

Acoustic Assessment at



Court Lodge Farm

Hook Green Road, Southfleet

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Executive Summary

Ned Johnson Acoustic Consultants Limited has been appointed to undertake an acoustic assessment of the proposed extension of hours at Court Lodge Farm, Hook Green Road, Southfleet.

The assessment takes account of the existing noise environment, which has been quantified using direct measurement to allow comparison of any sound emissions from the proposed change of use at the boundary of the nearest residential property.

No noise control works are required as the operation is predicted to have a low impact using the BS4142 rating system.



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1. Introduction

- 1.1 Ned Johnson Acoustic Consultants Limited has been appointed to undertake an acoustic assessment of the proposed extension of hours at Court Lodge Farm.
- 1.2 The site has planning permission to use the existing buildings on the site for the importation, packing, cold-storage, packing and dispatch of produce from 6am – 6pm daily.
- 1.3 The site has previously been used for the 12 years as processing, packing, storage and distribution facility for agricultural produce such as strawberries and raspberries. The use by former occupant, Prep World, was more intense than the current use and operated 24-hours per day with a higher level of staff, fork-lift trucks and heavy goods vehicles. The site proprietor would like to extend the hours granted in planning permission DA/23/01276/COU to 24-hour operation. This was previously undertaken with no complaints from nearby residents.
- 1.4 The noise levels from the system at the nearest noise-affected property has been predicted and compared to the likely requirements of Dartford Borough Council using the methodology set-out in BS4142:2014+A1 2019. The likely requirement is that noise from the external equipment shall be at least 5dB below the background noise level at the nearest or most noise affected residential window.



2. Site Description

- 2.1 The site is located on Court Lodge Farm, Hook Green Road, Southfleet. The site currently buildings which are used for commercial operations, most recently they were occupied by Prep World, which packed, stored and distributed agricultural products, such as strawberries and raspberries. The operation was 24-hours per day. The current site operator, Prep Kitchen, runs a similar operation but less intensely.
- 2.2 The site had a regular movement of HGVs for deliveries and distribution to the buildings on site, up to 60 per day, as well as 40 light vans undertaking deliveries. There were 8 forklift trucks which all worked externally at the site. The previous occupant also had 450 members of staff which led to up to 240 cars per day arriving/leaving the site.
- 2.3 Figure 1 below shows the location of the units and their proximity nearest residential property. MP1 refers to the measurement point for background noise which was located in the garden of the nearest residential property to the site. The sound level meter was placed adjacent to the façade of the property nearest to the site.

Figure 1



- 2.4 The new occupant of the site, Prep Kitchen, will have approximately 50 members of staff per shift and it is predicted there will 20 cars and 3 minibuses per shift (the site has a travel plan which involves bringing staff in by minibus) as opposed to 120-240 under the previous tenant. There will be up to 10 HGVs per day and approximately 5 small deliveries as opposed to the previous 40. The operational hours are proposed to be extended to 24-hours, as with the previous, more intensive use, of the site. There are two 12-hour shifts each with the same number of vehicle movements and staff although there will be no HGV movements or unloading at night. The latest a HGV will move on site will be on Saturdays up to 22:00.
- 2.5 In addition to the reduced HGV movements and staff there will be one forklift truck as opposed to the eight previously in use.



- 2.6 The activities themselves all take place within the existing buildings, with all vehicles entering the site via the gated entrance, the buildings screen the nearest noise sensitive receptor from all activities.
- 2.7 The receptor also has a 3-metre high close-boarded heavy wooden fence along the boundary with the farm complex. This screens the receptor from the nearest mechanical plant and the units.
- 2.8 During the site visits the mechanical plant at Court Lodge Farm was all in operation. In the garden of the receptor there was a very faint hum of the nearest condenser units at Court Lodge Farm, nothing else was audible.
- 2.9 The buildings have some windows facing the receptor, all warehouse style doors face into the site and are screened from the Receptor. There is one ordinary door (house style door rather than warehouse door) on the same side of the building as the windows.
- 2.10 The nearest windows facing the receptor appear to be office windows and are screened by the Receptor boundary 3 metre fence, but for the sake of a conservative assessment it will be assumed they are warehouse windows. The door is also screened by buildings and the fence, again for a conservative approach it is assumed that the door is directly into the warehouse.
- 2.11 The site has been operating for 24-hours since July 2023 and no complaints have been received from nearby residents. The movement of all vehicles is screened by the existing buildings on site and there is no audible sound from vehicle movements, loading or unloading at the nearest noise sensitive premises.



