Hawkins environmental

Noise Assessment:

Rainbow Industrial Estate, Trout Road, West Drayton

ET Planning

9th May 2022

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1. INTRODUCTION

1.1. Overview

Hawkins Environmental Limited has been instructed by ET Planning to undertake a noise assessment for the proposed redevelopment of Rainbow Industrial Estate, situated in West Drayton of the London Borough of Hillingdon.

The proposed development will see the *'Retention of entrance gates and change of use for use class sui generis including container and skip storage; open and closed storage of building, scaffolding and lighting materials; storage of aggregate materials; vehicle storage and sales; and associated installation of portacabins, container stores, transportable silos and other structures for a period of 12 months (retrospective application).'*

The proposals follow the refusal of planning permission by LB Hillingdon (LBH) on 19th August 2021 for *'Installation of two portacabins and retention of entrance gates and proposed change of use for Use Class Sui Generis including container storage; open and closed storage of building and scaffolding materials; storage of aggregate materials; vehicle storage and sales for a period of 36 months (part retrospective application)*' (LPA Ref: 38058/APP/2021/1327).

Reason for refusal 1 states "*The unauthorised use of the land would cause unacceptable adverse impacts arising from noise resulting in significant harm to the living conditions and well-being of neighbouring residents and user of the Canalside Moorings and Towpath. The development thereby conflicts with paragraph 185 of the NPPF (2021), policy D14 of the London Plan (2021), Policies BE1 and EM8 of the Hillingdon Local Plan: Part 1 – Strategic Policies (2012) and policy DMHB 11 of the Hillingdon Local Plan: Part 2- Development Management Policies (2020)".*

The application site previously had a temporary, 12-month permission to operate as an airport parking facility. Prior to this, outline planning permission and Reserved Matters has been approved for redevelopment of Rainbow Industrial Estate and the neighbouring Kirby Industrial Estates site for a mixed use development including the "*demolition of existing premises and erection of 99 residential units (C3), 50-unit extra care/dementia sheltered housing scheme (C3), 1,529.4sqm light industrial floorspace comprising 17 business units (B1c) and 611.30sqm of restaurant/cafe (A3) floorspace, associated open space, car parking and landscaping*".

The 2021 Application was sought for a temporary period as a meanwhile use of the site whilst a new mixed-use scheme for the Rainbow and Kirby Industrial sites is discussed with the LPA during pre-application discussions and a formal planning application is then submitted and determined.

Consequently, this assessment has been completed in connection with a proposed appeal to determine whether the proposed development achieves compliance with appropriate guidance in relation to noise, as well as national, regional and local planning policy.

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 noise 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 noise egress from the proposed development 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 MIEnvSc 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.

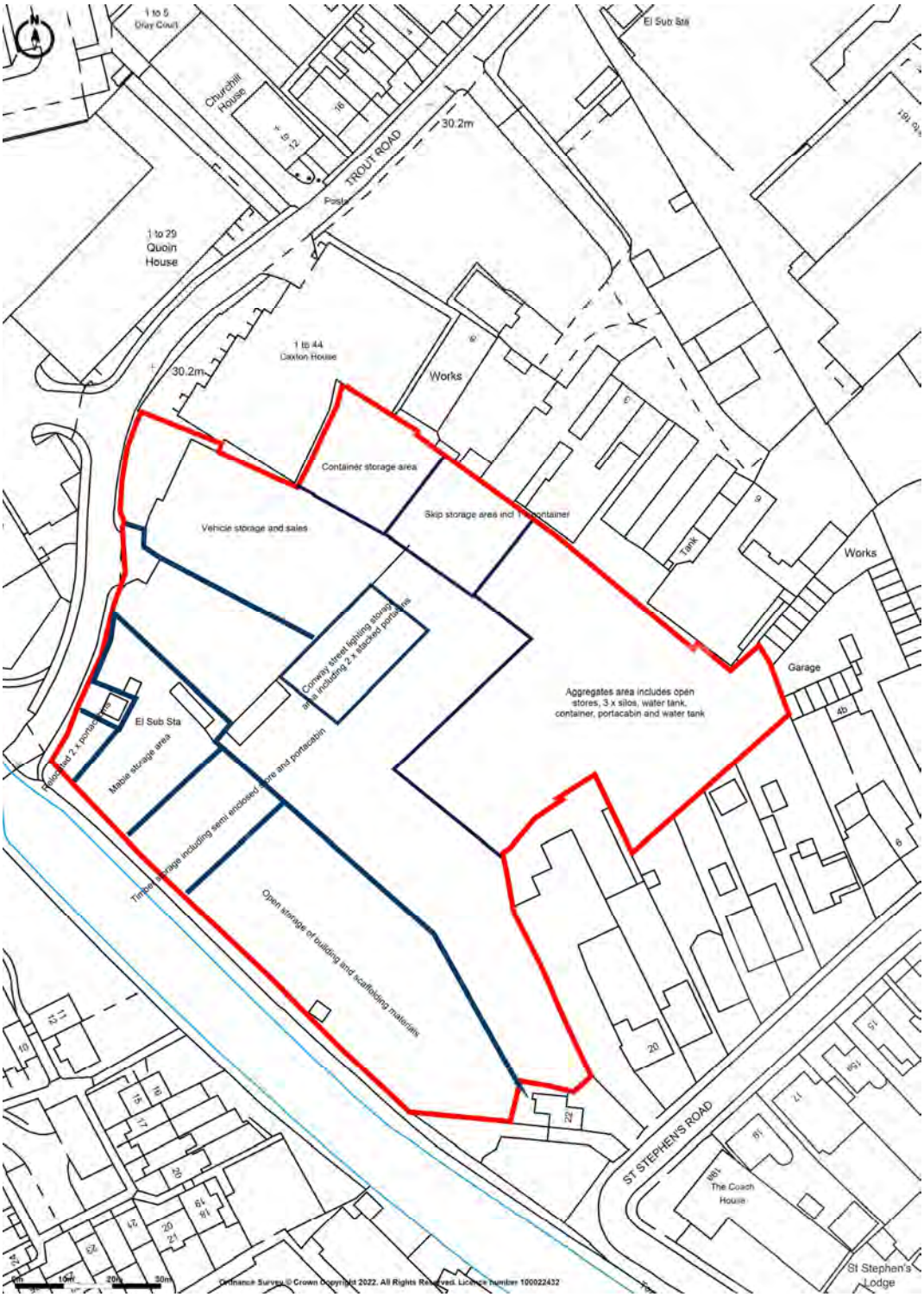
Nick is an alumnus of the University of East Anglia and the University of Southampton. Nick holds the Institute of Acoustics' Certificate of Competence in Environmental Noise Measurement and became a full Member of the Institute of Acoustics in 2010, having previously been an Associate Member. Nick is 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 Trout Road in West Drayton. It is bound by the Grand Union Canal to the southwest, the rear of a car dealership and several residential properties on St Stephen's Road to the southeast, light industrial/commercial premises to the northeast and Trout Road (which provides the site access) to the northwest. A location plan of the proposed site can be seen in **Figure 1.1**.

Figure 1.1: Site Plan



2. PLANNING POLICY & GUIDANCE

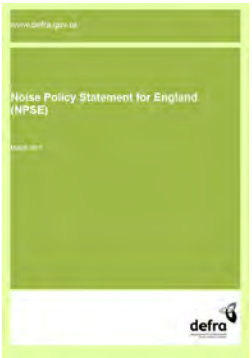
2.1. National Planning Policy Framework (2021)

The National Planning Policy Framework (NPPF) was first published on the 27th March 2012 and revised July 2018, February 2019 and again in July 2021. The NPPF outlines the Government's environmental, economic and social policies for England. The NPPF sets out a presumption in favour of sustainable development which should be delivered with three main dimensions: economic; social and environmental (Paragraphs 7, 8, 10 and 11). The NPPF aims to enable local people and their councils to produce their own distinctive local and neighbourhood plans, which should be interpreted and applied in order to meet the needs and priorities of their communities.

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 174).

Paragraph 185 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…"*

2.2. Noise Policy Statement for England (2010)



The Noise Policy Statement for England (NPSE) provides further guidance on the interpretation of Section 123 of 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 Planning Practice Guidance was launched on 6th March 2014 and provides additional guidance and interpretation to the Government's strategic policies, outlined within the NPPF, in a web-based resource. This is updated regularly.


Guidance
Noise
Advises on how planning can manage potential noise impacts in new development.
Noise
When is noise relevant to planning?

The NPPG 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 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 (ie whether or not the noise contains particular high or low-frequency content) and the general character of the noise (ie whether or not the noise contains particular tonal characteristics or other particular features). The local topology and topography should also be taken into account along with the existing and, where appropriate, the planned character of the area.*

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 PPG) and shows that 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 that 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.

Table 2.1: Noise Exposure Hierarchy

Perception	Examples of outcomes	Increasing effect level	Action	
Not noticeable	No Effect	No Observed Effect	No specific measures required	Low Noise Level
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required	
Lowest Observed Adverse Effect Level				
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, eg turning up the 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. The potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum	Increasing Noise Levels ↓
Significant Observed Adverse Effect Level				
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, eg 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. The potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep.	Significant Observed Adverse Effect	Avoid	
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise leading to psychological stress or physiological effects, eg regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, eg auditory and non-auditory	Unacceptable Adverse Effect	Prevent	High Noise Level

2.4. The London Plan (2021)

The New London Plan was formally published on the 2nd of March 2021 and replaces the previous London Plan.

