



Noise Assessment:

Tower Wharf, Lower Road, Northfleet

Gill Aggregates Limited

5th November 2024

Noise Impact Assessment:

Tower Wharf, Lower Road, Northfleet

Gill Aggregates Limited • 5th November 2024 • H4270 – NV – v1

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This report has been prepared by Hawkins Environmental Limited for the sole purpose of assisting in gaining planning consent for the proposed development described in the introduction of this report.

This report has been prepared by Hawkins Environmental Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This assessment takes into account the prevailing conditions at the time of the report and assesses the impact of the development (if applicable) using data provided to Hawkins Environmental Limited by third parties. The report is designed to assist the developer in refining the designs for the proposed development and to demonstrate to agents of the Local Planning Authority that the proposed development is suited to its location. This should be viewed as a risk assessment and does not infer any guarantee that the site will remain suitable in future, nor that there will not be any complaints either from users of the development or from impacts emanating from the development site itself.

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1. INTRODUCTION

1.1. Overview

Hawkins Environmental Limited has been instructed by Gill Aggregates Limited to undertake a Noise Assessment for the proposed redevelopment of Tower Wharf, situated in the Northfleet area of the Borough of Thurrock. During the planning process, it has been identified that the site may require a noise assessment to determine whether noise emissions from the concrete block manufacturing factory would be in line with permitted levels. Consequently, a noise survey was conducted to characterise the noise climate of the site and the impact of the proposed new plant has been assessed.

The assessment adheres to the principles of Government planning policy in relation to noise, specifically enacted by the *National Planning Policy Framework (NPPF)*, the *National Planning Practice Guidance (NPPG) on Noise* and the *Noise Policy Statement for England (NPSE)*.

All sound measurements were conducted in accordance with BS 7445-2: 1991 '*Description and measurement of environmental noise Part 2: Guide to the acquisition of data pertinent to land use*'. The assessment of plant sound has been assessed in accordance with British Standard BS 4142: 2014 +A1:2019 '*Methods for rating and assessing industrial and commercial sound*'.

1.2. The Nature, Measurement and Effect of Noise

Noise is often defined as sound that is undesired by the recipient. Whilst it is impossible to measure nuisance caused by noise directly, it is possible to measure the loudness of that noise. 'Loudness' is related to both sound pressure and frequency, both of which can be measured. The human ear is sensitive to a wide range of sound levels. The sound pressure level of the threshold of pain is over a million times that of the quietest audible sound. In order to reduce the relative magnitudes of the numbers involved, a logarithmic scale of decibels (dB) is normally used, based on a reference level of the lowest audible sound.

The response of the human ear is not constant over all frequencies. It is therefore usual to weight the measured frequencies to approximate the human response. The resulting 'A' weighted decibel, dB(A), has been shown to correlate closely to the subjective human response.

When related to changes in noise, a change of ten decibels from say 60 dB(A) to 70 dB(A) would represent a doubling in 'loudness'. Similarly, a decrease in noise from 70 dB(A) to 60 dB(A) would represent a halving in 'loudness'. A change of 3 dB(A) is generally considered to be just perceptible. **Table 1.1** details typical noise levels. A glossary of acoustic terms can be found in **Appendix 1**.

Table 1.1: Typical Noise Levels

Approximate Noise Level (dB(A))	Example
0	Limit of hearing
30	Rural area at night
40	Library
50	Quiet office
60	Normal conversation at 1 m
70	In car noise without radio
80	Household vacuum cleaner at 1 m
100	Pneumatic drill at 1 m
120	Threshold of pain

1.3. Statement of Competency

The assessment has been carried out by Nick Hawkins MSc MIOA MIAQM MEnvSc PIEMA, the managing director of Hawkins Environmental Limited. Nick is an environmental consultant with over 15 years of experience working in the field of noise/acoustics and environmental impact assessment.

Nick is an alumnus of the University of East Anglia and the University of Southampton. Nick holds the Institute of Acoustics' Certificate of Competence in Environmental Noise Measurement and became a full Member of the Institute of Acoustics in 2010, having previously been an Associate Member. Nick is also a Member of the Institution of Environmental Sciences and a Member of the Institute of Air Quality Management.

Nick has worked on a range of projects, including a number of prestigious projects, including the noise impact assessments of the Thameslink railway scheme through central London, the construction of lines BXD of the Luas Light Rail System in Dublin, the expansion of Bournemouth Airport and the M25 widening between junctions 1b to 3 and 5 to 7. Nick was one of the first acoustic consultants to be given access to the Crossrail tunnels to conduct vibration compliance monitoring. In addition, Nick regularly conducts acoustic assessments for housing developments, wind turbines, air conditioning units, kitchen extract fans, supermarkets, public houses and other commercial developments.

1.4. Site Description

The proposed development site is situated off Lower Road in Northfleet in an industrial area adjacent to the Seacon Port Terminal.

The site is currently industrial in use with a large warehouse building occupying much of the northern extent of the site with an area of hardstanding/open storage to the south.

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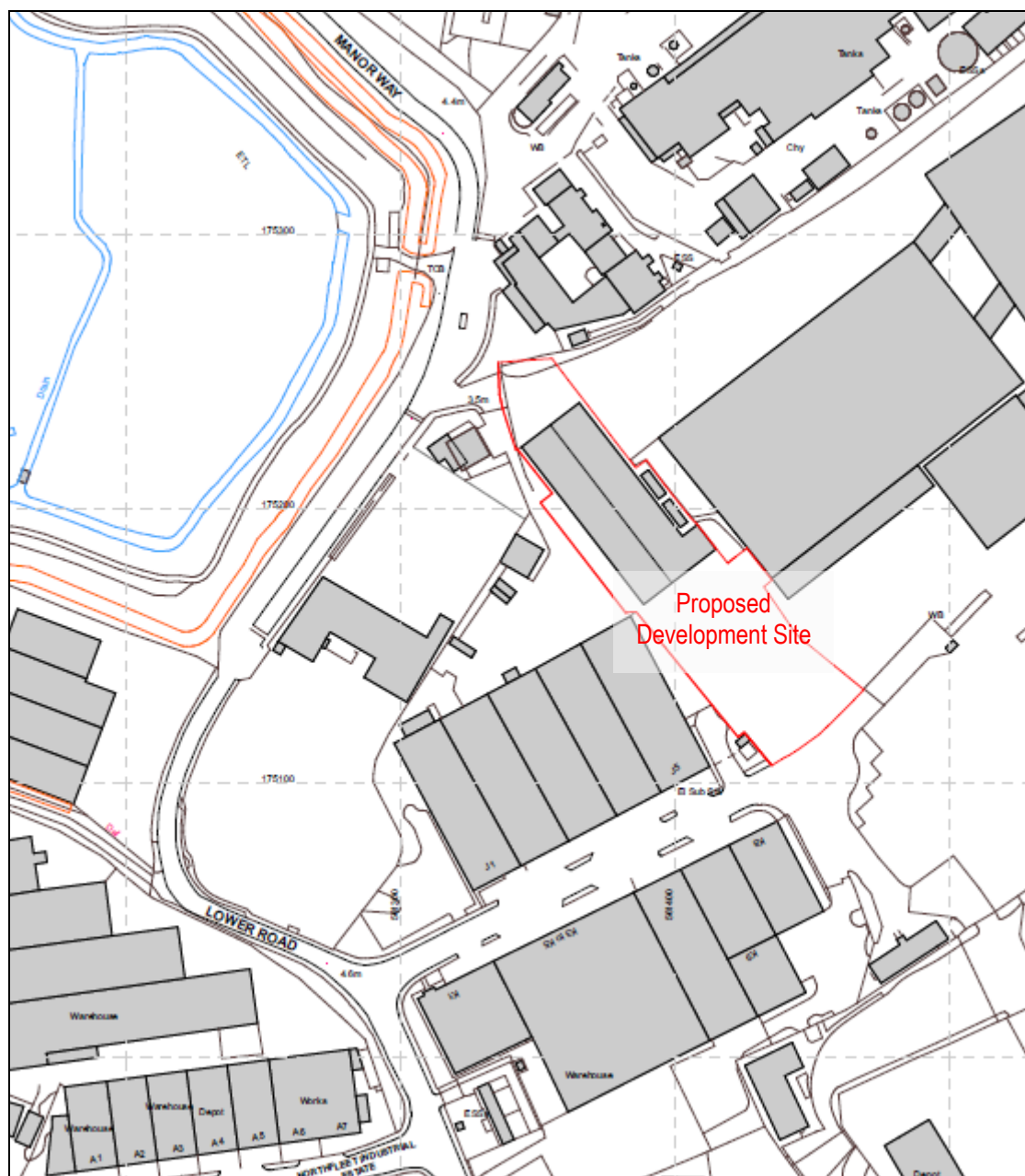
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The proposed development will see extensions to the existing storage warehouse to provide a state of the art fully automated aggregate bagging facility. The existing building will have extensions to both sides, a new warehouse section to the south and silos to the side.