3. Reference Documents

National Planning Policy Framework

3.1 The Department of Housing, Communities and Local Government published the National Planning Policy Framework (NPPF) in December 2023.

3.2 Paragraphs 180 (e) 191(a), (b) and 193 refer to noise in terms of policy approach:

180. 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; and

191. 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.



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

193. 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.

Noise Policy Statement for England

3.3 The Department for Environment, Food and Rural Affairs published the *Noise Policy Statement for England* (NPSE) in March 2010. The explanatory note of NPSE defines the terms used in the NPPF:

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

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

LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.



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

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

3.4 The NPSE does not define the SOAEL numerically, stating at paragraph 2.22:

“2.22 It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”

3.5 There is no local or national guidance on how the three terms should be defined numerically.

3.6 There are three aims in the NPSE, which match, and expand upon, the first two bullet points in paragraph 123 of the NPPF and add a third aim that relates to a wider improvement in health and quality of life (the bold text is in the NPSE):

3.7 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development.

3.8 The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable



steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.

- 3.9 This aim seeks, where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.

British Standard 4142:2014+A1 2019

- 3.10 The scope of British Standard 4142: *Method for rating industrial noise affecting mixed residential and industrial areas* describes methods for determining, at the outside of a building:
- a) noise levels from factories, or industrial premises, or fixed installations, or sources of an industrial nature in commercial premises; and
 - b) background noise level.
- 3.11 In particular BS4142 describes the “*use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.*” It sets out a methodology for assessing a noise Rating level which is a combination of absolute or ‘specific’ noise level (in terms of L_{Aeq} average noise level over different durations; 1 hour for daytime and 15 minute at night); and then including penalties to account for



character of a noise (i.e. tonality, impulsivity, intermittency and ‘other’).

[L]
[SEP]

- 3.12 BS4142 applies to new noise sensitive developments that are proposed near [L]
[SEP]existing industrial sources, the following paragraph relates to such developments: [L]
[SEP]

*“Where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation.” [L]
[SEP]*

Further to this BS4142:2014 also notes that other standards may be relevant; in this development this would include BS8233:2014.

- 3.13 The rating levels in BS4142 are as follows:

*“a) Typically, the greater this difference, the greater the magnitude of the impact. [L]
[SEP]*

*b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context. [L]
[SEP]*

*c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context. [L]
[SEP]*

*d) 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.” [L]
[SEP]*



- 3.14 BS4142:2014 also states *‘where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration’*. In terms of those factors the document states the following: *‘The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as, facade insulation ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and acoustic screening.’*
- 3.15 Where there is an adverse impact in terms of the BS4142 rating mitigation can be proposed to reduce the impact or achieve desirable internal noise levels.



4. Survey Methodology

- 4.1 The survey was conducted over a 7-day period on February 26th – March 4th 2024. This period was used to ensure several operating days would be covered. The measurement point is shown in Figure 1.
- 4.2 The instrument used for the survey was a Bruel & Kjaer 2260 precision grade sound level meter.
- 4.3 The sound level meter was calibrated immediately before and after the survey with a Bruel & Kjaer 4231 Acoustic Calibrator producing 94dB_A at 1KHz and no drift was noted in calibration readings. Both calibration results were 93.8dB_A.
- 4.4 The measurements at MP1 were taken with the microphone on a tripod with no reflecting surfaces, other than the ground, within 3.5 metres. The measurement point was representative of the façade of the receptor.
- 4.5 During the background survey the temperature was 4°C – 10°C with a wind speed of 0.3 metres per second. Cloud cover was a maximum of 100%. There was some precipitation on February 28th – March 2nd.
- 4.6 For the previous acoustic report measurements had been taken over a 24-hour period at the same location, October 24th – October 25th 2023.