The London Place notes that noise is an integral part of development planning. When designing developments, it notes that *"measures to design out exposure to poor air quality and noise from both external and internal sources should be integral to development proposals and be considered early in the design process. Characteristics that increase pollutant or noise levels, such as poorly-located emission sources, street canyons and noise sources should also be designed out wherever possible. Optimising site layout and building design can also reduce the risk of overheating as well as minimising carbon emissions by reducing energy demand"* (para 3.3.9).

Policy *D13 Agent of Change* formalises the Agent of Change principle in London's planning policy in relation to noise. The policy notes:

"For a long time, the responsibility for managing and mitigating the impact of noise and other nuisances on neighbouring residents and businesses has been placed on the business or activity making the noise or other nuisance, regardless of how long the business or activity has been operating in the area. In many cases, this has led to newly-arrived residents complaining about noise and other nuisances from existing businesses or activities, sometimes forcing the businesses or other activities to close" (para 3.13.1).

"The Agent of Change principle places the responsibility for mitigating the impact of noise and other nuisances firmly on the new development. This means that where new developments are proposed close to existing noise-generating uses, for example, applicants will need to design them in a more sensitive way to protect the new occupiers, such as residents, businesses, schools and religious institutions, from noise and other impacts. This could include paying for soundproofing for an existing use, such as a music venue. The Agent of Change principle works both ways. For example, if a new noise-generating use is proposed close to existing noise-sensitive uses, such as residential development or businesses, the onus is on the new use to ensure its building or activity is designed to protect existing users or residents from noise impacts" (para 3.13.2).

Policy D13 states:

A. *"The Agent of Change principle places the responsibility for mitigating impacts from existing noise and other nuisance-generating activities or uses on the proposed new noise-sensitive development. Boroughs should ensure that Development Plans and planning decisions reflect the Agent of Change principle and take account of existing noise and other nuisance-generating uses in a sensitive manner when new development is proposed nearby.*

B. *Development should be designed to ensure that established noise and other nuisance-generating uses remain viable and can continue or grow without unreasonable restrictions being placed on them.*

C. *New noise and other nuisance-generating development proposed close to residential and other noise-sensitive uses should put in place measures to mitigate and manage any noise impacts for neighbouring residents and businesses.*

D. *Development proposals should manage noise and other potential nuisances by:*

1) *ensuring good design mitigates and minimises existing and potential nuisances generated by existing uses and activities located in the area*

2) *exploring mitigation measures early in the design stage, with necessary and appropriate provisions including ongoing and future management of mitigation measures secured through planning obligations*

3) *separating new noise-sensitive development where possible from existing noise-generating businesses and uses through distance, screening, internal layout, sound-proofing, insulation and other acoustic design measures.*

E. *Boroughs should not normally permit development proposals that have not clearly demonstrated how noise and other nuisances will be mitigated and managed".*

Policy *D14 Noise* goes on to state:

A. *"In order to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise by:*

1) *avoiding significant adverse noise impacts on health and quality of life*

2) *reflecting the Agent of Change principle as set out in Policy D13 Agent of Change*

3) *mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on existing noise-generating uses*

4) *improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity)*

5) *separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening, layout, orientation, uses and materials – in preference to sole reliance on sound insulation*

6) *where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles*

7) *promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver.*

B. *Boroughs, and others with relevant responsibilities, should identify and nominate new Quiet Areas and protect existing Quiet Areas in line with the procedure in Defra's Noise Action Plan for Agglomerations".*

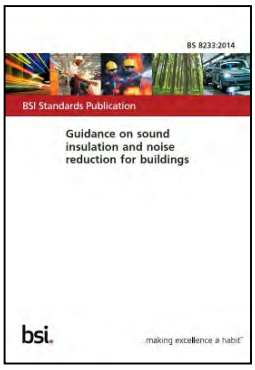
Policy D14 notes that *"the management of noise should be an integral part of development proposals and considered as early as possible"* (para 3.14.1).

It notes that "*The management of noise also includes promoting good acoustic design of the inside of buildings. Section 5 of BS 8223:2014 provides guidance on how best to achieve this. The Institute of Acoustics has*

produced advice, Pro:PG Planning and Noise (May 2017), that may assist with the implementation of residential developments. BS4214 provides guidance on monitoring noise issues in mixed residential/industrial areas" (para 3.14.3).

3. ASSESSMENT 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 PPG 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:

a) *"Assess the site, identify significant existing and potential noise sources, measure or estimate noise levels, and evaluate layout options.*

b) *Determine design noise levels for spaces in and around the building(s).*

c) *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 $L_{Aeq.8hour}$

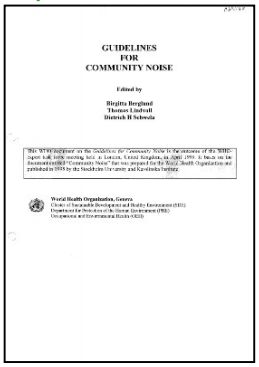
When considering the noise level criteria considered in **Table 3.1**, the following points should be noted:

- 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**.


GUIDELINES
FOR
COMMUNITY NOISE

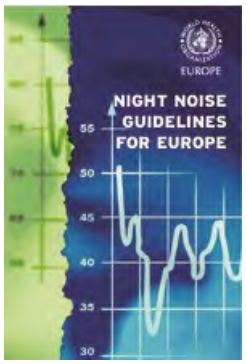
Edited by
Birgitta Berglund
Thomas Lindvall
Dietrich H Schwela

Table 3.2: Summary of Noise Criteria: WHO

Residential Environment	Critical Heath Effect	L_{Aeq}	L_{AFmax}	Time Base
Outdoor living	Serious annoyance, daytime and evening	55	-	07:00-23:00

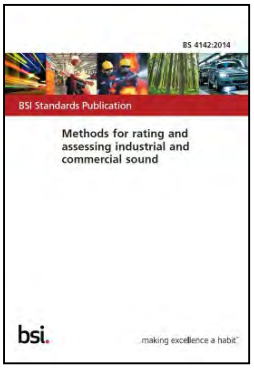
Residential Environment	Critical Heath Effect	L_{Aeq}	L_{AFmax}	Time Base
area	Moderate annoyance, daytime and evening	50	-	07:00-23:00
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	-	07:00-23:00
Inside bedrooms	Sleep disturbance, night-time	30	45	23:00-07:00
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").

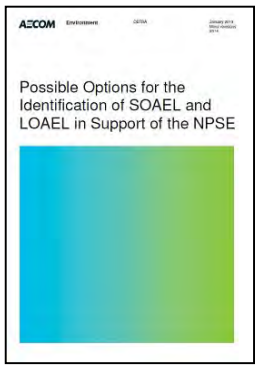
The procedure defined in BS 4142 for predicting the likelihood of complaints is based on establishing the difference between the rating level and the background level outside the residential property of interest. The greater the difference the greater the likelihood of complaints and more specifically:

- *"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. Possible Options for the Identification of SOAELs and NOAELs in Support of the NPSE (2014)



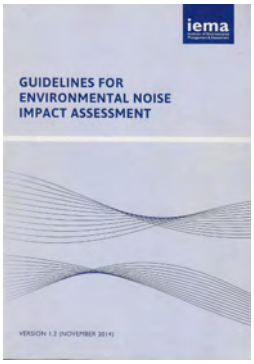
Published by Defra, based on a Research Project prepared by AECOM, *"Possible Options for the Identification of SOAELs and NOAELs in Support of the NPSE"* attempts to give values to the concepts of SOAELs and NOAELs, introduced by the Noise Policy Statement for England (NPSE). After the withdrawal of PPG24: 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)*

Source	Effect	LOAEL	SOAEL
Air	Annoyance (Daytime)	**52** *(50-54)*	**60** *(58-62)*
	Sleep (Night-time)	**41** *(40-49)*	**53** *(47-60)*

3.6. 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 3.3** 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

3.7. Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments (2021)


Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments

Version 6

2021 update

Introduction

This joint guidance, published by the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA), provides a unified approach to conducting noise assessments during the Covid-19 pandemic.

The guidance suggests that *"site survey measurements of the existing noise climate continue to be the default position for obtaining baseline sound level data"*. However, *"the prevailing sound environment must be reasonably representative and not affected by local restrictions"*. Consequently, *"where necessary, the measured data should be supplemented by other sources"*. The guidance notes that *"there remain some instances where the manner in which acoustic assessment and reporting is carried out needs to be adapted. We have, therefore, reiterated below some changes in working practices in the production of such reports, where these may be necessary. In so doing, it is still important to minimise uncertainties when determining baseline conditions, in a clear and transparent way"*.

The guidance notes that road, rail and air traffic has been reduced by the pandemic. Other noise sources may also be different, for example *"local factories may not be working at full output, shift patterns may have changed to allow for social distancing, and places of entertainment may be closed"*. However, the guidance states that *"data from other sources can be used such as existing data (for example, from previous local surveys and noise maps) or undertaking baseline sound predictions to establish an appropriate robust estimate of baseline conditions"*.