A location plan of the proposed site can be seen in **Figure 1.1**.

Figure 1.1: Site Location Plan



2. NATIONAL & LOCAL PLANNING POLICY

2.1. National Planning Policy Framework (2023)

The National Planning Policy Framework (NPPF) was first published on the 27th March 2012 and revised July 2018, February 2019, July 2021 and September 2023, with the latest version published in December 2023 in response to the Levelling-up and Regeneration Bill.

The NPPF outlines the Government's planning policies for England and determines how they should be applied. It provides a framework within which Local Planning Authorities are required to prepare their own locally-prepared plans, where both the policies within the NPPF and the local plan are material planning considerations against which planning decisions are determined. These distinctive local and neighbourhood plans should be interpreted and applied in order to meet the needs and priorities of their communities.

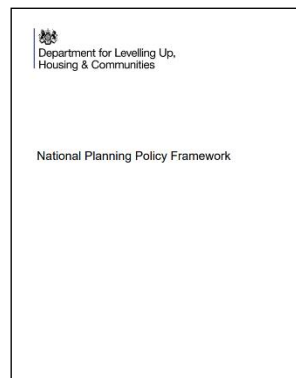
The NPPF notes *"The purpose of the planning system is to contribute to the achievement of sustainable development, including the provision of homes, commercial development, and supporting infrastructure in a sustainable manner"* (Paragraph 7). The NPPF notes sustainable development should be delivered with three main dimensions: economic; social and environmental (Paragraph 8).

The NPPF supports a presumption in favour of development, unless the adverse impacts of that development outweighs the benefits it notes *"that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development"* (Paragraph 10).

The NPPF states that in the planning system *"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"* (Paragraph 180).

Paragraph 191 of the NPPF talks specifically about noise stating that *"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..."*

Specifically in relation to noise from existing commercial premises, Paragraph 193 of the NPPF notes: *"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".

2.2. Noise Policy Statement for England (2010)

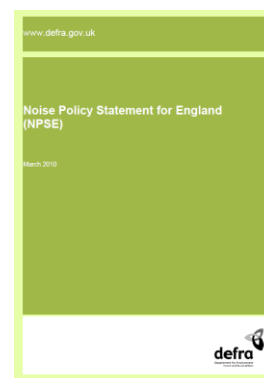
The Noise Policy Statement for England (NPSE) provides further guidance which is relevant to the policies set out in the NPPF and states that: *"Within the context of sustainable development:*

- *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 improvement of health and quality of life."*

NPSE introduces established concepts originally from the field of toxicology that are now being applied to noise impacts. They are:

- **NOEL – No Observed Effect Level** - This is the level of noise 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 of noise above which adverse effects on health and quality of life can be detected.
- **SOAEL – Significant Observed Adverse Effect Level** - This is the level above which significant adverse effects on health and quality of life occur.

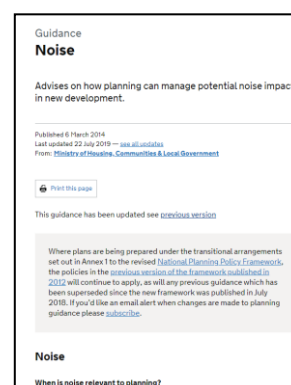
NPSE goes on to state that *"it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. 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."*



2.3. Planning Practice Guidance

The Noise Planning Practice Guidance (NPPG) was launched on 6th March 2014 and has undergone regular revision, with the most recent changes to Noise Guidance published in July 2019. NPPG provides additional guidance and interpretation to the Government's strategic policies, outlined within the NPPF, in a web-based resource.

The NNPPG provides more guidance on the assessment of noise for planning purposes and builds on the concepts of NOEL, LOAEL and SOAEL introduced in NPSE to establish whether noise is a factor that needs to be taken into account. It states: *"Local planning authorities' plan-making and decision taking should take*



account of the acoustic environment and in doing so consider:

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

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

However, it goes into more detail about the subjective nature of noise and how the results of any assessment must be treated flexibly and pragmatically. The guidance states: *“The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation. These factors include:*

- *the source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day – this is because people tend to be more sensitive to noise at night as they are trying to sleep. The adverse effect can also be greater simply because there is less background noise at night;*
- *for a new noise making source, how the noise from it relates to the existing sound environment;*
- *for non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;*
- *the spectral content of the noise (i.e. whether or not the noise contains particular high or low frequency content) and the general character of the noise (i.e. whether or not the noise contains particular tonal characteristics or other particular features), and;*
- *the local arrangement of buildings, surfaces and green infrastructure, and the extent to which it reflects or absorbs noise.*

More specific factors to consider when relevant include:

- *the cumulative impacts of more than one source of noise;*
- *whether any adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time (and the effect this may have on living conditions). In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations.*
- *In cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring even though little to no change in behaviour would be likely to occur.*
- *Noise Action Plans (where these exist), and, in particular the Important Areas identified through the process associated with the Environmental Noise Directive and corresponding regulations should be*

taken into account. Defra's website has information on Noise Action Plans and Important Areas. Local authority environmental health departments will also be able to provide information about Important Areas.

- *the effect of noise on wildlife. Noise can adversely affect wildlife and ecosystems. Particular consideration needs to be given to the potential effects of noisy development on international, national and locally designated sites of importance for biodiversity;*
- *where external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.*
- *some commercial developments including restaurants, hot food takeaways, night clubs and public houses can have particular impacts, not least because activities are often at their peak in the evening and late at night. Local planning authorities will wish to bear in mind not only the noise that is generated within the premises but also the noise that may be made by customers in the vicinity”.*

Table 2.1 shows examples of the noise hierarchy (adapted from the NPPG) and shows that the aim is to identify where the overall effect of the noise exposure falls in relation to SOAEL, LOAEL and NOEL. The implication of the advice is only noise that is ‘noticeable and very disruptive’ would be considered unacceptable and therefore, should be prevented. The inference, therefore, is that all other outcomes can be acceptable, depending upon the specific circumstances and level of mitigation.

Regarding noise from existing commercial premises, the NPPG provides additional guidance on the “Agent of Change” principle, introduced in the NPPF. The NPPG notes that where existing commercial premises could have a significant adverse effect on residents or users of the proposed scheme “*the applicant (or ‘agent of change’) will need to clearly identify the effects of existing businesses that may cause a nuisance (including noise, but also dust, odours, vibration and other sources of pollution) and the likelihood that they could have a significant adverse effect on new residents/users. In doing so, the agent of change will need to take into account not only the current activities that may cause a nuisance, but also those activities that businesses or other facilities are permitted to carry out, even if they are not occurring at the time of the application being made*”. Consequently, it is important to consider not just what noise the commercial premises currently make, but what they could make.

The NPPG goes on to note that “*The agent of change will also need to define clearly the mitigation being proposed to address any potential significant adverse effects that are identified. Adopting this approach may not prevent all complaints from the new residents/users about noise or other effects, but can help to achieve a satisfactory living or working environment, and help to mitigate the risk of a statutory nuisance being found if the new development is used as designed (for example, keeping windows closed and using alternative ventilation systems when the noise or other effects are occurring).*

It can be helpful for developers to provide information to prospective purchasers or occupants about mitigation measures that have been put in place, to raise awareness and reduce the risk of post-purchase/occupancy complaints”.