5. Noise Survey Results

5.1 The results of the survey can be seen in Table 1 below.

Table 1. Typical measured data over the survey period

| Start Date | Duration | Typical L_{Aeq} | Typical L_{A90} |
|------------|---------------|-------------------|-------------------|
| 26/02/24 | 19:31 – 23:00 | 44 | 41 |
| 26/02/24 | 23:00 – 07:00 | 41 | 39 |
| 27/02/24 | 07:00 – 23:00 | 42 | 38 |
| 27/02/24 | 23:00 – 07:00 | 38 | 37 |
| 28/02/24 | 07:00 – 23:00 | 44 | 39 |
| 28/02/24 | 23:00 – 07:00 | 40 | 37 |
| 29/02/24 | 07:00 – 23:00 | 45 | 43 |
| 29/02/24 | 23:00 – 07:00 | 37 | 35 |
| 01/03/24 | 07:00 – 23:00 | 48 | 37 |
| 01/03/24 | 23:00 – 07:00 | 37 | 36 |
| 02/03/24 | 07:00 – 23:00 | 46 | 43 |
| 02/03/24 | 23:00 – 07:00 | 38 | 35 |
| 03/03/24 | 07:00 – 23:00 | 42 | 38 |
| 03/03/24 | 23:00 – 07:00 | 38 | 37 |
| 04/03/24 | 07:00 – 19:23 | 45 | 43 |

5.2 Although the operations at the site will be intermittent this will not be readily distinctive against the residual acoustic environment and no



penalty has been added, as per paragraph 9.2 of BS4142:2014+A1 2019. No penalty has been added for other acoustic features, such as bangs and clangs, as this will not be audible against the residual acoustic environment at the nearest residential receptor.

5.3 The loading of goods in the area outside the units has been calculated. The single exposure level (SEL) measurement has been used and then converted to compare to daily and nightly noise levels. The calculations are based on two 12-hour shifts. Table 2 is for daytime and Table 3 for night-time (no HGV movements).

Table 2. External site activities daytime

| Event | Duration | Sound Pressure Levels | Distance to Receptor | Distance Correction | Correction to 12-Hours | Screening | L _{Aeq} |
|---|-------------|-----------------------|----------------------|---------------------|------------------------|-----------|------------------|
| 10 HGVs arriving/departing at 1m | 10 minutes | 73dB _A | 80m | -38 | -19 | -18 | 0 |
| 10 HGVs loading/unloading at 2m | 200 minutes | 70dB _A | 80m | -32 | -6 | -18 | 14 |
| Arrival/departure 20 cars at 1m (all arriving and leaving together) | 80 minutes | 71dB _A | 80m | -38 | -10 | -18 | 5 |
| Forklift truck at 1m | 200 minutes | 70dB _A | 80m | -38 | -6 | -18 | 8 |
| Total | | | | | | | 15 |



Table 3. External site activities night-time

| Event | Duration | Sound Pressure Levels | Distance to Receptor | Distance Correction | Correction to 12-Hours | Screening | L _{Aeq} |
|---|-------------|-----------------------|----------------------|---------------------|------------------------|-----------|------------------|
| Arrival/departure 20 cars at 1m (all arriving and leaving together) | 80 minutes | 71dB _A | 80m | -38 | -10 | -18 | 5 |
| Forklift truck at 1m | 200 minutes | 70dB _A | 80m | -38 | -6 | -18 | 8 |
| Total | | | | | | | 10 |

5.4 The following tables represents the predicted outbreak from the farm units, this is based on warehouse noise, measured at a different site.