The guidance goes on to note that *"the safety of staff is paramount and it must be safe to undertake such measurements"*. Any *"site visits must comply with any restrictions on movement and ensure that social distancing is embedded within the site visit methodology"*.

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. Two separate sets of noise measurements have been carried out – one to determine the background noise levels in the area; a second to characterise noise from activities on site.

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.

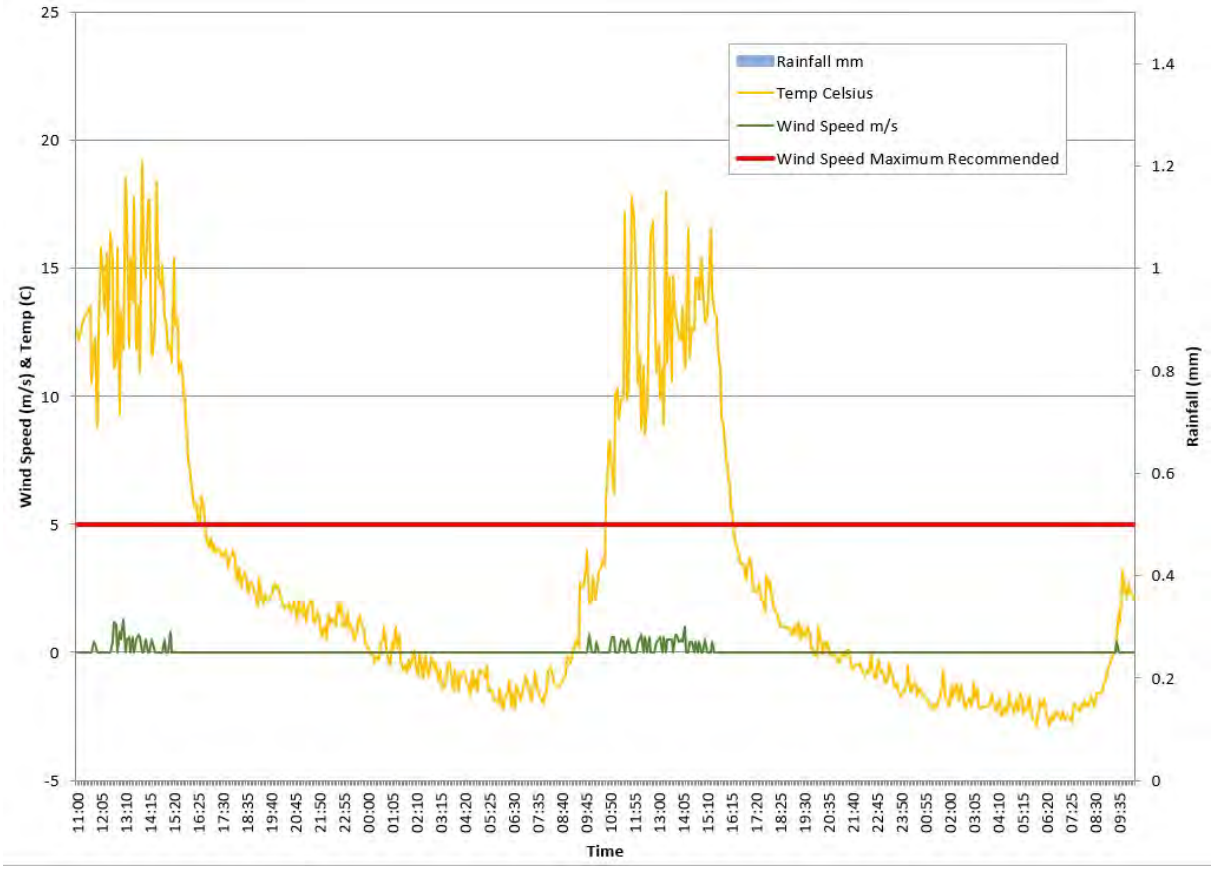
The survey was conducted from the 12th to the 14th January 2022. The noise monitoring was conducted by Nick Hawkins and Mathew Vaughan of Hawkins Environmental Limited. Nick is a Member of the Institute of Acoustics and holds the Institute of Acoustic's Certificate of Competence in Environmental Noise Measurement.

Weather conditions were conducive to successful monitoring. During the measurement period, Hawkins Environmental measured the weather with a Kestrel 5000 windspeed and temperature logger, plus an 8in rain gauge with 1000 series Watchdog data logger. **Table 4.1** summarises the weather conditions during the measurement period, with the data presented in graphical form in **Figure 4.1**.

Table 4.1: Summary of Weather Conditions during the Noise Measurements

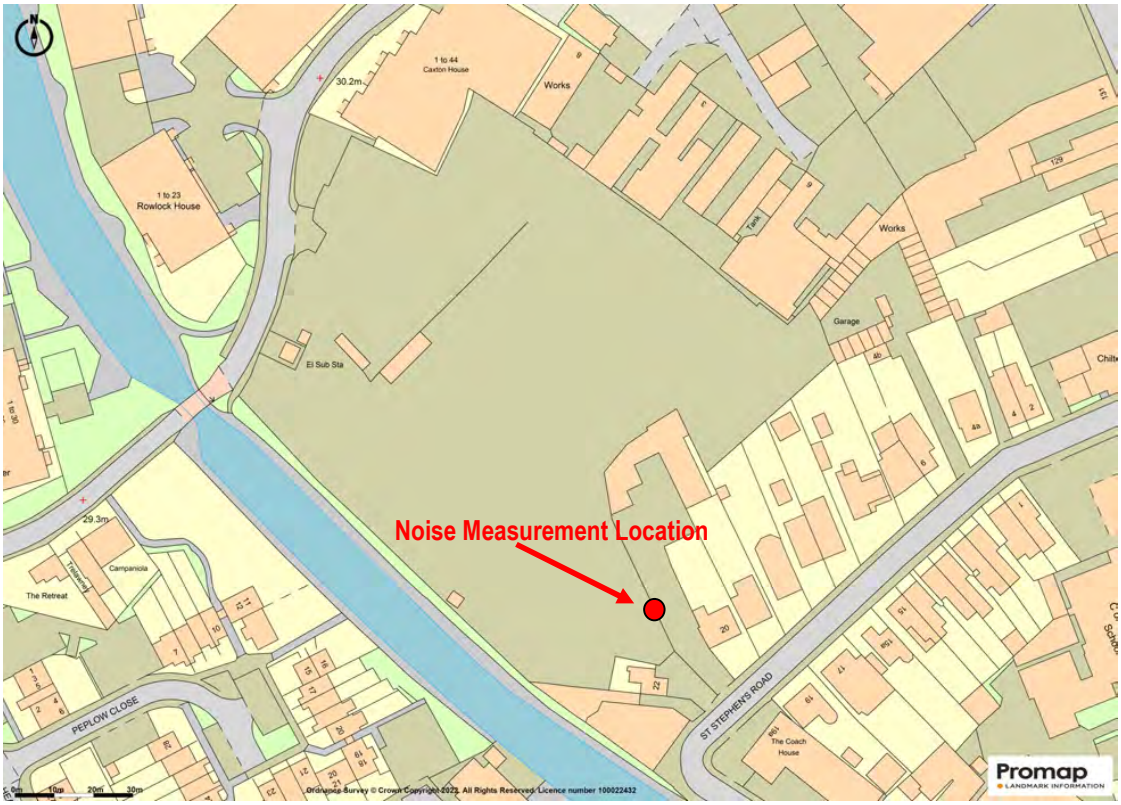
General Description	The measurement periods were warm for the time of year, with some sunshine during the day with light winds.
Windspeed	Average wind speeds were low, typically less than 0.5 m/s.
Temperature	Lows of -3°C at night, with daytime temperatures up to around 18°C when in direct sunshine.
Precipitation	The measurement period remained dry.

Figure 4.1:Weather Data



Noise measurements were conducted adjacent to the boundary in the southwest corner of the site. The monitoring location was located away from the noisy onsite activity and the location is considered representative of the rear of the dwellings on St Stephens Road. A map showing the measurement location can be seen in **Figure 4.2**.

Figure 4.2: Noise Measurement Location & Proposed Ground Floor Plan



4.2. Noise Survey Results

The noise measurement study has identified that the site is affected my multiple noise sources. Distant road traffic noise is audible from the M25, located 1.8km to the west, as well as the M4, located 2.1km south of the site. Noise from Heathrow Airport (where the northern runway is 4km south of the site) is also regularly audible, with the noise of planes taking off noticeable every few minutes.

Local traffic is also audible, especially on St Stephen's Road. Noise from activities on the proposed development site was also audible at times, but due to the intermittent nature of onsite activities, these are unlikely to have a significant impact on background noise levels.

The noise measurement data is detailed in **Appendix 3** and **Figure 4.3** and summarised in **Table 4.2** below.

Table 4.2: Summary of the Noise Level Measurements

Period (hours)	Measured Noise Level dB
	$L_{Aeq.T}$
Wednesday 12th: 11am to 11pm	54.9
Wednesday 12th / Thursday 13th: 11pm to 7am	50.8
Thursday 13th: 7am to 11pm	55.6
Thursday 13th / Friday 14th: 11pm op 7am	50.2
Friday 14th: 7am to 11am	55.9

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 night-time periods, the background sound levels have been analysed over the appropriate time periods, i.e. 1 hour for the daytime periods. **Figure 4.4** details the distribution of the background sound levels as described in BS 4142: 2014 for the day time periods. Since it is understood that onsite activities will only occur between 7am and 7pm, only background noise levels between these hours have been considered.