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Table 2.1: Noise Exposure Hierarchy

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

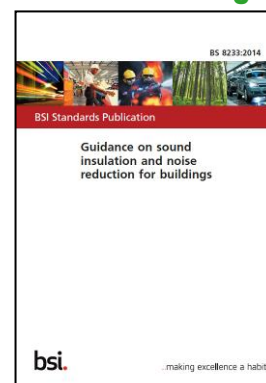
3. SSESMENT METHODOLOGY & GUIDANCE

3.1. BS 8233: 2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'

Originally published in 1999, the 2014 edition of BS 8233, significantly updates the guidance in light of the policy changes as a result of the advent of the NPPF and the withdrawal of NPPG 24. The 2014 edition of BS 8233 sees a change in the title of the Standard, moving from a 'Code of Practice' to 'Guidance', as the text 'largely comprises guidance that does not support claims of compliance'.

BS 8233:2014 indicates that to control external noise ingress into a proposed development, a number of planning stages should occur as follows:

- "Assess the site, identify significant existing and potential noise sources, measure or estimate noise levels, and evaluate layout options."
- Determine design noise levels for spaces in and around the building(s).
- Determine sound insulation of the building envelope, including the ventilation strategy".



BS 8233:2014 suggests design noise levels for various types of building. The recommended noise levels for dwelling houses, flats and rooms in residential use (when unoccupied) can be seen in **Table 3.1** below. This is replicated from Table 4 of Section 7.7.2 of BS 8233:2014. The guidance suggests that "In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values". The noise levels in **Table 3.1** are marginally different to those published in BS 8233:1999 'Sound insulation and noise reduction for buildings – Code of practice', but are based on the existing guidance from the current World Health Organisation (WHO) "Guidelines on Community Noise".

Table 3.1: Summary of Noise Criteria: BS 8233: 2014

Activity	Location	07:00 To 23:00	23:00 To 07:00
Resting	Living room	35 dB L _{Aeq,16hour}	-
Dining	Dining room/area	40 dB L _{Aeq,16hour}	-
Sleeping	Bedroom	35 dB L _{Aeq,16hour}	30 dB L _{Aeq,8hour}

When considering the noise level criteria considered in **Table 3.1**, the following points should be noted:

- BS 8233: 2014 suggests that the above criteria should be adopted flexibly and that "where development is considered necessary or desirable... the internal target level may be relaxed by up to 5 dB and reasonable internal conditions still achieved".
- The noise levels quoted above are annual averages and "do not need to be achieved in all circumstances" e.g. New Year's Eve or fireworks night.

- The noise levels in **Table 3.1** are “for steady external noise sources” such as traffic noise or plant noise. This is a departure from the 1999 version of BS 8233, where the recommended internal noise levels were irrespective of the external noise source and therefore included the suggestion that in order to achieve “reasonable” noise levels within bedrooms at night, L_{AFmax} noise levels should not exceed 45 dB. Whilst this has been omitted from the 2014 version of BS 8233, it does state that “Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values.” Therefore, at sites which may be affected by individual noise events, it is more appropriate to use the guidance contained within the WHO “Guidelines on Community Noise” which suggest that good sleep will not generally be affected if internal levels of L_{AFmax} 45 dB are not exceeded more than 10-15 times per night.
- BS 8233:2014 notes that if the design of the building is “relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the facade insulation or resulting noise level”.
- BS 8233 provides guidance for noise in gardens and outdoor amenity space. It suggests that “it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments.” The guidance does go on to say that these guideline values are not achievable in all circumstances and in some areas, “such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.”

3.2. World Health Organisation Guidelines for Community Noise (1999)

The 1999 World Health Organisation (WHO) guidance “Guidelines for Community Noise”, provides recommendations on maximum internal and external noise levels in a range of situations. The WHO guidelines are a consequence of a comprehensive review of the scientific evidence in relation to community noise exposure and the health and social aspects of such exposure. Whilst not adopted policy, the recommendations within the WHO Guidelines are often quoted and form the basis of the recommendations within BS 8233 and other similar guidance. A summary of the noise criteria can be seen in **Table 3.2**.

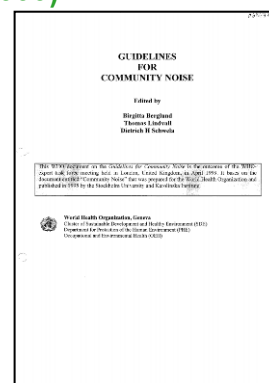
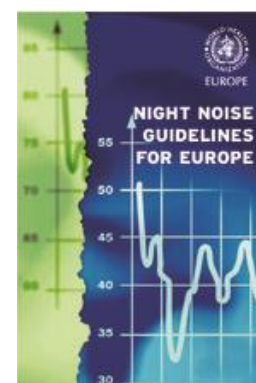


Table 3.2: Summary of Noise Criteria: WHO

Residential Environment	Critical Health Effect	L_{Aeq}	L_{AFmax}	Time Base
Outdoor living area	Serious annoyance, daytime and evening	55	-	07:00-23:00
	Moderate annoyance, daytime and evening	50	-	07:00-23:00
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	-	07:00-23:00
Inside bedrooms	Sleep disturbance, night-time	30	45	23:00-07:00
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	60	23:00-07:00

3.3. WHO Night Noise Guidelines for Europe (2009)

In 2009, the World Health Organisation published the “Night Noise Guidelines for Europe” as a partial update and extension to the “Guidelines for Community Noise”, specifically in relation to development on the scientific evidence of night noise exposure. The 2009 guidance suggests that a “ $L_{night,outside}$ of 40 dB should be the target of the night noise guideline (NNG) to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly”. However, since that target would be impossible to achieve in many situations, a “ $L_{night,outside}$ value of 55 dB is recommended as an interim target for the countries where the NNG cannot be achieved in the short term for various reasons, and where policy-makers choose to adopt a stepwise approach”.

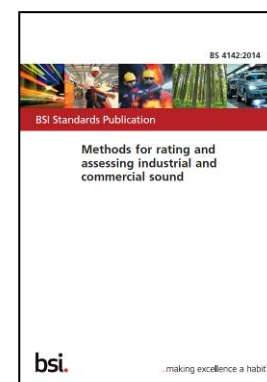


3.4. BS 4142: 2014 +A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

British Standard BS 4142: 2014 +A1:2019 “Methods for rating and assessing industrial and commercial sound” provides a method for the measurement and rating of industrial noise or noise of an industrial nature and background noise levels outside dwellings in mixed residential and industrial areas. The rating level (defined in the BS) is used to rate the industrial noise source outside residential dwellings (this is defined as the “specific noise source”).

The procedure defined in BS 4142 for predicting the likelihood of complaints is based on establishing the difference between the rating level and the background level outside the residential property of interest. The greater the difference the greater the likelihood of complaints and more specifically:

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



- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
- Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.”

The guidance goes on to state that “where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.” Consequently, when considering the impact of a BS 4142 assessment, it is often also necessary to consider the absolute noise levels experienced at the receptor location in relation to BS 8233 and World Health Organisation guidelines.

3.5. BS 4142:2014+A1:2019 Technical Note (2020)

In March 2020, Acoustic and Noise Consultants (the ANC) published a guidance note to accompany BS 4142.

The Technical Note states “remain concerns for some users of BS 4142 and this guidance is designed to assist readers with a reasonable interpretation and application of BS 4142 as a whole”. It notes “In the production of this guidance, the ANC Working Group (WG) has reviewed BS 4142 and attempted to address any content regarded as ambiguous”. Consequently, whilst not an official guidance document, the Technical Note provides advice of the interpretation of BS 4142 and provides examples of best practice with regards to the application of the BS.



The following sub-sections contain clarifications from the Technical Note that are particularly pertinent to this assessment.

3.5.1. Internal Noise Levels

The Technical Note notes “BS 4142 ‘is not intended to be applied to the assessment of indoor sound levels’ (Subclause 1.3) and cannot, therefore, be used for façade design. Whilst BS 4142 can be used to assist in the determination of the likelihood of an adverse or significant adverse impact, guidance on internal design criteria and mitigation is provided elsewhere”. The Technical Note goes on to state that in conjunction with BS 4142, the use of BS 8233 may be appropriate to determine internal noise levels “although recognition should be given to the associated scope and/or limitations”.

3.5.2. Introduction of a New Noise-Sensitive Receptors

One of the major short-comings of BS 4142 is the lack of differentiation between the assessment of new noise sources verses the assessment of new noise-sensitive receptors. Subclause 8.5 of BS 4142 states “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”.