Table 4. Farm unit breakout impact with windows open

| Procedure | Overall dB _A |
|--|-------------------------|
| 1. Sound pressure inside the nearest unit | 70 |
| 2. Attenuation due to building fabric with windows open | -15 |
| 3. Attenuation due to sound outbreak (loss of reverberant sound) | -6 |
| 4. Attenuation to nearest residential property (25m) | -28 |
| 5. Screening of fence (0.5m path difference) | -13 |
| 6. Overall sound pressure level at nearest window | 8 |



5.5 The following table presents the building attenuation with doors open.

Table 5. Farm unit breakout impact with nearest door open

| Procedure | Overall dB _A |
|--|-------------------------|
| 1. Sound pressure inside the nearest unit | 70 |
| 2. Attenuation due to building fabric with Door open | -5 |
| 3. Attenuation due to sound outbreak (loss of reverberant sound) | -6 |
| 4. Attenuation to nearest residential property (40m) | -32 |
| 5. Screening of fence (0.5m path difference) | -13 |
| 6. Overall sound pressure level at nearest window | 14 |

5.6 The following tables present the BS4142 assessment for the noise from the operation at the nearest noise sensitive façade at Receptor 1 during the day and at night. The lowest typical L_{A90} and L_{Aeq} measured are used for both daytime and night.



Table 6. BS4142 assessment for the impact of the combined activity at the nearest residential property during daytime

| Results | Measurement | Clause | Commentary |
|---|-------------------------|--------|---|
| Typical ambient sound level | $L_{Aeq} = 42\text{dB}$ | 7.3.1 | |
| Typical background sound level | $L_{A90} = 37\text{dB}$ | 8.3 | |
| Specific sound level of the warehouse activities at Orchard House | 18dB_A | | |
| Acoustic feature | 0dB | 9.2 | No activity audible against the residual acoustic environment |
| Rating level | 18dB_A | 11 | Sound source |
| Typical background sound level | $L_{A90} = 37\text{dB}$ | 8.3 | |
| Rating level at receptor point | -19dB | 11 | |
| The assessment shows that there is likely to be no adverse impact at receptor point | | | |



Table 7. BS4142 assessment for the impact of the combined activity at the nearest residential property at night

| Results | Measurement | Clause | Commentary |
|---|-------------------------|--------|---|
| Typical ambient sound level | $L_{Aeq} = 37\text{dB}$ | 7.3.1 | |
| Typical background sound level | $L_{A90} = 35\text{dB}$ | 8.3 | |
| Specific sound level of the warehouse activities at Orchard House | 16dB_A | | |
| Acoustic feature | 0dB | 9.2 | No activity audible against the residual acoustic environment |
| Rating level | 16dB_A | 11 | Sound source |
| Typical background sound level | $L_{A90} = 35\text{dB}$ | 8.3 | |
| Rating level at receptor point | -19dB | 11 | |
| The assessment shows that there is likely to be no adverse impact at receptor point | | | |



6 Discussion

- 6.1 The suitability of the site has been determined by comparing the measured noise levels with the criteria set out in Section 3 of this report.
- 6.2 The rating level for the site at the receptor during daytime and night-time operational hours is -19dB. This result shows that the operational noise will comply with the likely requirements of Dartford Borough Council.
- 6.3 No penalties have been added to the rating for intermittency as the intermittent operation will not be audible at the nearest residential property as it will be 17dB lower than the ambient sound pressure level at night. BS4142:2014+A1 2019 states that a penalty for intermittency can be added if it is readily distinct against the residual acoustic environment. In this case the intermittent action will not be distinctive against the residual acoustic environment.
- 6.4 No penalty for any other acoustic features has been added as none of the activities on site would be audible against the residual acoustic environment.
- 6.5 In terms of rating for BS4142 the results show that there will be a low impact and no noise control system is required to protect the nearest receptor.
- 6.6 The nearest receptor is at least 80 metres from the external activities and is screened from all of them by the existing commercial units at the site. The combination of distance and screening ensures that the nearest receptor is unaffected by any vehicle movements or activities. While at the receptor during the survey there were some HGV movements, which were inaudible while in the garden. There will be no HGV movements at



night, the latest movement would be at 22:00 on a Saturday; during the week no HGV movements after 18:00.