It can be seen from **Figure 4.4** that during the day, the $L_{A90.1hour}$ ranged from 43 dB to 58 dB. However, it can be seen from **Figure 4.3** that for several hours during the middle of the day on Thursday the 13th January, the background noise levels dropped very low (to 43.3 dB). It can be seen from **Figure 4.3** that background noise levels during this period drop below typical background noise levels at night at this location. Given that the underlying background noise levels at this site are driven by distant road traffic from the M25 and M4, the most likely cause of this unusual dip in background noise levels would be due to changes in traffic flows on the M25 and/or the M4. It is understood that on the day in question, there was severe congestion on both the M25 and M4 due to an accident in the morning of the 13th. Consequently, it is considered that this period should not be

considered in the background analysis. Generally speaking, background noise levels are normally in the region of 50 dB or above; therefore, it is considered that 50 dB is the typical background noise level at this site.

4.4. Onsite Noise Levels

In addition to the long term background noise measurements, observations and noise measurements of typical activity noise levels were observed on site on both the 12th and 14th of January. **Table 4.3** summarises these noise level.

Table 4.3: Summary of the Onsite Activity Noise Level Measurements

Activity/Plant	Area	% On time	Measured Noise Level L_{Aeq} at 10m
Forklift unloading marble	A	5%	66.8
JCB loading sand onto lorry	B/C	5%	73.7
Lorry idling	B/C	10%	62.8
Cement silo loading aggregates on lorry	B/C	5%	62.6
Generator for silo	B/C	5%	57.8
Lorry drive by	Haul Routes	5 per hour	67.6*

* = Lorries on haul routes are normally described as L_{Amax} noise levels at 10m

It was observed that other than lorry movements on site, there was very few other noisy activities. It is understood that there are approximately 60 lorry movements on and off site each day.

Adjacent to the entrance to the site on Trout Road (area A – see **Figure 4.5**), an area is used for the storage of marble. It is understood that every couple of months, there is a large delivery of marble to the site, which is unloaded using a forklift from a lorry. Then, as required, marble is removed from the site onto a lorry/van using a forklift. Noise measurements were conducted during one of the infrequent deliveries. Whilst noise from the forklift is relatively high, it is understood that this typically occurs for relatively short periods of time and very infrequently. For example, during the second site visit on the 14th, no activity was observed in connection with the marble storage area.

Save Time Concrete Limited operates from two of the plots on the site (areas B and C). A number of different activities occur on both plots. Each plot includes a cement silo, that is used to store cement until it is required to load onto a lorry. JCBs are also used to load sand onto lorries. A generator is located on each plot in order to operate the silo. It was observed that JCBs loading sand onto lorries was the noisiest activity on site; however, this occurred very infrequently. The most common activity associated with Save Time Concrete Limited was the idling of lorries, which occurred regularly. It should be noted that the mixing of concrete does not occur on the site. The site is only used for the storage and handling of materials and aggregates.

A number of other businesses are present on site. However, they are generally quiet and use the site only for storage. Consequently, the only noise these site generate are in relation to lorry movements on the haul road.