The Technical Note clarifies this position by noting “where BS 4142 is used in this situation, its fundamental principles, in terms of what constitutes the residual, background and specific sources, should not be compromised. Where other standards or guidance document are used, care should be taken with regard to their own stated scope or limitations. Examples of such guidance might include:

- *BS8233: 2014 where an industrial/commercial sound source is constant and new residential development is proposed nearby;*
- *Elements of ProPG where the impact of regular night time maximum sound events is the critical consideration;*
- *DMRB where impacts relate solely to changes to vehicular movements within or around a site; or*
- *BS 5228 where activities are temporary and of a similar nature to the construction activities considered by that Standard.*

These documents, or others, may help to inform the contextual elements of a BS 4142 assessment or help where a numerical assessment fully in accordance with BS 4142 may not be possible”.

In this regard the Technical Note that when assessing new noise-sensitive receptors close to commercial noise sources, it may not be possible to use BS 4142 as difficulties in disaggregating “*legitimate commercial residual sources to the background sound level could potentially lead to unrepresentatively adverse outcomes*”. Consequently, “*alternative guidance and standards should be referenced, although care should be taken not to apply them beyond their own stated scope or limitations*”. It goes on to note that “*different approaches might be adopted depending on whether the industrial/commercial source is continuous or intermittent, whether there are ancillary sources present, or where one particular industrial/commercial premises dominates*”.

3.5.3. Background Sound Levels

BS 4142 does not provide a definitive method for calculating or determining a background sound level. The Technical Note does not a definitive method either, but does provide more clarification. It notes “*it was the view of the WG that it is not always appropriate to define a singular background sound level for use in an assessment. In such cases, a range of values over one or more time periods may be more appropriate. An assessment should generally focus on the sound levels measured during the period of greatest interest, which may be the quietest part of the night, or the time period relating to a complaint. Determining the period of greatest interest should be judged on a case-by-case basis*”.

The Note points out that “*it is important that the established background sound level is representative of typical conditions*”. It goes on to provide a number of examples whereby time history, histogram and cumulative distribution data is presented, along with the range of values selected by the WG as being representative. “*These examples are included to illustrate the range of views in the WG as to how best to identify representative background sound levels for particular datasets and serve to highlight the sensitivity of the outcome to individual interpretations of measurement data. It must be remembered that there are no ‘correct’ answers, only judgement and justification. In many instances, additional information beyond that presented in these examples would be required to inform the judgement of representative levels*”.

3.5.4. Context

The criteria used to determine the acceptability of an impact with BS 4142 talks about the requirement to consider “context”. However, BS 4142 does not provide much detail as to what one might consider in relation to context.

BS 4142 notes that absolute levels of sound can be of significance, where residual values are both high and low. In particular, BS 4142 notes that absolute levels may be as, or more, important than relative outcomes where background and rating levels are low, but does not provide further commentary.

The Technical Note points out that “BS 4142 does not indicate how the initial estimate of impact should be adjusted when background and rating levels are low, only that the absolute levels may be more important than the difference between the two values. It is likely that where the background and rating levels are low, the absolute levels might suggest a more acceptable outcome than would otherwise be suggested by the difference between the values. For example a situation might be considered acceptable where a rating level of 30dB is 10dB above a background sound level of 20dB, i.e. an initial estimate of a significant adverse impact is modified by the low rating and background sound levels.

There may be situations where the opposite is true, and it is for the assessor to justify any modifications to the initial estimate of impact.

BS 4142 does not define ‘low’ in the context of background sound levels nor rating levels. The note to the Scope of the 1997 version of BS 4142 defined very low background sound levels as being less than about 30 dB L_{A90} , and low rating levels as being less than about 35 dB $L_{A,T,r}$.

The WG suggest that similar values would not be unreasonable in the context of BS 4142, but that the assessor should make a judgement and justify it where appropriate”.

The Technical Note suggests other areas one might consider when looking at context:

- “character of a particular neighbourhood;
- former uses at or close to a site;
- legitimacy of the industrial use, e.g. planning permissions or environmental permits;
- implementation of best practicable means for a given process or activity; or
- local convention or perceptions”.

It goes on to provide two examples:

“For example; a former industrial use may be less relevant if it ceased 10 years previously, than a use that ceased within the previous six months. Setting out the context in this way is important so that the reader is fully aware of the point being made”.

“For example; a coffee shop with drive thru facility located adjacent to a fairly busy road with traffic lights and constant stop/start traffic, with residential properties nearby. In these circumstances the noise climate is unlikely to change in any perceptible way due to the addition of vehicles moving and idling in the drive thru area. However, during the evening, the gaps in the general traffic could reduce the background sound level sufficiently that an adverse or significant adverse impact is suggested. An intermittency correction could also be

considered appropriate. In this example, the assessor might legitimately take the view that the context is at odds with the initial (numerical) assessment, and substantially adjust the conclusions of the assessment on the basis of the context”.

3.6. The Little Red Book of Acoustics (4th ed.) (2024)

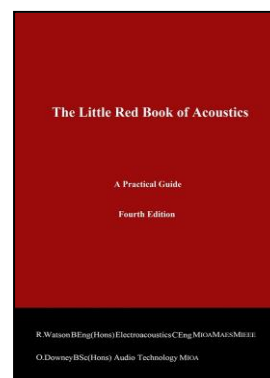
First published in 2007, ‘*The Little Red Book of Acoustics: A Practical Guide*’ remains an industry-standard textbook. Appreciated by professionals and beginners alike for being clear and straightforward, the book has also been included in recommended reading lists for Institute of Acoustics accredited courses.

The 4th edition of the book was published in September 2004 and includes recent updates to standards such as BS 8233 and BS 4142, in addition to presenting a new method to assess and determine the representative background sound levels as part of a BS 4142 assessment.

The book recognises that BS 4142 does not give a single fixed method for assessing the representative background sound level and proposes the ‘*LRB Method*’ which considers a modal approach with a distribution threshold criterion.

The LRB Method requires each of the background sound level integer values to be counted. The analysis of the candidate values for the background sound level first starts with the candidate with the highest number of occurrences. If there are multiple values with the same number of occurrences, then the analysis will first consider the lowest of these candidate values.

Each candidate value is tested based on whether or not there is less than or equal to 45% of the data below the candidate value. If the candidate value features more than 45% of the data below the candidate value, then it should be rejected. Once the candidate value features less than or equal to 45% of the data below the candidate value, then it should be accepted as the representative background sound level.



3.7. Possible Options for the Identification of SOAELs and LOAELs in Support of the NPSE (2014)

Published by Defra, based on a Research Project prepared by AECOM, “*Possible Options for the Identification of SOAELs and NOAELs in Support of the NPSE*” attempts to give values to the concepts of SOAELs and NOAELs, introduced by the Noise Policy Statement for England (NPSE). After the withdrawal of NPPG24: Planning and Noise in 2012, which included Noise Exposure Categories, with specific numerical boundaries, the NPSE was heavily criticised for having no specific numerical guidance. Whilst the NPSE and NPPF encourage the development of location-specific criteria, in the context of the specific environment, the absence of guidance meant the implementation of the NPSE was difficult. Consequently, the project identifies both specific possible values and possible ranges of values for SOAELs and NOAELs for different noise sources. These values can be seen in **Table 3.3**.

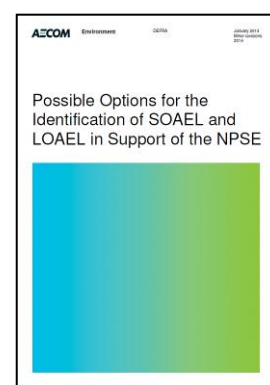


Table 3.3: Possible Value & Ranges of Values for LOAEL & SOAEL

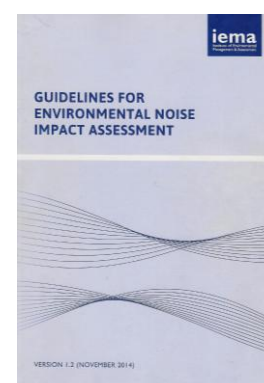
Source	Effect	LOAEL	SOAEL
Road	Annoyance (Daytime)	56 (53-59)	66 (64-68)
	Sleep (Night-time)	46 (43-52)	56 (51-64)
Rail	Annoyance (Daytime)	63 (61-66)	72 (70-74)
	Sleep (Night-time)	55 (52-63)	68 (61-77)
Air	Annoyance (Daytime)	52 (50-54)	60 (58-62)
	Sleep (Night-time)	41 (40-49)	53 (47-60)

3.8. IEMA Guidelines for Environmental Noise Assessment (2014)

The 2014 IEMA “Guidelines for Environmental Noise Assessment” address the key principles of noise impact assessment and are applicable to all development proposals where noise effects may occur. The guidance provides advice with regards to the collection of baseline noise data, prediction of noise levels and how noise should be assessed.