- 6.7 The fabric of the units themselves also provide a reasonable level of sound attenuation to prevent internal activities impacting upon the receptor. The assumption made is that the sound generated inside the units by Prep Kitchen will be similar to that of a fruit and vegetable warehouse. The calculations at the Receptor due to the sound breakout from the commercial unit have not taken into account the 3 metre high solid boarded fence that screens the house from Court Lodge Farm. If this were to be taken into account the impact would be even lower at the receptor.
- 6.8 As mentioned earlier in the report the site has been used more intensively for the last 12 years. The current proposed use amounts to a reduction in noise compared to the previous 12 years and the application represents a betterment in terms of noise impacts.



Appendix 1: Glossary of Terms

Daytime Defined in BS8233 and BS4142 as the period 07:00-23:00 hours.

Night-time Defined in BS8233 and BS4142 as the period 23:00-07:00 hours.

Decibel (dB): A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure levels the reference quantity is 20 uPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.

dB_A: Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB_A broadly agree with people's assessment of loudness. A change of 3 dB is the minimum perceptible under normal conditions, and a change of 10 dB corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB_A; normal conversation about 60 dB_A at 1 metre; heavy road traffic about 80 dB_A at 10 metres; the level near a pneumatic drill about 100 dB_A.

L_{A10,T}: The A weighted noise level exceeded for 10% of the measurement period, T. It gives an indication of the upper limit of fluctuating noise such as that from road traffic.

L_{A90,T}: The A weighted noise level exceeded for 90% of the measurement period, T. This is defined in BS 4142 as the background noise level.

L_{AE}: The sound exposure level – the level of a sound with a period of 1 second that has the same sound energy as the event considered.



$L_{Aeq,T}$: The equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T).

$L_{A Max}$: The highest A weighted noise level recorded during a noise event. The time weighting (slow or fast) should be stated.



Appendix 2: Calibration Certificates

Laboratory Location

Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, GB-CM6 1HD
Phone 01371 871030



Certificate of Calibration

Certificate number: 41049

Test Object: Sound Level Meter, BS EN 60651 and or BS EN 60804 Class 1

Producer: Brüel & Kjær
Type: 2260
Serial number: 2034414
Customer: Ned Johnson Acoustic Consultants Ltd
Address: 378 Church Street,
London. N9 9HS.
Contact Person: Ned Johnson
Order No:

Introduction:

Calibration has been performed as set out in CA Technical Procedures which are based on the procedures for periodic verification of sound level meters as per the **Test Object** listed above. Results and conformance statement are overleaf and detailed results, where appropriate, are provided in the attached Measurement Report.

| Tested: | Producer | Type | Serial No | Certificate No |
|--------------|----------------|--------|-----------|----------------|
| Microphone | Brüel & Kjær | 4189 | 2169417 | 41048 |
| Calibrator* | Brüel and Kjær | 4231 | 2039392 | 41047 |
| Preamplifier | Brüel & Kjær | ZC0026 | NoCode | Included |

* The calibrator was complete with any required coupler for the microphone specified.

Additional items that have also been submitted for verification:

| | | |
|-----------------|--------------|----------------------|
| Wind shield | Brüel & Kjær | UA0237 (Large round) |
| Attenuator | N/A | |
| Extension cable | N/A | |

These items have been taken into account wherever appropriate.

| Conditions | Pressure kPa | Temperature °C | Humidity %RH |
|------------------------|--------------|----------------|--------------|
| Reference conditions | 101.325 | 23 | 50 |
| Measurement conditions | 101.07 ±0.03 | 22.35 ±0.15 | 42.43 ±1 |

Calibration Dates:

| | | | |
|-------------------|------------|----------------|------------|
| Received date: | 06/05/2022 | Reviewed date: | 17/05/2022 |
| Calibration date: | 17/05/2022 | Issued date: | 17/05/2022 |

Technicians: (Electronic certificate)

Calibrated by: *Palanivel Marappan B.Eng (Hons), M.Sc*

Reviewed by: *Darren Batten*

This certificate is issued in accordance with the CA Quality Management system. It provides traceability of measurement to recognized national standards, and to the units of measurement realized at the National Physical Laboratory or other recognized national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.