Figure 4.3: Noise Measurements

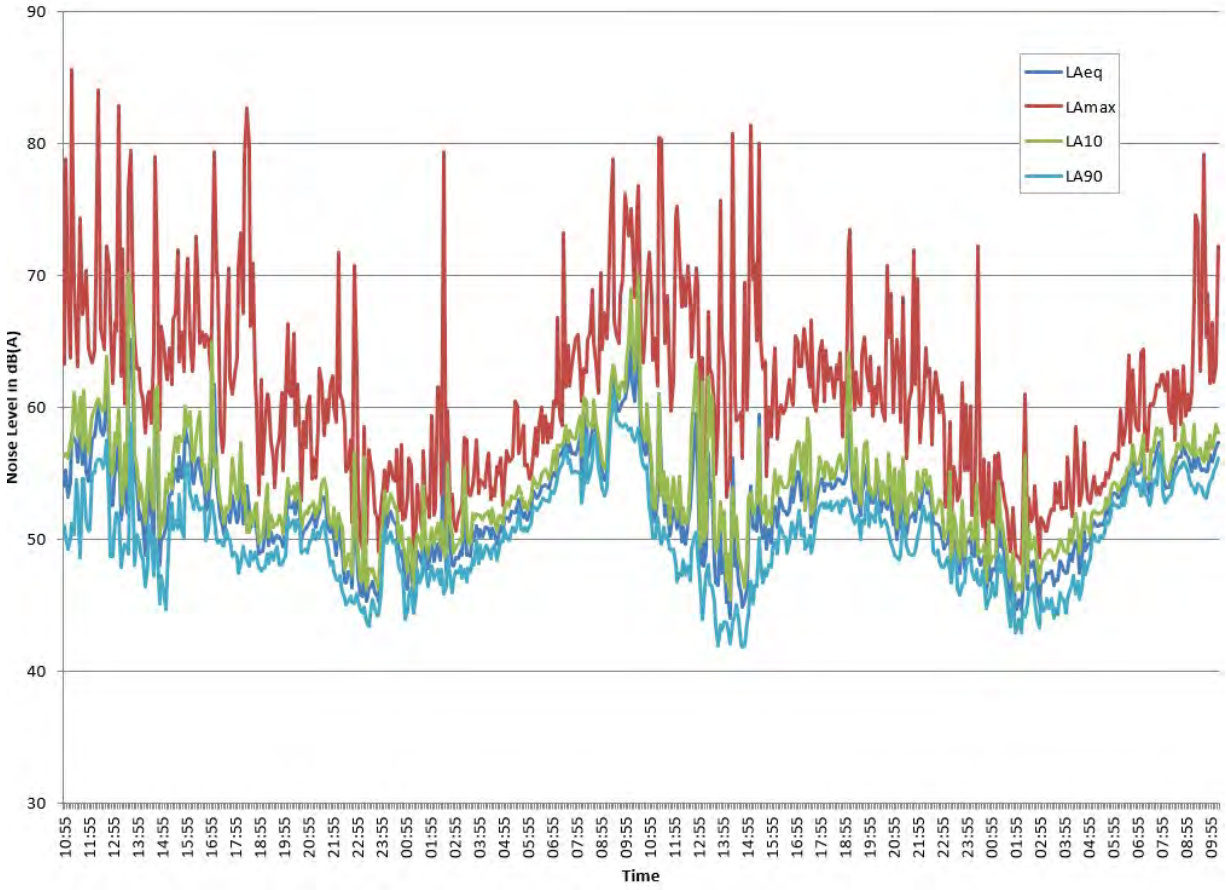


Figure 4.4: Distribution of Day Time $L_{A90.1hour}$ Sound Levels

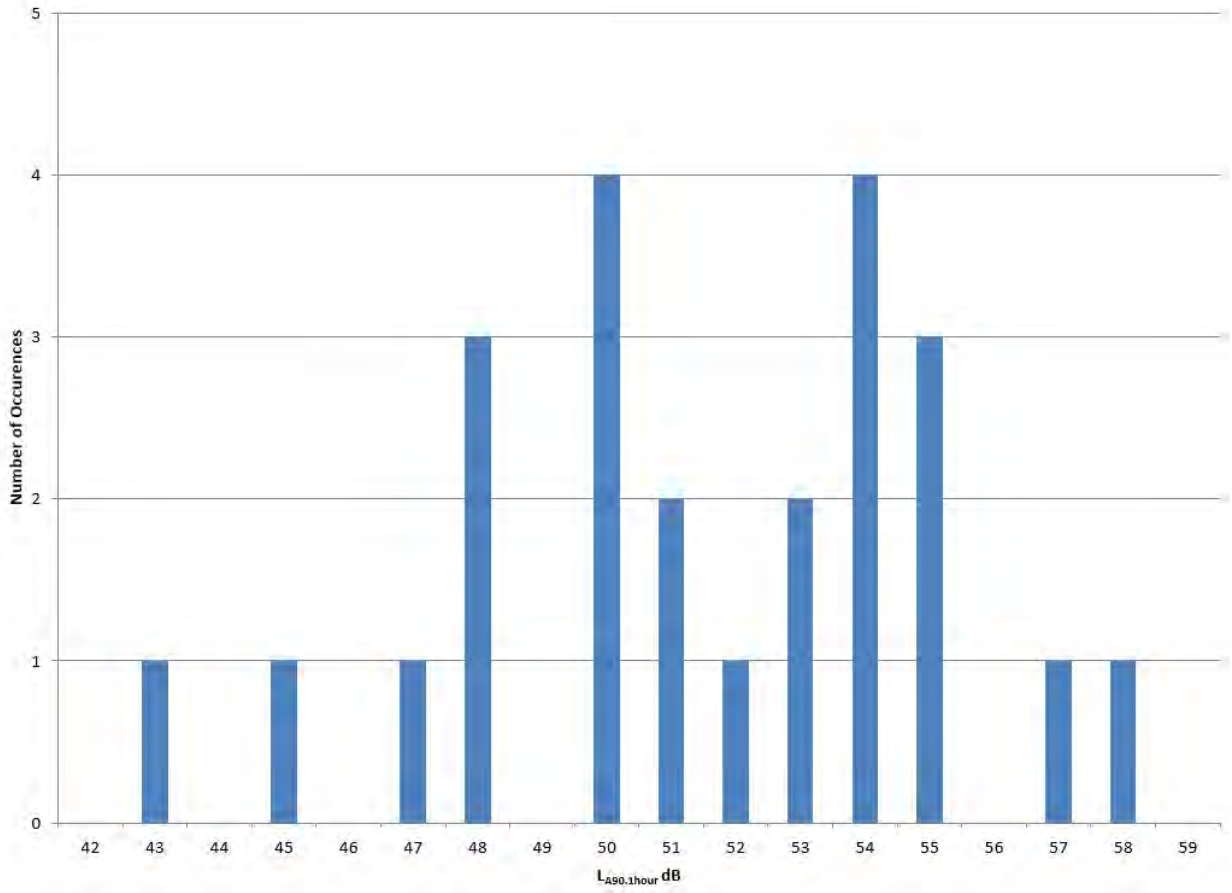
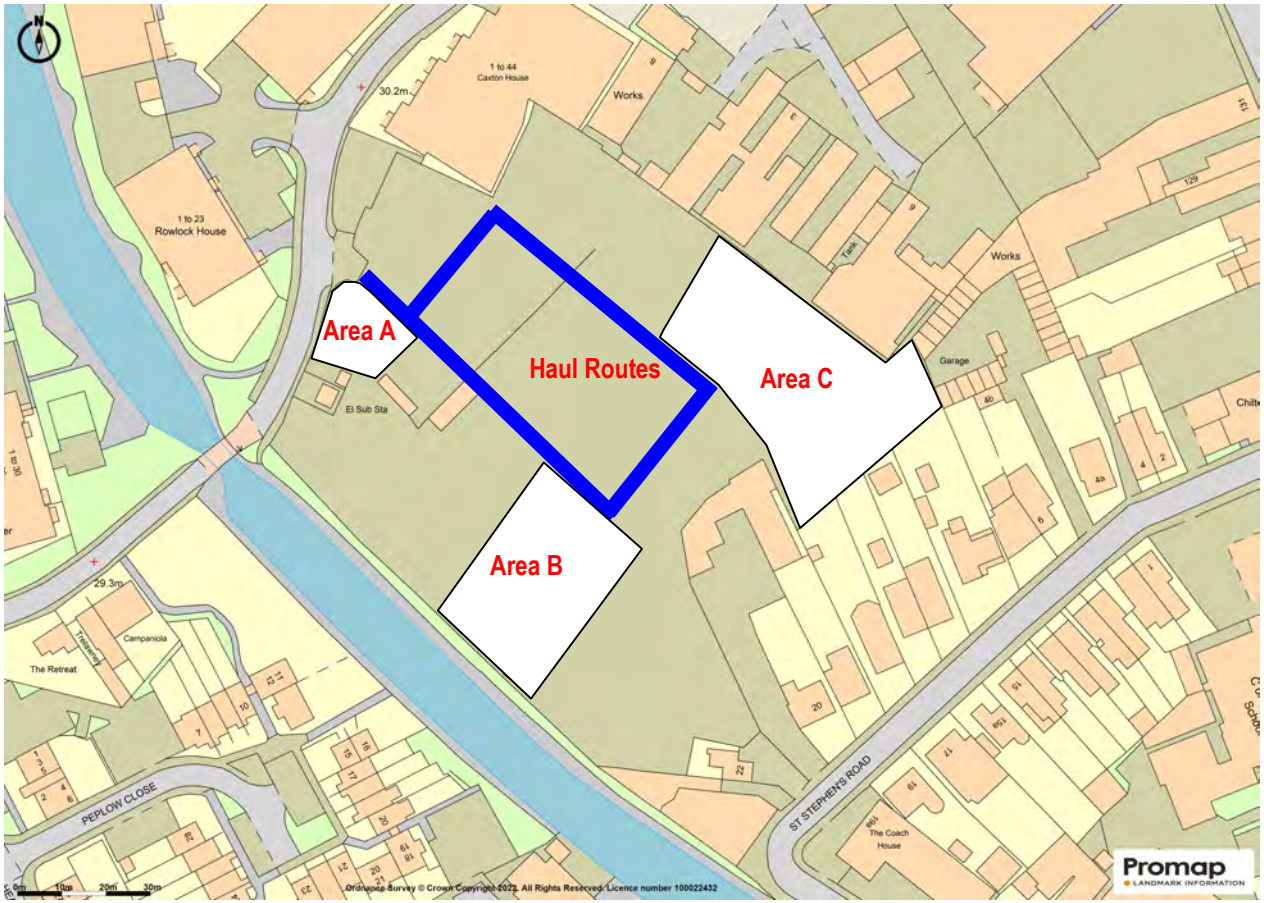


Figure 4.5: Site Plan Showing Activity Area



5. IMPACT OF THE PROPOSED 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. Industrial Noise Prediction

A three-dimensional computer noise model has been created using the NoiseMap 5 noise modelling software, to predict noise levels on site. The NoiseMap 5 software utilises the prediction methodology contained within BS 5228. The calculations takes into account the effect of any intervening noise barriers and buildings, distance attenuation and the effect of reflecting surfaces.

Noise sources have been modelled as per the measured sound levels described in **Table 4.3**, including the sound of lorry movements on the haul roads. The locations of the noise sources can be seen in **Figure 4.5**. Noise levels have been predicted at 10 receptors, the locations of which can be seen in **Figure 5.1**. The noise contour map can be seen in **Figure 5.2**.

Sensitive receptors in the area mainly consist of existing dwellings surrounding the site. However, consideration has also been given to moorings along the towpath of the Grand Union Canal that runs to the west of the site, primarily as this was referenced in one of the reasons for refusal of the original application.

The closest moorings designated by the Canal and River Trust are at Packet Boat (700m northwest) and Cowley Lock (1.9km northwest). Clearly these sites will be unaffected by the proposed development due to the distance from the proposed development. Some informal casual towpath mooring occurs at other points on the Grand Union Canal other that the designated mooring areas. However, observations of the area note that this generally occurs to the north of the Trout Road Bridge, alongside Rowlock House, Kiln Lodge and the Tesco superstore on Chantry Close. To a lesser extent, casual towpath mooring also occurs to the south of the site along side St Stephen's Road. It has been observed that casual towpath mooring does not generally occur adjacent to the site. This is likely to be due to a number of reasons, including the fact that the Canal and River Trust only allow casual towpath mooring in locations where boats can be moored without causing an obstruction to other canal users. South of Trout Road Bridge, the Grand Union Canal narrows slightly, which is further compounded by a large number of overhanging trees on the western bank, which narrows the usable channel of the waterway, thus making mooring on the eastern bank less feasible. Furthermore, the eastern bank of the canal past the site is suffering some erosion, whereas areas to the north and south both benefit from quaysides in good condition. This, coupled with good access to the tow path to both the areas north and south of the development site, mean that generally mooring does not occur immediately adjacent to the tow path that runs parallel to the western boundary of the development site.