Whilst the guidance contains a great deal of technical guidance for the noise practitioner, it also provides guidance on the assessment of significance, which is replicated later in this chapter.

The IEMA Guidelines provides guidance on how to assess the effects and significance of developments, but it stops short of providing specific assessment criteria which developments should achieve. The guidance instead suggests that the methodology adopted should be selected on a site by site basis with reference to relevant national and local standards, since the guidance recognises that the effect associated with a particular noise impact will be dependent on a number of factors including but not limited to the sensitivity of the receptor, frequency and duration of the noise source and time of day.



When describing the magnitude of the noise effect, the IEMA guide does not suggest a definitive method but does give a number of examples of ways of describing and determining the magnitude. One such example, which has been used in this assessment, is set out in **Table 3.4** below.

Table 3.4: Magnitude of Change in Noise Levels

Long Term Impact Magnitude	Sound Level Change dB $L_{Aeq,T}$ (positive or negative) T= 16 hour day or 8 hour night
Negligible	≥ 0 dB and < 3 dB
Minor	≥ 3 dB and < 5 dB
Moderate	≥ 5 dB and < 10 dB
Major	≥ 10 dB

3.9. Assessment Criteria for Impact of Vibration on Humans

The assessment criteria for the impact of vibration on humans is based upon the Vibration Dose Value (VDV) and the criteria is given in **Table 3.5** below. This guidance is given in *BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings – Part 1: Vibration sources other than blasting*.

Table 3.5: VDV ranges which might result in various probabilities of adverse comment

Place and time	Low probability of adverse comment ($m/s^{1.75}$) ¹	Adverse comment possible ($m/s^{1.75}$)	Adverse comment probable ($m/s^{1.75}$) ²
Office buildings 16hr day	0.4 to 0.8	0.8 to 1.6	1.6 to 3.2
Residential buildings 16hr day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8hr night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

1) Below these ranges adverse comment is not expected

2) Above these ranges adverse comment is very likely

4. ENVIRONMENTAL NOISE SURVEY

4.1. Survey Overview

In order to determine the extent to which the site is affected by noise, a detailed noise measurement study has been carried out on the proposed development site. Noise measurements have been carried out in order to determine the overall $L_{Aeq,16hrs}$ and $L_{Aeq,8hrs}$ for the day and night time periods. In addition, the L_{Amax} , L_{A10} , L_{A50} , and L_{A90} noise levels have also been measured.

All noise monitoring was conducted using a Norsonic 140 sound level meter, which conforms to BS EN IEC 61672-1: 2003 as a Class 1 precision measurement system. A Norsonic 1251 field calibrator was used before and after the measurement periods in order to ensure that the equipment had remained within reasonable calibration limits (+/- 0.5 dB).

All of the equipment used has been calibrated in accordance with the procedures set out in BS EN IEC 61672-2: 2003 and for the electrical testing of frequency filters as set out in BS EN IEC 61260. The equipment was calibrated at Campbell Associates Limited, in Great Dunmow, Essex. Campbell Associates Limited meets the laboratory accreditation requirements of the United Kingdom Accreditation Service (UKAS Lab No. 0789). Sound level meters are laboratory calibrated every two years, with field calibrators laboratory calibrated every twelve months. **Appendix 2** summarises the equipment used including serial numbers and calibration certificates.

All noise monitoring has been conducted in accordance with the guidance set out in BS 7445-2: 1991 '*Description and measurement of environmental noise Part 2: Guide to the acquisition of data pertinent to land use*'. This standard details information that should be recorded in addition to the actual measured levels such as meteorological data, and a description of the noise source itself.

Proposed operations will occur onsite between 5am and 7pm; therefore, it is necessary to determine representative background noise levels between these hours. The distance between the closest dwellings and the proposed development site is between 200 and 250m; therefore, conducting the noise measurements on the proposed development site was not considered feasible, as it is unlikely to be representative of the closest affected dwellings. As a consequence, short duration noise measurements were carried out to characterise background noise levels in the area at a location representative of the affected properties.

Two sets of measurements were conducted – one during the daytime, conducted by Nick Hawkins on the 23rd October 2024. The other set was conducted in the early morning between 5am and 7am on the 5th November 2024 by Will Totty. Both Will and Nick hold the Institute of Acoustic's Certificate of Competence in Environmental Noise Measurement. On both days, weather conditions were conducive to successful monitoring. The location of the noise measurements can be seen in **Figure 4.1**. The location is considered to be a freefield location.

Figure 4.1: Noise Measurement Location

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4.2. Noise Survey Results

The noise measurement study has identified that the primary noise source is road traffic associated with Stonebridge Road, including a large number of HGV movements, especially in the early morning period between 5am and 7am. Aircraft noise is also occasionally audible. The noise measurement data is summarised in **Table 4.1** below.

Table 4.1: Summary of the Noise Level Measurements

Period (hours)	Measured Noise Level dB			
	$L_{Aeq,T}$	Range $L_{Aeq,5mins}$	Range $L_{Amax,5mins}$	Range $L_{A90,5mins}$
12pm to 3pm	62.4	58.0 – 65.9	70.8 – 88.1	47.3 – 51.5
5am to 7am	59.8	49.2 – 67.6	51.6 – 83.0	40.6 – 62.9

4.3. Background Sound Levels

The background sound levels have been calculated in accordance with BS 4142:2014, which represents the most up-to-date guidance on the subject. Prior to the publication of the 2014 version of BS 4142, acousticians would use the lowest measured background sound levels; however, BS 4142: 2104 provides substantially more guidance on the determination of background sound levels. Section 8.1 of BS 4142: 2014 states that “*for this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods. Among other considerations, diurnal patterns can have a major influence on background sound levels and, for example, the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes*”. The guidance goes on to say that “*a representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value*”.

In order to determine the background sound levels for the day and night-time periods, the background sound levels have been analysed over the appropriate time periods, i.e. 15 minutes for night-time (11 pm to 7 am) and 1 hour for the daytime periods.

During the daytime $L_{A90,1hour}$ noise measurements were consistently between 49 and 50 dB(A). Therefore, 49 dB is considered to be the daytime background noise level. During the night-time period (5am to 7am), the $L_{A90,15mins}$ were between 41 and 52 dB, with most 15 minute periods between 44 and 47 dB(A). Therefore, 44 dB is considered to be night time background noise level.

5. IMPACT OF THE DEVELOPMENT

5.1. Overview

The assessment is carried out in accordance with BS 4142: 2014 +A1:2019 '*Methods for rating and assessing industrial and commercial sound*'.

5.2. Onsite Activities

The site will be used to bag/package aggregates and cementitious products into smaller palletised 20kg plastic bags. The material will be re-packaged in the raw form without any further processing. Aggregates and materials will only be stored internally and not in open air environment.

Raw materials will arrive by barge at the adjacent Seacon Port Terminal, approximately every two months. The material will be loaded onto open back trailers and transported via shunter tractor units (owned and operated by Seacon). These tractors are smaller than a standard HGV tractor unit and the shipment will be off loaded within a single day which is approximately 150 shunts. All of these vehicle movements would be using port vehicles and would all be contained within the port. The tractor shunts will enter the building through the doors on the northeast elevation of the building (in the southeastern corner of the site).

The shunter tractors take the aggregates into the warehouse, where an overhead gantry crane will be installed inside the warehouse. This crane will hook the bags using lifting loops and move them into the hopper. An automated cutting mechanism will then discharge the material into the hopper. The hopper will then feed the material using screw conveyors into the silos. The screw conveyors are fully enclosed (i.e. the material is not exposed to the air) and are virtually silent.

Once the material is in the silo it will be discharged towards the production line through screw conveyors or through pipes using air. Material will then be repackaged into smaller 20kg plastic bags on an enclosed, state of the art, fully automatic production line. The production line will be located fully within the warehouse and will be completely sealed enclosure which will not allow dust to escape. The production line would have a maximum output of 500x 20kg bags per hour. Therefore, over a 10-hour shift, there is a maximum possible output of 100,000kg (100t). The production line has a sound power level of <95 dB(A).