Laboratory Location

Campbell Associates Ltd
 5b Chelmsford Road Industrial Estate
 GREAT DUNMOW, Essex, GB-CM6 1HD
 Phone 01371 871030



Certificate of Calibration

Certificate number: 41048

Test Object: Measurement Microphone

Producer: Brüel & Kjær
Type: 4189
Serial number: 2169417
Customer: Ned Johnson Acoustic Consultants Ltd
Address: 378 Church Street, London. N9 9HS.
Contact Person: Ned Johnson
Order No:

| Measurement Results | Sensitivity (dB re 1V/Pa) | Sensitivity (mV/Pa) | Capacitance (pF) |
|--------------------------|------------------------------|------------------------|---------------------|
| Measurement 1 | -24.87 | 57.07 | 14.09 |
| Measurement 2 | -24.87 | 57.10 | 14.09 |
| Measurement 3 | -24.86 | 57.14 | 14.10 |
| Result (Average): | -24.87 | 57.11 | 14.09 |
| Expanded Uncertainty: | 0.10 | | 1.00 |
| Degree of Freedom: | >100 | | >100 |
| Coverage Factor: | 2 | | 2 |

The stated sensitivity is the pressure sensitivity at 250Hz, S₂₅₀, and is valid at reference conditions. The following correction factors have been applied during the measurement:

Pressure:-0.01 dB/kPa Temperature:-0.006 dB/°C Humidity:0 dB/%RH

| Conditions | Pressure kPa | Temperature °C | Humidity %RH |
|------------------------|-----------------|----------------|--------------|
| Reference conditions | 101.325 | 23 | 50 |
| Measurement conditions | 101.108 ± 0.043 | 22.4 ± 0.1 | 41.9 ± 0.9 |

The calibration test report shown on the next page gives details of the response at other frequencies relative to this 250 Hz reference sensitivity. Results ≥100 Hz are obtained using an electrostatic actuator as described in BS EN 61094-6 and those below 100 Hz are obtained in a reference pressure chamber. Detailed results are available from the calibration laboratory upon request.

The reported expanded uncertainty of measurements is based on a standard uncertainty multiplied by the coverage factor of k=2, providing a coverage probability of approximately 95%. Where the degrees of freedom are insufficient to maintain this confidence level, the coverage factor is increased to maintain this confidence level.

Calibration Dates:

Received date: 06/05/2022 Reviewed date: 17/05/2022
 Calibration date: 17/05/2022 Issued date: 17/05/2022

Technicians: (Electronic certificate)

Calibrated by: *Palanivel Marappan BEng(Hons), MSc*
 Reviewed by: *Darren Batten*

This certificate is issued in accordance with the CA Quality Management system. It provides traceability of measurement to recognized national standards, and to the units of measurement realized at the National Physical Laboratory or other recognized national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Doc ref: Mic-Cert-Master-V3-03



Laboratory Location

Campbell Associates Ltd

5b Chelmsford Road Industrial Estate
 GREAT DUNMOW, Essex, GB-CM6 1HD
 Phone 01371 871030