Figure 5.1: Locations of the Sensitive Receptors

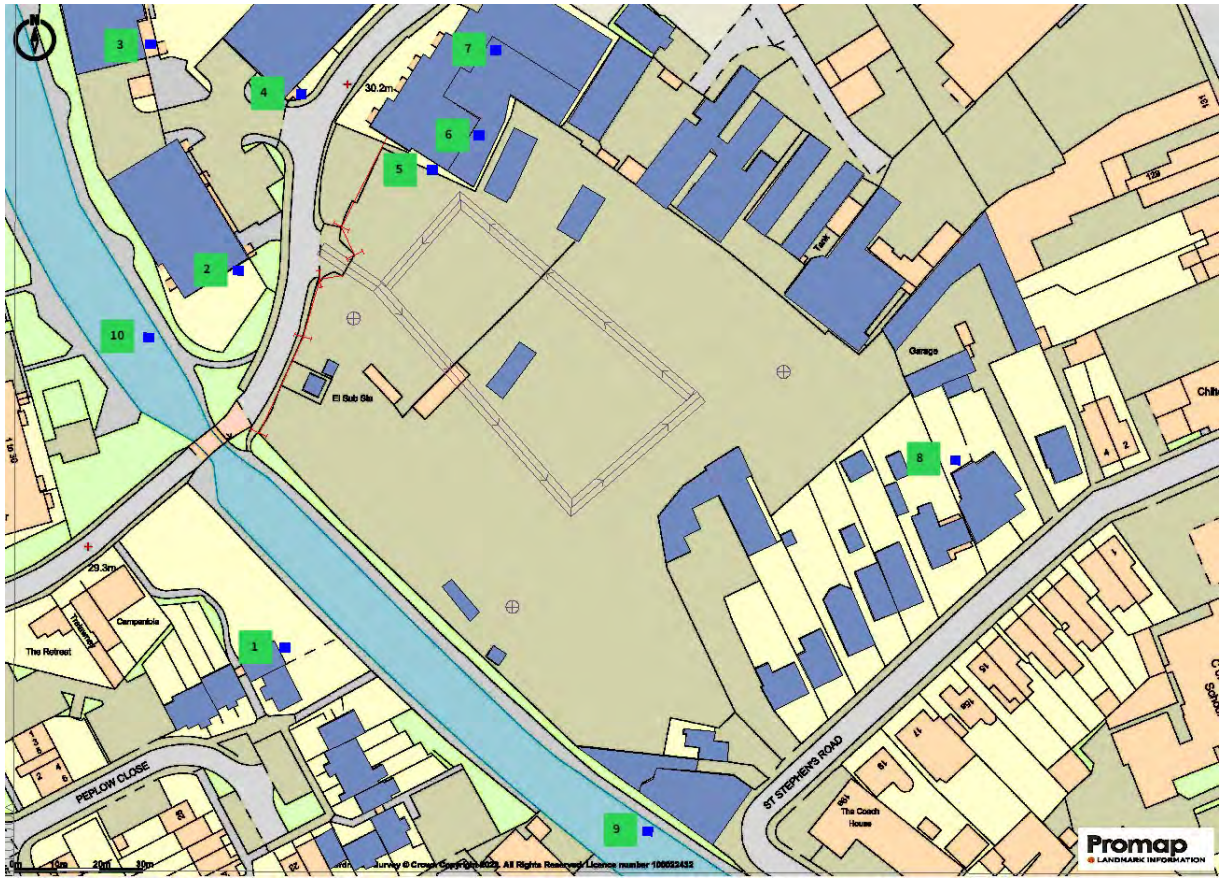
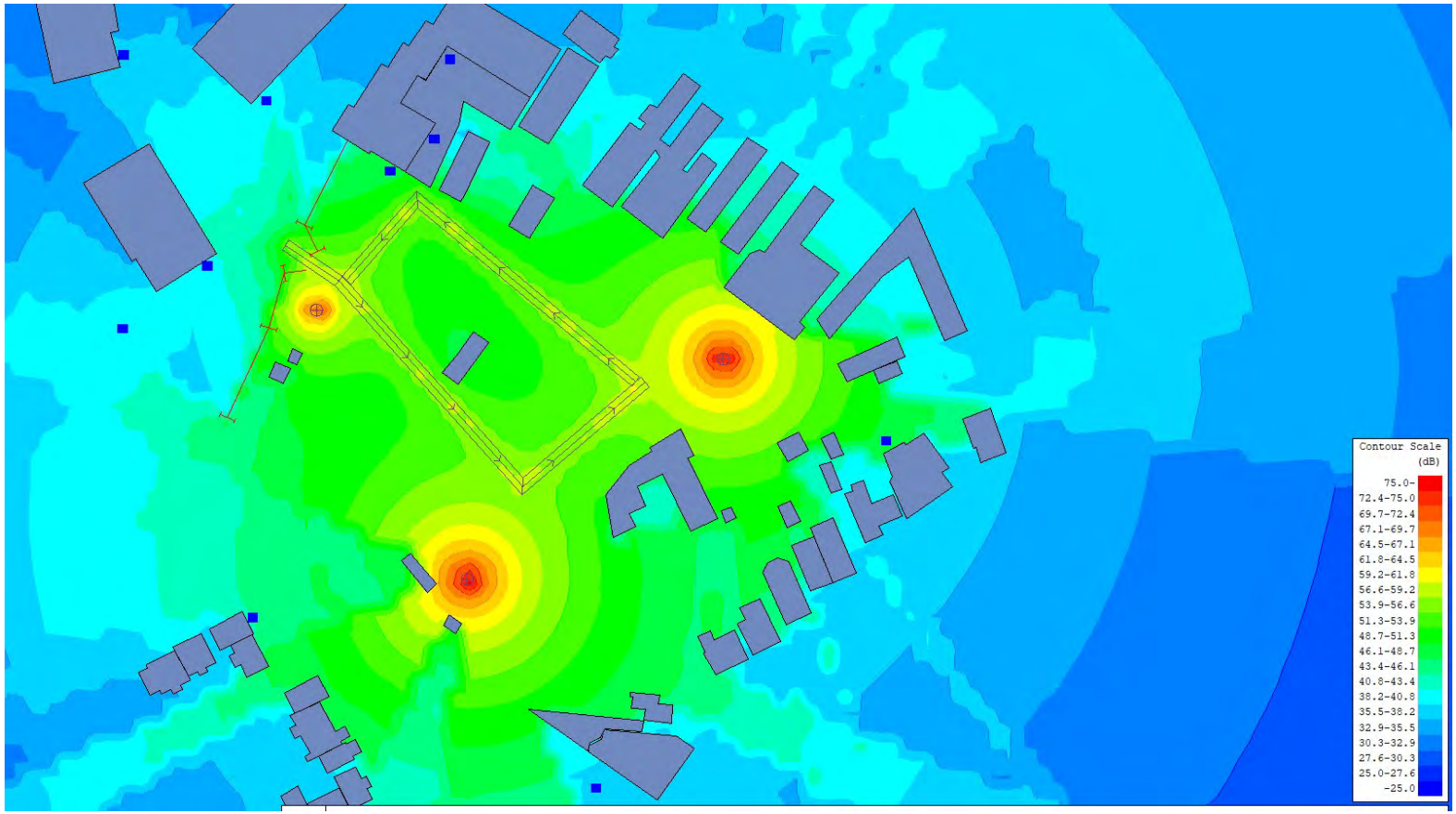


Figure 5.2: Noise Contour Map



5.3. Specific and Rating Sound Level

Using the predictions at the 10 receptors, it has been possible to establish typical L_{Aeq} noise levels during the working day. These specific receptor noise levels can be seen in **Table 5.1**.

Table 5.1: Receptor Specific Sound Levels

Location Ref	Location	Freefield Specific Sound Level in dB(A)
1	Peplow Close	43.6
2	Rowlock House	40.8
3	Kiln Lodge	36.6
4	Quoin House	40.8
5	Caxton House	47.5
6	Caxton House	46.8
7	Caxton House	43.8
8	8 St Stephen's Road	47.8
9	Canal Moorings – St Stephen's Road	37.4
10	Canal Moorings – North of Trout Road Bridge	39.0

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 5.2** below:

Table 5.2: Subjective Character Corrections

Category	Comments
Tonality	*"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".*
Impulsivity	*"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"*
Other sound characteristics	*"Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic*

Category	Comments
	environment, a penalty of 3 dB can be applied."
Intermittency	*"If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."*

Onsite observations indicate that sound from the various activities are varied and not constant. Consequently, it is not considered that there is a specific tonal element to the sound. Generally, there isn't an impulsive elements to the sound either. However, given that the sound has been noted to be intermittent, a 3 dB intermittency penalty should be applied to calculate the Rating noise level. **Table 5.3** determines the rating sound levels at the receptor locations.

Table 5.3: Receptor Rating Sound Levels

Location Ref	Location	Freefield Specific Sound Level in dB(A)
1	Peplow Close	46.6
2	Rowlock House	43.8
3	Kiln Lodge	39.6
4	Quoin House	43.8
5	Caxton House	50.5
6	Caxton House	49.8
7	Caxton House	46.8
8	8 St Stephen's Road	50.8
9	Canal Moorings – St Stephen's Road	40.4
10	Canal Moorings – North of Trout Road Bridge	42.0

5.4. Adherence to Sound Criteria

To assess the impact of the plant, the predicted sound levels have been compared to the criteria in BS 4142. **Table 5.4** 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 lowest background sound level gives an indication of the likelihood of complaint.

Table 5.4: BS 4142 Assessment

Location Ref	Location	Background Sound Level L_{A90}	Specific Sound Level L_{Aeq}	Rating Sound Level L_{Aeq}	Difference between Rating Level and Background Sound Level
1	Peplow Close	50	44	47	-3
2	Rowlock House	50	41	44	-6
3	Kiln Lodge	50	37	40	-10
4	Quoin House	50	41	44	-6
5	Caxton House	50	48	51	+1
6	Caxton House	50	47	50	0
7	Caxton House	50	44	47	-3
8	8 St Stephen's Road	50	48	51	+1
9	Canal Moorings – St Stephen's Road	50	38	41	-9
10	Canal Moorings – North of Trout Road Bridge	50	39	42	-8

Note: All sound levels are freefield 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 levels generally does not exceed the background noise level; therefore, at most receptors, the development is likely to have a low impact and this is a positive indication that complaints are unlikely. The exception is receptors 5 and 8, representative of Caxton House and the rear of properties to the north of St Stephen's Road, where the Rating level will exceed the background noise level by a very small amount – 1 dB in each case.

This is not deemed to be significant given the context of the site. The application associated with this development is to use the site in this manner for a temporary period of three years, after which time it is expected that the site would come forward for residential development. Generally speaking short duration impacts of this magnitude would be considered acceptable and not considered a significant impact; for example, noise from construction site would generally be allowed to be significantly higher than those described in this report and can often be longer in duration. As a consequence, given that this is for a fixed short duration, noise levels marginally in excess of the background noise level would normally be considered acceptable.