Once the product is in its final 20kg form, it will be stacked on a wooden pallet (appx 40 bags per pallet) and wrapped in plastic before being put into stock within the shed. Pallets will then be loaded onto lorries using a maximum of two forklifts. The majority of stock pallets will be loaded inside the shed however there will be some that may be loaded whilst waiting in the external yard. The lorries will exit through the doors on the northwest facade of the building. Any external loading will occur in the yard in front of the northwestern facade.

On average there will be 7 lorry loads of pallets leaving each day. The lorries would be 44t articulated lorries, which have a maximum payload of 14.5t. On average 5 loads would go towards Kent/Southeast (towards the A2 southbound), with 2 loads operating towards Dartford (A2 northbound and M25).

In addition, there could be up to 2 tanker collections per day. These would be loaded outside, directly from the silos. The lorries would park underneath, and raw materials would empty via gravity from the silos directly into the tanker. The tankers would either go to Gill Aggregates manufacturing facility on the same industrial park, or via the Dartford Crossing to their facility in Dagenham.

Site operations will occur between 5 am and 7pm.

The proposed development will generate 18 HGV movements per day (9 in, 9 out). In addition, there will be 4 employees, so approximately 8 LGV movements per day.

5.3. Noise Sources

Based on the onsite activities identified above, **Table 5.1** presents each item of plant and associated 'activity'. **Table 5.1** also summarises the source of the noise data associated with the activity. It was not possible to obtain noise data for some of the activities and therefore, noise measurements were conducted at an existing Gill Aggregates site on the 14th December 2022 – these measurements are summarised in **Appendix 3**. Other noise source data is from BS 5228-1:2009+A1:2014 "Code of practice for noise and vibration control on construction and open sites – Part 1: Noise" or from the plant manufacturer.

Table 5.1: Plant Sound Power Levels

Activity	Plant	% On Time	SPL at 10 metres	Data Source
			L _{Aeq}	
Bagging	Bagging Production Line	100	53	The manufacturer notes that the Sound Power Level is 95 dB(A). A 30 dB attenuation has been assumed for the building fabric.
Tanker Collections	Silo	10	59.6	Onsite measurements (See App 3)
Forklifts Route	Forklift – 2x	50	57.0	Onsite measurements (See App 3)
Lorries Idling	Articulated Lorry Idling	50	56.0	BS 5228 – Table C4 – Ref 8

Based on the percentage activity time noted above, this gives a total aggregated activity noise level of 60 dB L_{Aeq} at 10m.

5.4. Receptor Locations

Figure 5.1 shows the locations of the closest sensitive receptors. They are:

- 64-67 Stonebridge Road – located 200m from the development site; and
- 10 & 11 Galley Hill Road – located 260m from the development site.

Figure 5.1: Receptor Locations



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5.5. Establishment of Freefield Receptor Specific Sound Levels

Based on the noise measurements, noise levels at the closest receptors have been calculated using the prediction methodology contained within BS 5228-1:2009+A1:2014.

BS 5228 contains a procedure for predicting noise levels at a distance from an item of plant, taking into account sound power level, L_{Amax} or L_{Aeq} at 10 metres. The propagation model also takes into account the effect of any intervening noise barriers and buildings and the effect of reflecting surfaces.

Table 5.2 summarises the free-field specific noise level result at the closest receptors.

Table 5.2: Receptor Specific Sound Levels

Location	Freefield Specific Sound Level in dB(A)
64-67 Stonebridge Road	23.9
10 & 11 Galley Hill Road	21.7

5.6. Rating Sound Level

In accordance with Section 9 of BS 4142, the rating sound level is calculated by applying a character correction to the calculated receiver sound level. For this assessment, the character correction was specified using the “Subjective Method”, where it is necessary to *“consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention.”*

BS 4142 goes on to highlight the subjective correction that one could apply; these corrections are summarised in **Table 5.3** below:

Table 5.3: Subjective Character Corrections

Category	Comments
Tonality	<i>“2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible”.</i>
Impulsivity	<i>“a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible”</i>
Other sound characteristics	<i>“Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.”</i>
Intermittency	<i>“If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.”</i>

It is expected that noise associated with the proposed development could be both intermittent and have a tonal element. Consequently, a 2 dB tonal penalty correction and a 3 dB intermittency correction should be applied to all specific sound levels to determine the rating sound level. **Table 5.4** determines the rating sound levels at the receptor locations.

Table 5.4: Receptor Rating Sound Levels

Location	Freefield Rating Sound Level in dB(A)
64-67 Stonebridge Road	29
10 & 11 Galley Hill Road	27

5.7. Adherence to Sound Criteria

To assess the impact of the proposed plant, the predicted sound levels have been compared to the criteria in BS 4142. **Table 5.5** below considers the sound levels in a BS 4142 assessment during the period when the plant will be operational. In a BS 4142 assessment, the 'industrial' sound is rated by comparison against the background sound level. The difference between the rating sound level and the background sound level gives an indication of the likelihood of complaint.

Table 5.5: BS 4142 Assessment

	Background Sound Level L_{A90}	Specific Sound Level L_{Aeq}	Rating Sound Level L_{Aeq}	Difference between Rating Level and Background Sound Level
64-67 Stonebridge Road	44	23.9	29	-15
10 & 11 Galley Hill Road	44	21.7	27	-17

Note: All sound levels are free-field sound measurements.

BS 4142: 2014 suggests that “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”. At this site, the Rating noise level will be at least 15 dB below the background noise level and therefore it is possible to conclude that the development would have a low impact.

6. TRAFFIC IMPACT ASSESSMENT

The proposed development will generate 18 HGV movements per day (9 in, 9 out). In addition, there will be 4 employees, so approximately 8 LGV movements per day. Therefore, in total there is expected to be an increase in AADT (Annual Average Daily Traffic) of 26.

The Department for Transport has conducted regular traffic counts at a location to the west of the proposed development site on the A226, which suggests that typically traffic flows on the A226 would be in the region of 12,000 AADT. Under the IEMA Guidelines, for a road traffic impact to be greater than “negligible”, a 3 dB increase in noise would need to occur. It is known that a 3 dB increase in traffic noise equates to a doubling of traffic on the road. Therefore, the proposed development would need to increase traffic by 12,000 AADT to have a “minor adverse” on road traffic noise. Given that the proposed development will only increase AADT by 26, the proposed development can be considered to have a “negligible” impact on road traffic noise.

7. VIBRATION

Observations at the existing Gill Aggregates sites indicate that their operations do not generate large amounts of vibration. Whilst there was some localised vibration, e.g. in close proximity to lorries in operation, it was observed that there wasn't any source of vibration that was likely to be perceptible off-site.

Furthermore, it is important to note that the proposed development is situated in an area of existing commercial/industrial use with no nearby high sensitivity receptors. The nearest residential dwellings are located 200 m from the development site. As a consequence of the above factors, the need for a detailed vibration assessment can be screened out.

8. OVERALL CONCLUSIONS AND RECOMMENDATIONS

A detailed sound measurement study has been carried out to determine whether a proposed aggregate bagging facility at Tower Wharf, Northfleet is likely to be acceptable in terms of noise and whether complaints are considered likely.

Using the guidance and calculation methods contained within BS 4142: 2014 +A1:2019 '*Methods for rating and assessing industrial and commercial sound*', the rating sound level has been calculated to be at least 15 dB(A) below the background sound level at the closest dwellings. Consequently, it is possible to conclude that the proposed development and associated plant could have a low impact on the nearest residential dwellings.