**Certificate of Calibration****Certificate number: 44378****Test Object: Sound Calibrator**

Producer: Brüel & Kjær
Type: 4231
Serial number: 2039392
Customer: Ned Johnson Acoustic Consultants Ltd
**Address: 378 Church Street,
 London, N9 9HS**
Contact Person: Ned Johnson
Order No: TBC

| Measurement Results | Level dB | Level Stability dB | Frequency Hz | Distortion % |
|--------------------------|--------------|-----------------------|-----------------|-----------------|
| Measurement 1 | 94.00 | 0.02 | 999.85 | 0.51 |
| Measurement 2 | 94.00 | 0.02 | 999.85 | 0.51 |
| Measurement 3 | 94.00 | 0.02 | 999.86 | 0.65 |
| Result (Average): | 94.00 | 0.02 | 999.85 | 0.56 |
| Expanded Uncertainty: | 0.1 | 0.02 | 1 | 0.16 |
| Degree of Freedom: | >100 | >100 | >100 | 9 |
| Coverage Factor: | 2 | 2 | 2 | 2.37 |

The stated level is relative to 20 μ Pa. The level is traceable to National Standards. The stated level is valid at reference conditions. The following correction factors have been applied during the measurement

Pres:0.0008 dB/kPa Temp:0.0015 dB/°C Humi:0.001 dB/%RH Load volume: 0.0003 dB/mm³

| Conditions | Pressure kPa | Temperature °C | Humidity %RH |
|------------------------|---------------------|----------------|--------------|
| Reference conditions | 101.325 | 23 | 50 |
| Measurement conditions | 102.046 \pm 0.041 | 22.8 \pm 0.1 | 39 \pm 0.8 |

The reported expanded uncertainty of measurements is based on a standard uncertainty multiplied by the coverage factor of k=2, providing a level of confidence of approximately 95%. Where the degrees of freedom are insufficient to maintain this confidence level, the coverage factor is increased to maintain this confidence level. The uncertainty has been determined in accordance with UKAS requirements.

Records: K:\C A\Calibration\Nor-1504\Nor-1018 CalCal\Current Year\BNK4231_2039392_M1.nmf

Preconditioning

The equipment was preconditioned for more than 4 hours in the specified calibration environment.

Method

Calibration has been performed as set out in the current version of CA Technical procedure TP01

Calibration Dates:

| | | | |
|-------------------|------------|----------------|------------|
| Received date: | 25/05/2023 | Reviewed date: | 01/06/2023 |
| Calibration date: | 31/05/2023 | Issued date: | 01/06/2023 |

Technicians: (Electronic certificate)

Calibrated by: *Katie Brown*
 Reviewed by: *Jenny Crawford*

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.



Appendix 3: Uncertainty

The measurement method used was to measure the existing background noise levels. No measurement of the sources could be undertaken as they are not in place.

As part of the BS4142 assessment the headings from the 2014 standard have been used to consider where uncertainty in the measurements may have occurred.

The complexity of the sound source and the level of variability in sound emission from the source

It is not possible to comment on the variability, as the new commercial use is not currently taking place.

The complexity and level of variability of the residual acoustic environment

In relation to the existing ambient noise level the noise over each 15-minute period varied very little.

The ambient environment overall provided consistent, reproducible results and therefore uncertainty for this aspect is low.

The level of residual sound in the presence of the specific sound at the measurement location

The specific sound level has no impact on the residual sound pressure level at the receptor.



The location(s) selected for taking the measurements

The location for measurements followed the guidance in BS4142:2014+A1 2019 and was representative of the noise sources in the area. The results were reproducible.

The distance between sources of sound and the measurement location and intervening ground conditions

The sources of sound are all screened from the receptor. The receptor has a 3-metre-high heavy boarded fence along his boundary and the existing buildings screen all external activity at the site from the receptor. The distance from the receptor to external activities is a minimum of 80 metres and from the façade of the commercial buildings the separation is a minimum of 25 metres.

The number of measurements taken

7-days of data were collected in 15-minute periods providing a data set which is representative of the quietest conditions during operational hours. Overall there is a reliable dataset from which to derive the typical background noise levels and uncertainty is low.

The measurement time intervals

The time intervals for logged data were 15-minute periods, which is an appropriate period for this type of survey and uncertainty is low.

The range of times when the measurements have been taken

The measurement times were representative of the background and ambient sound levels.



