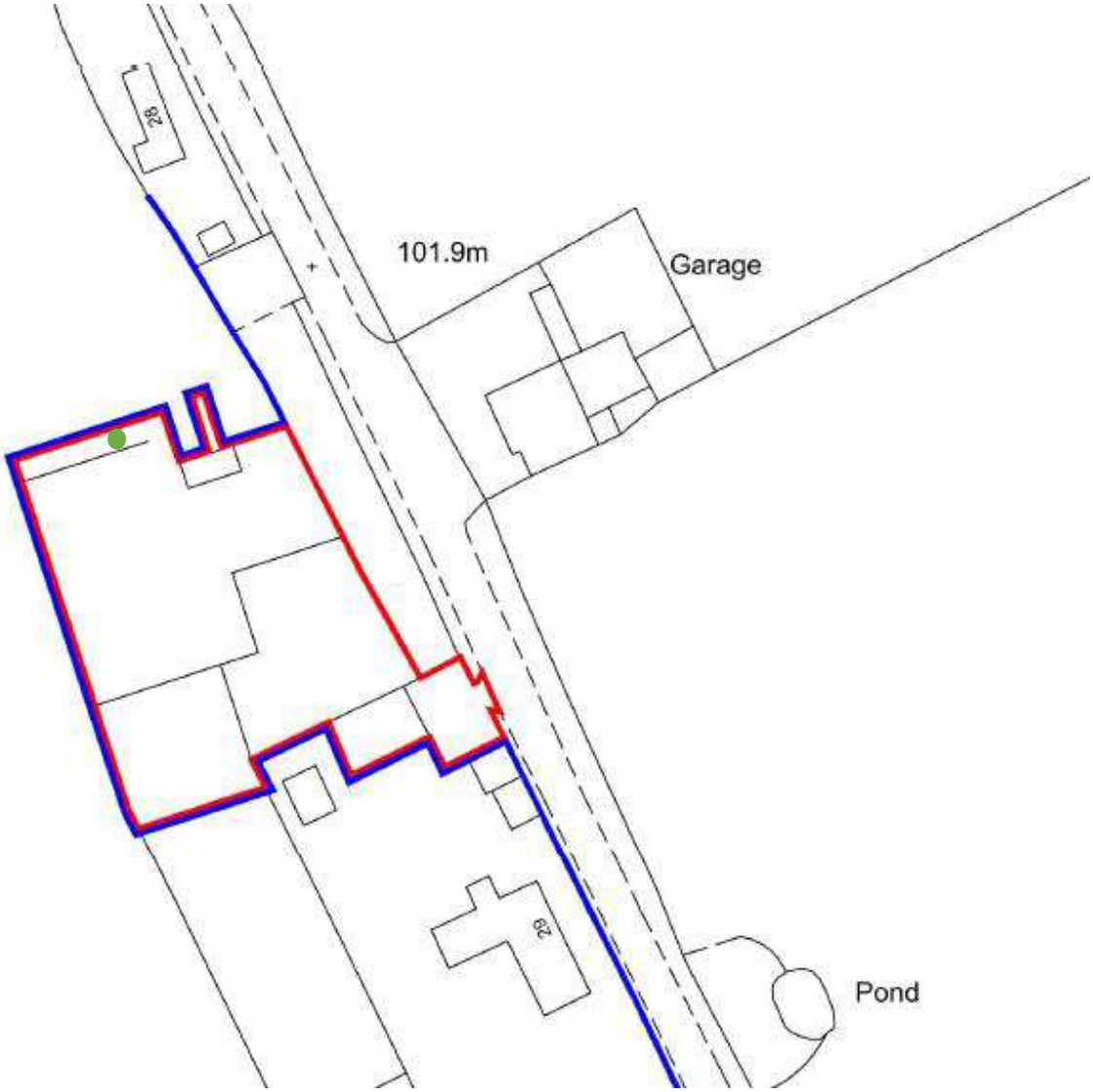
## Appendix F: Noise Monitor Location

The proposed noise monitor should be installed on the northern boundary of the hops garden, installed at a minimum height of 1.5m facing into the hops gardens. An indicative location has been provided below, shown by a green dot.