Appendix 1

Glossary of Acoustic Terms

Appendix 1: Glossary of Acoustic Terms

Decibel (dB)	This is a tenth (deci) of a bel. Decibel can be a measure of the magnitude of sound, changes in sound level and a measure of sound insulation. Decibels are not an absolute unit of measurement but are an expression of the ratio between two quantities expressed in logarithmic form.
dB(A)	A-weighted decibels, i.e. decibel level 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.
Freefield	A situation in which the radiation from a sound source is completely unaffected by the presence of any reflecting boundaries.
Hertz (Hz)	Unit of frequency, equal to one cycle per second. The frequency of sound waves refers to the number of pressure fluctuations per second. Frequency is related to the pitch of a sound.
$L_{Aeq,T}$	The equivalent steady sound level in dB(A) containing the same acoustic energy as the actual fluctuating sound level over the given period, T. For example, daytime noise is generally measured over a 16 hour period, so T is 16 hours. $L_{Aeq,T}$ can be measured directly with an integrating sound level meter.
L_{A10}	The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 10 percent of a given time and is the $L_{A10,T}$. The L_{A10} is used to describe the levels of road traffic noise at a particular location.
L_{A50}	The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 50 percent of a given time and is the $L_{A50,T}$.
L_{A90}	The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 90 percent of a given time and is the $L_{A90,T}$. The L_{A90} is used to describe the background noise levels at a particular location.
L_{Amax}	The 'A'-weighted maximum sound pressure level measured over a measurement period.
R_w (or SRI)	The weighted sound reduction index as a single number laboratory measured rating used to describe the sound insulation of building elements.

Noise Impact Assessment:

Tower Wharf, Lower Road, Northfleet

Gill Aggregates Limited • 5th November 2024 • H4270 – NV – v1

Appendix 2

Schedule of Equipment

Noise Impact Assessment:

Tower Wharf, Lower Road, Northfleet

Gill Aggregates Limited • 5th November 2024 • H4270 – NV – v1

Appendix 2: Schedule of Equipment

Hawkins Noise Kit 2 - Equipment Set 5199:

Equipment Type	Manufacturer	Serial Number	Calibration Certification Number	Calibration Type	Date of Last Calibration Check	Date of Next Calibration Check
Nor-140 Type 1 Sound Level Meter	Norsonic	1405199	U49007	UKAS Calibration: 0789	16 th October 2022	October 2026
Nor-1209 Pre-amplifier	Norsonic	15117	49006	UKAS Calibration: 0789	16 th October 2022	October 2026
Nor-1225 Microphone	Norsonic	151240	49006	UKAS Calibration: 0789	16 th October 2022	October 2026
Nor-1251 Sound Calibrator	Norsonic	32849	U49005	UKAS Calibration: 0789	16 th October 2022	October 2025
Nor-1284 Dehumidifier	Norsonic	366	Not Applicable			
Nor- 1212 Weather Protection Kit	Norsonic	Not Applicable				
Nor1408A/10 Extension Cable	Norsonic/Lemo	Not Applicable				

Noise Impact Assessment:

Tower Wharf, Lower Road, Northfleet

Gill Aggregates Limited • 5th November 2024 • H4270 – NV – v1

Laboratory Location

Campbell Associates Ltd

5b Chelmsford Road Industrial Estate

GREAT DUNMOW, Essex, GB-CM6 1HD

Phone 01371 871030



Certificate of Calibration and Conformance

Certificate number: **U49007**

Test Object: **Sound Level Meter, BS EN IEC 61672-1:2003 Class 1**

Producer: **Norsonic AS.**

Type: **140**

Serial number: **1405199**

Customer: **Hawkins Environmental Ltd**

Address: **70 Wentworth Crescent, Basingstoke
Hampshire, RG22 4WX**

Contact Person: **Nick Hawkins**

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	Norsonic	1225	151240	49006
Calibrator*	Norsonic	1251	32849	U49005
Preamplifier	Norsonic	1209	15117	Included

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

Additional items that have also been submitted for verification:

Wind shield Norsonic Nor1451 (ø 60mm)

Attenuator N/A

Extension cable N/A

These items have been taken into account wherever appropriate.

Instruction Manual: Im140_1Ed8R0En Firmware Version: 3.0.1866 The test object is a single channel instrument.

Conditions	Pressure kPa	Temperature °C	Humidity %RH
Reference conditions	101.325	23	50
Measurement conditions	99.70 ±0	22.20 ±0	56.05 ±1.55

Calibration Dates:

Received date: 14/10/2024 Reviewed date: 16/10/2024

Calibration date: 16/10/2024 Issued date: 16/10/2024

Technicians: (Electronic certificate)

Calibrated by: *Martyna Silva*

Reviewed by: *Michael Tichner*

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.

Doc ref: Sim-Cert-Master-V3-07

Noise Impact Assessment:

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Certificate of Calibration and Conformance

Continuation of Certificate number: **U49007**

The statements of conformance and observation notes detailed in this certificate are made with reference to the following standards in respect of the calibration of the test object.

Manufactured: **BS EN IEC 61672-1:2003**
 Periodic Tests: **BS EN IEC 61672-3:2006**
 Pattern Evaluation: **BS EN IEC 61672-2:2003**

Conformance:

From markings on the sound level meter or by reference to the manufacturer's published literature it has been determined that the instrument submitted for verification was originally manufactured to the listed standard and similarly that the associated sound calibrator conforms to the BS EN IEC 60942 standard.

Measurement Summary:

Indication at the calibration check frequency - IEC61672-3 Ed.1 #9	Passed
Self-generated noise - IEC 61672-3 Ed.1 #10.2	Passed
Acoustical signal tests of a frequency weighting - IEC 61672-3 Ed.1 #11	Passed
Electrical signal tests of frequency weightings - IEC 61672-3 Ed.1 #12	Passed
Frequency weightings: A Network - IEC 61672-3 Ed.1 #12.3	Passed
Frequency weightings: C Network - IEC 61672-3 Ed.1 #12.3	Passed
Frequency weightings: Z Network - IEC 61672-3 Ed.1 #12.3	Passed
Frequency and time weightings at 1 kHz IEC 61672-3 Ed.1 #13	Passed
Level linearity on the reference level range - IEC 61672-3 Ed.1 #14	Passed
Toneburst response - IEC 61672-3 Ed.1 #16	Passed
Peak C sound level - IEC 61672-3 Ed.1 #17	Passed
Overload indication - IEC 61672-3 Ed.1 #18	Passed

Comments

Correct level with associated calibrator is 113.9dB(A).

Statement of Conformance

The sound level meter submitted has successfully completed the periodic tests of the standard listed for the environmental conditions under which the tests were performed. As public evidence(1) was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with the manufacturer's standard to demonstrate that the model of sound level meter fully conformed to the requirements of the said standard, the sound level meter submitted for testing conforms to the relevant class of the said standard.

(1 - evidence is held on file at the calibration laboratory)

Observations

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a coverage probability of approximately 95 %. The uncertainty evaluation has been carried out in accordance with UKAS requirements. Details of the uncertainty for each measurement are available from the Calibration Laboratory upon request. Details of the sources of corrections and their associated uncertainties that relate to this verification are contained within the test report accompanying this certificate.

Decision Rule

Basic Meter Function - The decision rules will be applied in accordance with the procedure as described in BS EN 61672-3:2006.

This certificate relates only to the items tested above.

**** End of Certificate ****

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Laboratory Location

Campbell Associates Ltd

5b Chelmsford Road Industrial Estate

GREAT DUNMOW, Essex, GB-CM6 1HD

Phone 01371 871030



Certificate of Calibration

Certificate number: 49006

Test Object: Measurement Microphone

Producer: Norsonic AS.

Type: 1225

Serial number: 151240

Customer: Hawkins Environmental Ltd

Address: 70 Wentworth Crescent, Basingstoke

Hampshire, RG22 4WX

Contact Person: Nick Hawkins

Order No:

Measurement Results	Sensitivity (dB re 1V/Pa)	Sensitivity (mV/Pa)	Capacitance (pF)
Measurement 1	-26.00	50.10	21.53
Measurement 2	-26.02	50.02	21.56
Measurement 3	-26.01	50.08	21.57
Result (Average):	-26.01	50.07	21.55
Expanded Uncertainty:	0.10		2.00
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:uncertainty dB/kPa Temperature:-0.005 dB/°C Humidity:0 dB/%RH

Conditions	Pressure kPa	Temperature °C	Humidity %RH
Reference conditions	101.325	23	50
Measurement conditions	99.7 ± 0.040	22.8 ± 0.1	51.5 ± 0.7

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: 14/10/2024

Reviewed date: 16/10/2024

Calibration date: 16/10/2024

Issued date: 16/10/2024

Technicians: (Electronic certificate)

Calibrated by: *Martyna Silva*

Reviewed by: *Michael Tichner*

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.