The range of suitable weather conditions during which measurements have been taken

During the survey the wind conditions were suitable as they did not exceed 5m/s at any time; there was also no precipitation and temperature was 4°C – 10°C. All conditions were recorded, including cloud cover and all were in line with the requirements of BS4142 and therefore uncertainty due to weather is low.

The measurement method and variability between different practitioners in the way the method is applied

The method for taking measurements followed that required in BS4142. The measurement procedure is reproducible and therefore uncertainty is low.

The level of rounding of each measurement recorded

Where necessary results have been rounded to the nearest whole decibel; any results at 0.5 have been rounded up.

The instrumentation used

The instruments used are class 1 sound level meters and calibrators and have all been calibrated to a traceable standard at a UKAS accredited laboratory in the last 24 months. Uncertainty due to instrumentation is low.



Uncertainty in calculations:

Uncertainty in any measured sound levels used in calculations

All vehicle movements and warehouse sounds were measured at existing sites and are representative of those sound pressure levels.

Uncertainty in the calculation method

Standard calculation for attenuation with distance was used in the calculations and all calculations followed normal acoustic methods. Uncertainty is low

Simplifying the real situation to 'fit' the model (user influence on modelling)

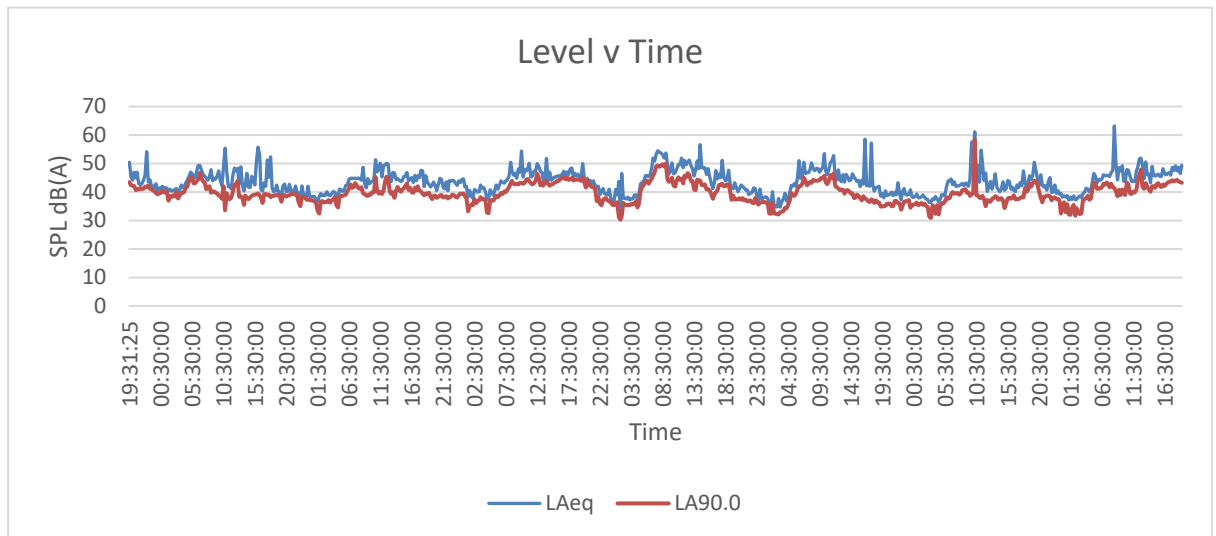
No modelling took place and all calculations were based on the site characteristics.

Error in the calculation process

All calculations were checked by a colleague in an independent consultancy and uncertainty is low.



Appendix 4: Data



Disclaimer:

This report was completed by Ned Johnson Acoustic Consultant Ltd on the basis of a defined programme of work and terms and conditions agreed with the client. The report has been prepared with all reasonable skill, care and diligence within the terms of the Contract with the Client and taking into account the project objectives, the agreed scope of works, prevailing site conditions and the degree of manpower and resources allocated to the project.

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