It should be noted that it would be possible to implement further mitigation to reduce noise levels at the worst affected receptors. For example, it has been noted that noise levels at Caxton House are generally most affected by lorries using the haul routes around the site, primarily the eastern branch of the site road which passes very close to Caxton House. Further iterations of the NoiseMap 5 noise model (as seen in **Figure 5.3,** with the suggested haul routes shown in **Figure 5.4**) shows that if this branch of the haul route is removed (or at least traffic mainly rerouted via the main route down the centre of the site), noise levels at Caxton House would be reduce by 1.5 to 2 dB; this small reduction would reduce the Rating noise level below the background noise level. Similarly, it has been noted that noise levels at the rear of properties to the north of St Stephen's Road are mainly affected by the aggregate activities located in area C. It has also been observed that the boundary between the site and the worst-affected properties is formed by a chain-link fence, which will not have any acoustic properties. It is likely that even a fairly basic solid fence, with minimal acoustic properties, could reduce noise levels by a couple of decibels. Even a reduction in noise levels of 2 dB would mean that the Rating noise level would be below the background noise level. As a consequence, it can be demonstrated that through some very minor modifications to the site and management practices, the Rating noise level could be reduced below the background noise level at all receptors.

Figure 5.3: Noise Contour Map with Eastern Haul Route Removed

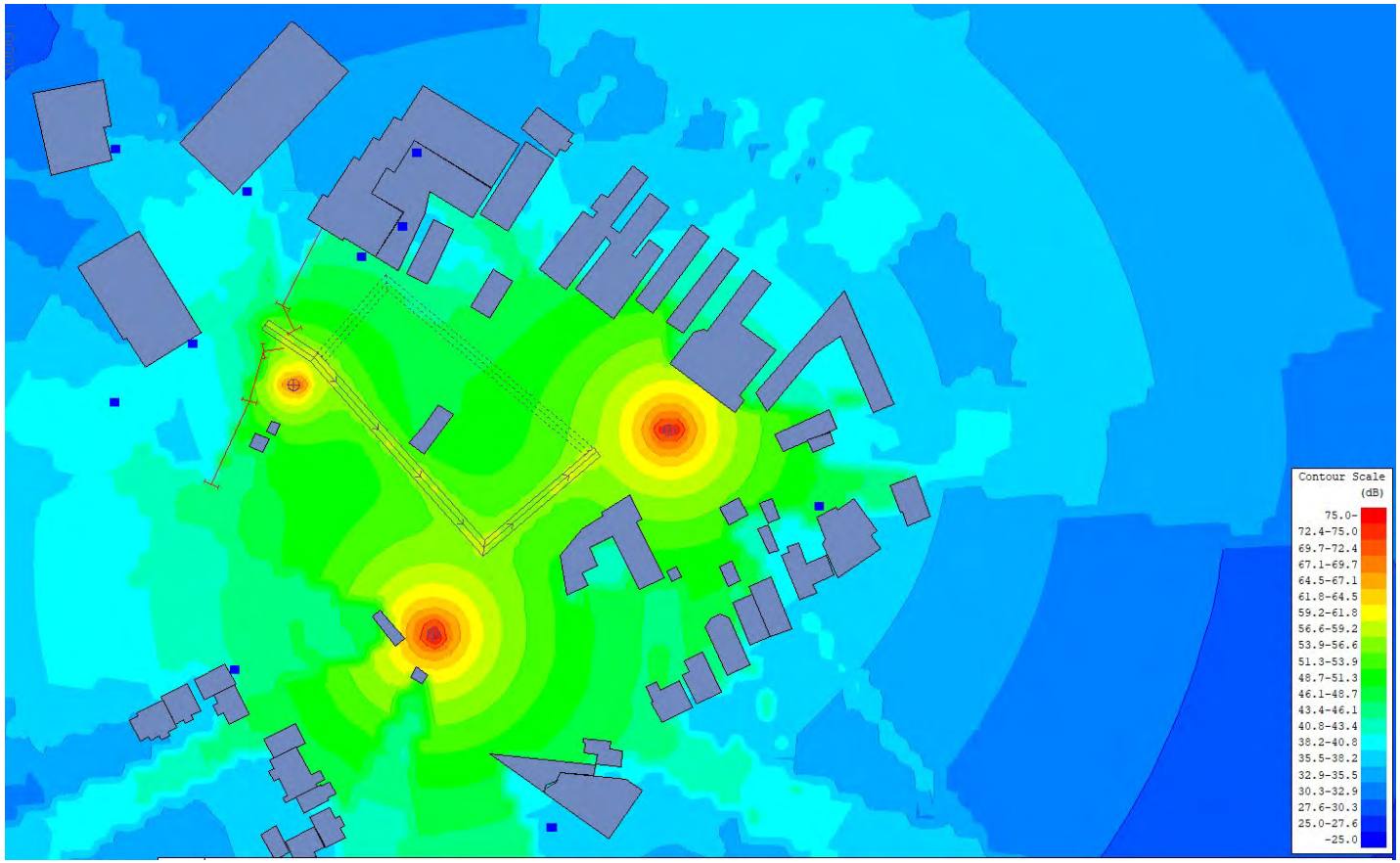


Figure 5.4: Site Plan Showing Revised Haul Routes

6. OVERALL CONCLUSIONS AND RECOMMENDATIONS

A detailed sound measurement study has been carried out to determine whether a development at the Rainbow Industrial Estate is likely to be acceptable in terms of noise and whether complaints are considered likely.

The purpose of the assessment is to determine whether reason (a) of Planning Enforcement Notice HS/ENF/019144 is justified, specifically in relation to the assertion that "*The unauthorised use of the land would cause unacceptable adverse impacts arising from noise resulting in significant harm to the living conditions and well-being of neighbouring residents and user of the Canalside Moorings and Towpath".*

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 generally below the background noise level in the vicinity of the site; therefore, at most receptors, the development is likely to have a low impact and this is a positive indication that complaints are unlikely. The exception is receptors 5 and 8, representative of Caxton House and the rear of properties to the north of St Stephen's Road, where the Rating level will exceed the background noise level by a very small amount – 1 dB in each case.

This is not deemed to be significant given the context of the site. The application associated with this development is to use the site in this manner for a temporary period of three years, after which time it is expected that the site would come forward for residential development. Generally speaking short duration impacts of this magnitude would be considered acceptable and not considered a significant impact; for example, noise from construction site would generally be allowed to be significantly higher than those described in this report and can often be longer in duration. As a consequence, given that this is for a fixed short duration, noise levels marginally in excess of the background noise level would normally be considered acceptable.

Furthermore, it has been shown that through some very minor modifications to the site and management practices, the Rating noise level could be below the background noise level at all receptors.

Consequently, it is considered that the proposed development adheres to the principles of the National Planning Policy Framework since the development will not be *"put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution".* Since it has been shown that in terms of noise, the proposals adhere to local, London and national planning policy, it is considered that the noise environment of the site should not be a constraint on the proposed development.

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.

Appendix 2
Schedule of Equipment

Appendix 2: Schedule of Equipment

Equipment Set 3056:

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	1403056	U36172	UKAS Calibration: 0789	10th November 2021	October 2022
Nor-1209 Pre-amplifier	Norsonic	12528	U36172	UKAS Calibration: 0789	10th November 2021	October 2022
Nor-1225 Microphone	Norsonic	98361	U36172	UKAS Calibration: 0789	10th November 2021	October 2022
Nor-1251 Sound Calibrator	Norsonic	32849	U39252	UKAS Calibration: 0789	21st October 2021	October 2022
Nor-1284 Dehumidifier	Norsonic	222	Not Applicable			
Nor- 1212 Weather Protection Kit	Norsonic	Not Applicable				
Nor1408A/5 Extension Cable	Norsonic/Lemo	Not Applicable				

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

0789

CALIBRATION

Certificate of Calibration and Conformance

Certificate number: **U36172(Supplement)**

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

Producer: **Norsonic AS.**
Type: **140**
Serial number: **1403056**
Customer: **Hawkins Environmental Ltd**
Address: **The Square, Basing View, Basingstoke, Hampshire. RG21 4EB.**
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	98361	39426
Calibrator*	Norsonic	1251	32849	U39252
Preamplifier	Norsonic	1209	12528	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	-	
Extension cable	-	

These items have been taken into account whereever appropriate.

Instruction Manual: Im140_1Ed6R3En Firmware Version: 2.1.670 The test object is a single channel instrument.

Conditions	*Pressure kPa*	*Temperature °C*	*Humidty %RH*
Reference conditions	101.325	23	50
Measurement conditions	101.30 ±0.39	22.65 ±0.81	45.88 ±4

Calibration Dates:

Received date:	23/10/2020	Reviewed date:	10/11/2021
Calibration date:	30/10/2020	Issued date:	10/11/2021

Technicians: (Electronic certificate)

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

Reviewed by: *Darren Batten*

Certificate of Calibration and Conformance

Continuation of Certificate number: **U36172(Supplement)**

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**
Periodics 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
Note:- Supplement to Calibration Certificate No. U36172 (issued 30/10/2020). Original microphone Nor-1225.384649 replaced with Nor-1225.98361. Acoustic tests re-tested with new microphone.