## Appendix G: Glossary

The list below details the major acoustical terms and descriptors, with brief definitions:

| **'A' Weighting** |
|---|
| Weighting applied to the level in each stated octave band by a specified amount, in order to better represent the response of the human ear. The letter 'A' will follow a descriptor, indicating the value has been 'A' weighted. An 'A' weighted noise level may also be written as dB(A). |
| **Airborne Noise** |
| Noise transmitted through air. |
| **Ambient Noise** |
| The total noise level including all 'normally experienced' noise sources. |
| **dB or Decibel** |
| Literally meaning 'a tenth of a bel', the bel being a unit devised by the Bell Laboratory and named after Alexander Graham Bell. A logarithmically based descriptor to compare a level to a reference level. Decibel arithmetic is not linear, due to the logarithmic base. For example: |

| | |
|---|---|
| 30 dB + 30 dB ≠ 60 dB | 30 dB + 30 dB = 33 dB |

| **$D_{nTw}+C_{tr}$** | |
|---|---|
| The weighted, normalised difference in airborne noise levels measured in a source room (L1) and a receive room (L2) due to a separating partition. | |
| D | Is simply L1 – L2. |
| $D_{nT}$ | Is the normalisation of the measured level difference to the expected (in comparison to the measured) reverberation time in the receiving room. |
| $D_{nTw}$ | Is the weighted and normalised level difference. This value is the result of applying a known octave band weighting curve to the measured result. |
| $C_{tr}$ | Is a correction factor applied to the $D_{nTw}$ to account for the known effects of particular types of noise, such as loud stereo music or traffic noise. |

| **Frequency (Hz)** |
|---|
| Measured in Hertz (after Heinrich Hertz), and represents the number of cycles per second of a sound or tone. |

**Insertion Loss, dB**

The amount of sound reduction offered by an attenuator or louvre once placed in the path of a noise level.

**$L_{A90, T}$**

The 'A' weighted noise level exceeded for 90% of the time period T, described or measured. The '90' can be substituted for any value between 1 and 99 to indicate the noise level exceeded for the corresponding percentage of time described or measured.

**$L_{Aeq, T}$**

The 'A' weighted 'equivalent' noise level, or the average noise level over the time period T, described or measured.

**$L_{Amax}$**

The 'A' weighted maximum measured noise level. Can be measured with a 'slow' (1 sec) or 'fast' (0.125 sec) time weighting.

**$L_{Amin}$**

The 'A' weighted minimum measured noise level.

**NR**

Noise Rating (NR) level. A frequency dependent system of noise level curves developed by the International Organisation for Standardisation (ISO). NR is used to categorise and determine the acceptable indoor environment in terms of hearing preservation, speech communication and annoyance in any given application as a single figure level. The US predominantly uses the Noise Criterion (NC) system.

**Octave**

The interval between a frequency in Hz (f) and either half or double that frequency (0.5f or 2f).

**Pa**

Pascals, the SI unit to describe pressure, after physicist Blaise Pascal.

**Reverberation Time, $T_{mf}$, RT60, RT30 or RT20**

The time taken in seconds for a sound to diminish within a room by 1,000 times its original level, corresponding to a drop in sound pressure of 60 dB. When taking field measurements and where background noise levels are high, the units RT20 or RT30 are used (measuring drops of 20 or 30 dB respectively). Sometimes given as a mid-frequency reverberation time, $T_{mf}$ which is the average of reverberation time values at 500Hz, 1kHz and 2kHz.

**$R_w$**

The sound reduction value(s) of a constructional element such as a door, as measured in a laboratory, with a known octave band weighting curve applied to the result.

**Sound Power Level**

A noise level obtained by calculation from measurement data, given at the face of an item of plant or machinery. Referenced to $10^{-12}$ W or 1pW.

**Sound Pressure Level**

A noise level measured or given at a distance from a source or a number of sources. Referenced to $2x10^{-5}$ Pa.

**Subjective Effect of Changes in Sound Pressure Level**

The table below details the subjective effects of variations in sound pressures (adapted from Bies and Hansen).

| Difference between background noise and rating levels | Increase in ambient noise level in 'real terms' | Change in apparent loudness |
|---|---|---|
| + 10 dB | + 10 dB | Twice as loud |
| + 5 dB | + 6 dB | Clearly noticeable |
| 0 dB | + 3 dB | Just perceptible |
| -10 dB | 0 dB | No change |

**W**

Watts, the SI unit to describe power, after engineer James Watt.