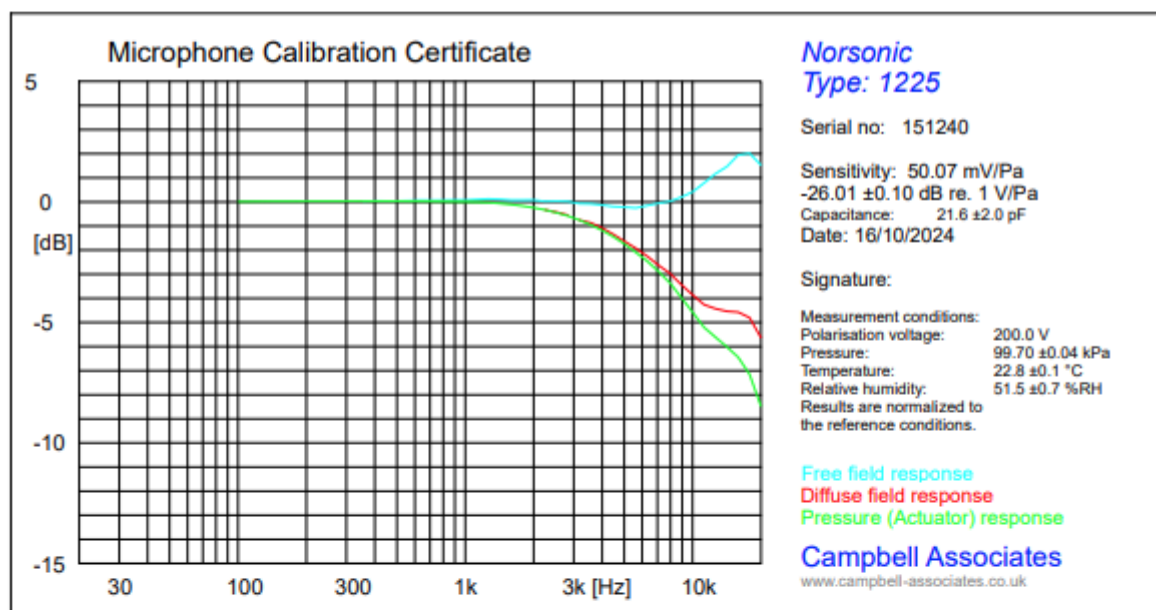
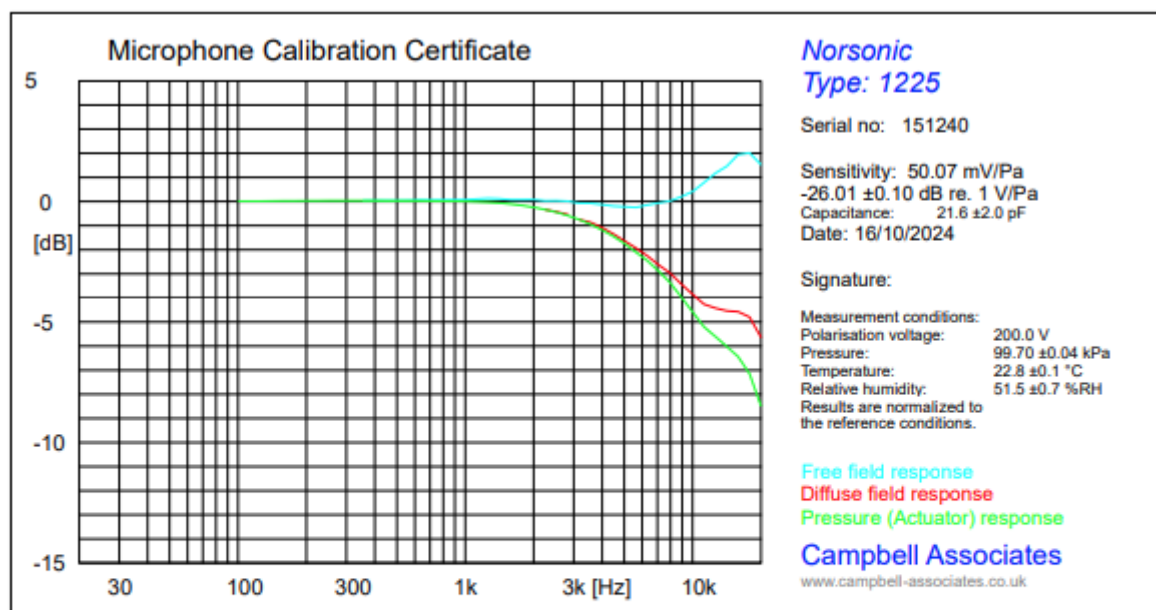
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Comment:

Noise Impact Assessment:

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Laboratory Location

Campbell Associates Ltd

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



Certificate of Calibration

Certificate number: **U49005**

Test Object: **Sound Calibrator**

Producer: **Norsonic AS.**
Type: **1251**
Serial number: **32849**
Customer: **Hawkins Environmental Ltd**
Address: **70 Wentworth Crescent, Basingstoke**
Hampshire, RG22 4WX
Contact Person: **Nick Hawkins**
Order No:

Measurement Results	Level dB	Level Stability dB	Frequency Hz	Distortion %
Measurement 1	114.05	0.04	999.80	0.42
Measurement 2	114.05	0.05	999.79	0.43
Measurement 3	114.05	0.05	999.80	0.45
Result (Average):	114.05	0.05	999.79	0.43
Expanded Uncertainty:	0.1	0.02	1	0.1
Degree of Freedom:	>100	>100	>100	>100
Coverage Factor:	2	2	2	2

The stated level is relative to 20µPa. 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:0.0005 dB/kPa Temp:0.003 dB/°C Humi:0 dB/%RH Load volume: 0.0003 dB/mm3

Conditions	Pressure kPa	Temperature °C	Humidity %RH
Reference conditions	101.325	23	50
Measurement conditions	99.7 ±0.040	22.1 ±0.1	54.7 ±0.7

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\NOR1251_32849_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:	14/10/2024	Reviewed date:	16/10/2024
Calibration date:	16/10/2024	Issued date:	16/10/2024

Technicians: (Electronic certificate)

Calibrated by: *Martyna Silva*
Reviewed by: *Michael Tichner*

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Doc ref: Calb-Cert-Master-V3-07

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Certificate of Calibration

Continuation of Certificate number: **U49005**

Reference Microphone: **WSM11 (C) - GRAS40AG-291442**

Measurements

The calibrator has been tested as described in the following annexes to BS EN IEC60942:2003 Sound Calibrators; B3.4 for sound pressure level, B3.5 for frequency, B3.6 for total distortion and A4.4 for short term stability of the pressure level.

Instruments and Program

A complete list of instruments, hardware and software that have been used for this calibration is available from the calibration laboratory

Comments

Statement of Calibration

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in annex B of BS EN IEC 60942:2003 for the sound pressure levels and frequencies stated, for the environmental conditions under which the tests were performed. However, as public evidence was not available, from a testing organisation responsible for pattern approval, to demonstrate that the model of sound calibrator conformed to the requirements for pattern evaluation described in annex A of BS EN IEC 60942:2003, no general statement of conclusion can be made about conformance of the sound calibrator to the requirements of BS EN IEC 60942:2003.

Notes:

The sound pressure level generated by the calibrator in its ½ inch configuration was measured five times and averaged by a WS2P working standard microphone for class 1 or 2 devices or a LS2P reference microphone for class 0 or LS devices as specified in the International Standard BS EN 61094-4. The results of three replications and the mean of the measurements obtained are given in the measurement results table of this certificate. The frequency and distortion were measured in a similar manner. The figures in BOLD are the final results; a small correction factor may need to be added to the sound pressure level quoted here if the device is used to calibrate a sound level meter that is fitted with a free field response microphone. See manufacturer's handbooks for full details of this and other corrections that may be applicable.

Observations:

Decision Rule:

The decision rules have been applied in accordance with the procedure as described in BS EN 60942:2003

This certificate relates only to the items tested above.

**** End of Certificate ****

Noise Impact Assessment:

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Appendix 3

Summary of Noise Measurements

Appendix 3: Summary of Noise Measurements

Source	Spot Measurements of Onsite Plant				
	Measured at Varying Distances			Normalised to 10 Metres	
	L _{Aeq}	L _{Amax}	Distance	L _{Aeq}	L _{Amax}
Silo	80.5	85.9	0.9	59.5	64.9
Linde H70 Forklift - Drive-by	74.7	84.3	1.3	56.9	66.5
Linde H70 Forklift - Lifting	71.1	77.8	1.7	55.7	62.4