Decision Rule
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 **

Page 2 of 2

Laboratory Location

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

0789

CALIBRATION

Certificate of Calibration and Conformance

Certificate number: **U39252**

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	114.03	0.06	999.78	<0.3
Measurement 2	114.03	0.06	999.78	<0.3
Measurement 3	114.03	0.06	999.78	<0.3
Result (Average):	**114.03**	**0.06**	**999.78**	**<0.3**
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
Pressure:0.0005 dB/kPa Temperature:0.003 dB/°C Humidity:0 dB/%RH Load volume: 0.0003 dB/mm3

Conditions	*Pressure kPa*	*Temperature °C*	*Humidty %RH*
Reference conditions	101.325	23	50
Measurement conditions	100.716 ±0.044	22.2 ±0.1	44.5 ±1.3

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\2021\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:	08/10/2021	Reviewed date:	21/10/2021
Calibration date:	21/10/2021	Issued date:	21/10/2021

Technicians: (Electronic certificate)
Calibrated by: *Palaniwel Marappan B.Eng(Hons), M.Sc*
Reviewed by: *Darren Batten*

Page 1 of 2

Certificate of Calibration and Conformance

Continuation of Certificate number: **U39252**

Reference Microphone: WSM8 - GRAS-40AG.147852

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

Statement of Conformance and Calibration

As public evidence was available*, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in annex A of BS EN IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of that BS EN IEC 60942:2003.

*This evidence is held on file at the calibration laboratory.

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 **

Page 2 of 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	U35957	UKAS Calibration: 0789	8th October 2020	October 2022
Nor-1209 Pre-amplifier	Norsonic	15117	U35957	UKAS Calibration: 0789	8th October 2020	October 2022
Nor-1225 Microphone	Norsonic	151240	U35957	UKAS Calibration: 0789	8th October 2020	October 2022
Nor-1255 Sound Calibrator	Norsonic	25262	U39613	UKAS Calibration: 0789	30th November 2021	November 2022
Nor-1284 Dehumidifier	Norsonic	222	Not Applicable			
Nor- 1212 Weather Protection Kit	Norsonic	Not Applicable				
Nor1408A/5 Extension Cable	Norsonic/Lemo	Not Applicable				

Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, GB-CM6 1HD
www.campbell-associates.co.uk
Phone 01371 871030 Facsimile 01371879106

CALIBRATION

0789

Certificate of Calibration and Conformance

Certificate number: U35957

Test object:	**Sound Level Meter, BS EN IEC 61672-1:2003 Class 1 (Precision)**
Producer :	**Norsonic**
Type :	**140**
Serial No.:	**1405199**
Customer:	**Hawkins Environmental**
Address:	**The Square, Basing View, Basingstoke. RG21 4EB.**
Contact Person:	**Nick Hawkins.**

Method :
Calibration has been performed as set out in CA Technical Procedures TP01 & 02 as appropriate. These are based on the procedures for periodic verification of sound level meters as set out in BS EN IEC 61672-3:2006. Results and conformance statement are overleaf and detailed results are in the attached Test Report.

Tested

	Producer:	Type:	Serial No:	Certificate number
Microphone	Norsonic	1225	151240	35956
Calibrator*	Norsonic	1255	125525262	U35955
Preamplifier	Norsonic	1209	15117	Included

Additional items that also have been submitted for verification

Wind shield	Norsonic	Nor1451 (ø 60mm)
Attenuator	-	
Extension cable	-	

These items have been taken into account wherever appropriate.

Instruction manual: Im140_1Ed6R3En Firmware version: 3.0.1866 The test object is a single channel instrument.

Conditions	Pressure	Temperature	Humidity
Reference conditions:	101.325 kPa	23.0 °C	50 %RH
Measurement conditions:	100.10 ±0.06 kPa	22.7 ±0.3 °C	43.5 ±0.7 %RH

Date received for calibration:	28/09/2020
Date of calibration:	08/10/2020
Date of issue:	08/10/2020
Engineer	Michael Tickner
Supervisor	Darren Batten TechIOA

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

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Certificate of Calibration and Conformance

UKAS Laboratory Number 0789

Certificate number: U35957

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 BS EN IEC 61672-1:2002 and similarly that the associated sound calibrator conforms to BS EN IEC 60942.

Statement of conformance

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of BS EN IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available[1], from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with BS EN IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in BS EN IEC 61672-1:2002, and that the sound level meter submitted for testing conforms to the class 1 requirements of BS EN IEC 61672-1:2003.

[1] This evidence is held on file at the calibration laboratory

Summary of Measurement Results

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

Comment

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

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.

K:\C A\Calibration\Nor-1504\Nor-1019 SimCal\2020\Nor140_1405199_M1.docx

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Cert_UB1672Ed1.0_C1_PE_v1.8

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

0789

Certificate of Calibration and Conformance

Certificate number: **U39613**

Test Object: **Sound Calibrator**

Producer: **Norsonic AS.**
Type: **1255**
Serial number: **125525262**
Customer: **Hawkins Environmental**
Address: **70 Wentworth Crescent, Basingstoke, Hants. RG22 4WX.**
Contact Person: **Nick Hawkins.**
Order No:

Measurement Results	Level dB	Level Stability dB	Frequency Hz	Distortion %
Measurement 1	114.04	0.01	1000.00	0.35
Measurement 2	114.04	0.02	1000.00	0.35
Measurement 3	114.04	0.01	1000.00	0.35
Result (Average):	**114.04**	**0.01**	**1000.00**	**0.35**
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
Pressure:0 dB/kPa Temperature:0 dB/°C Humidity:0 dB/%RH Load volume: 0.00015 dB/mm3

Conditions	*Pressure kPa*	*Temperature °C*	*Humidty %RH*
Reference conditions	101.325	23	50
Measurement conditions	100.157 ±0.044	22.4 ±0.1	36.2 ±1.3

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\2021\NOR1255_125525262_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:	19/11/2021	Reviewed date:	30/11/2021
Calibration date:	30/11/2021	Issued date:	30/11/2021

Technicians: (Electronic certificate)
Calibrated by: *Michael Tickner*
Reviewed by: *Darren Batten*

Page 1 of 2

Certificate of Calibration and Conformance

Continuation of Certificate number: **U39613**

Reference Microphone: WSM8 - GRAS-40AG.147852

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

Statement of Conformance and Calibration

As public evidence was available*, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in annex A of BS EN IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of that BS EN IEC 60942:2003.

*This evidence is held on file at the calibration laboratory.

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 **

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Appendix 3
Summary of Noise Measurements

Appendix 3: Summary of Noise Measurements

	Time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A50}	L_{A90}
Wednesday	11:00	56.4	85.6	58.2	54.6	51.6
	12:00	57.9	84.0	59.2	56.7	53.9
	13:00	58.9	82.8	59.0	54.0	50.8
	14:00	53.5	79.0	54.4	51.2	48.5
	15:00	54.6	71.9	56.0	52.9	50.4
	16:00	55.1	72.9	56.8	54.0	52.5
	17:00	55.3	79.3	54.6	51.6	50.1
	18:00	52.2	82.6	52.5	49.9	48.5
	19:00	50.0	62.1	51.3	49.4	48.4
	20:00	51.9	66.3	52.9	51.4	50.3
	21:00	51.8	62.9	52.6	51.1	49.9
	22:00	49.4	71.7	50.3	47.2	46.0
	23:00	46.8	58.5	48.2	45.7	44.7
Thursday	00:00	50.7	57.1	51.7	50.1	48.9
	01:00	48.4	56.7	49.6	47.9	46.5
	02:00	51.0	79.3	50.6	48.7	47.1
	03:00	49.7	57.7	51.0	49.3	47.9
	04:00	50.5	56.5	51.6	50.4	49.2
	05:00	52.0	60.4	53.0	51.8	50.7
	06:00	53.6	60.0	54.4	53.4	52.5
	07:00	56.5	73.2	57.3	56.2	55.3
	08:00	57.5	70.2	58.7	56.7	55.5
	09:00	59.7	78.8	60.0	58.6	57.6
	10:00	61.6	76.8	63.0	58.9	56.9
	11:00	54.5	80.4	54.2	51.4	50.2
	12:00	54.1	75.2	55.3	50.5	48.3
	13:00	51.9	75.7	53.8	47.5	45.1
	14:00	48.8	80.7	49.0	45.2	43.3
	15:00	52.7	81.3	52.9	49.2	47.1
	16:00	52.6	65.4	54.5	51.5	50.1
	17:00	53.5	66.6	55.3	51.8	50.7
	18:00	54.2	65.0	55.3	53.5	52.6
	19:00	55.0	73.5	56.3	52.9	51.8

	20:00	53.0	70.7	54.1	52.1	51.2
	21:00	51.8	71.9	53.3	50.5	49.3
	22:00	52.5	64.5	53.5	51.6	50.3
	23:00	49.3	61.8	50.6	48.5	47.5
Friday	00:00	48.9	72.2	49.9	48.0	46.9
	01:00	48.2	56.5	49.3	47.5	46.1
	02:00	47.2	61.0	48.7	46.1	44.6
	03:00	47.3	54.3	49.0	47.0	45.1
	04:00	48.9	58.5	50.4	48.5	46.5
	05:00	51.6	56.2	52.3	51.4	50.5
	06:00	54.4	63.9	55.0	54.2	53.5
	07:00	55.7	64.4	56.7	55.3	54.2
	08:00	55.5	63.1	56.2	55.1	54.4
	09:00	55.7	79.1	56.8	55.1	53.9
	10:00	56.6	72.2	57.7	56.1	55.3