



Acoustic Impact Assessment:

Land at Cowplain Community School, Hart Plain Avenue,
Waterlooville

Frontier Estates Limited

5th May 2023

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Land at Cowplain Community School, Hart Plain Avenue, Waterloooville

Frontier Estates Limited • 5th May 2023 • H3844 – NV – v2

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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 Frontier Estates Limited to undertake an acoustic impact assessment for the redevelopment of land at Cowplain Community School, Hart Plain Avenue, Waterloooville.

A planning application has been submitted to Havant Borough Council for the “erection of a 64 bed care home (within Use Class C2) and 6No. dwellings (within Use Class C3) with associated works including access, parking and landscaping” at “Land at Cowplain School, Hart Plain Avenue, Waterloooville” (application reference: PP/22/00837).

Comments from local residents have identified that noise from the proposed car park could have a potential impact on surrounding existing properties. As a consequence, this assessment characterises the potential impact associated with the proposed car park.

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*’.

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. Site Description

The development site is situated on Hart Plan Avenue, located in a residential area located close to the village centre of Cowplain. The proposed development will see the construction of a 64-bed care home on part of the playing field currently used by Cowplain Community School. In addition, six dwellings are proposed on what is currently a disused playground, adjacent to the school. A location plan of the proposed site can be seen in **Figure 1.1**.

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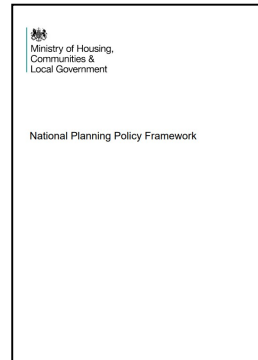
Figure 1.1: Site Location



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..."*

Specifically in relation to noise from existing commercial premises, Paragraph 187 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)

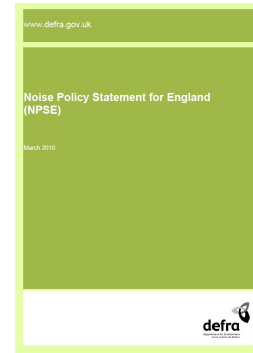
The Noise Policy Statement for England (NPSE) provides further guidance on the interpretation of Section 123 of the NPPF and states that: “*Within the context of sustainable development:*

- 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.”

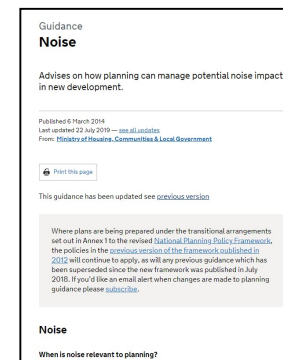


2.3. Planning Practice Guidance

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.

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 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.

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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	
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	High Noise Level
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	

Increasing Noise Levels
↓

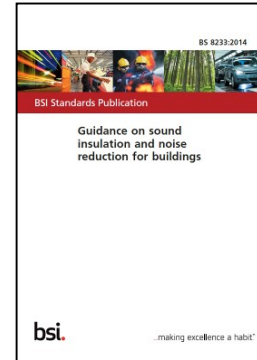
3. ASSESSMENT METHODOLOGY & GUIDANCE

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:

- "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**.

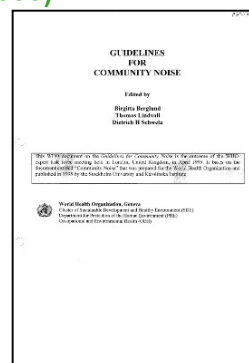


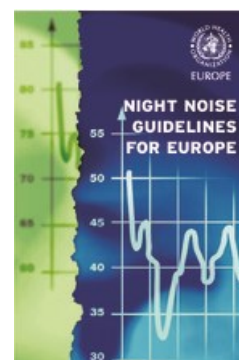
Table 3.2: Summary of Noise Criteria: WHO

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

Residential Environment	Critical Health Effect	L _{Aeq}	L _{AFmax}	Time Base
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”.

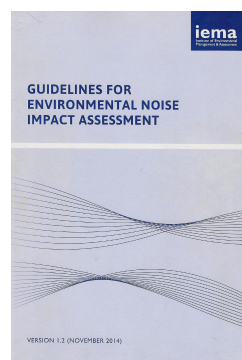


3.4. IEMA Guidelines for Environmental Noise Assessment (2014)

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 3.3: Magnitude of Change in Noise Levels

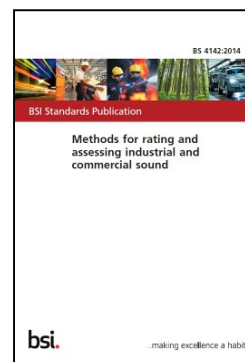
Long Term Impact Magnitude	Sound Level Change dB $L_{Aeq,T}$ (positive or negative) T= 16 hour day or 8 hour night
Negligible	≥ 0 dB and < 3 dB
Minor	≥ 3 dB and < 5 dB
Moderate	≥ 5 dB and < 10 dB
Major	≥ 10 dB

3.5. 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.”

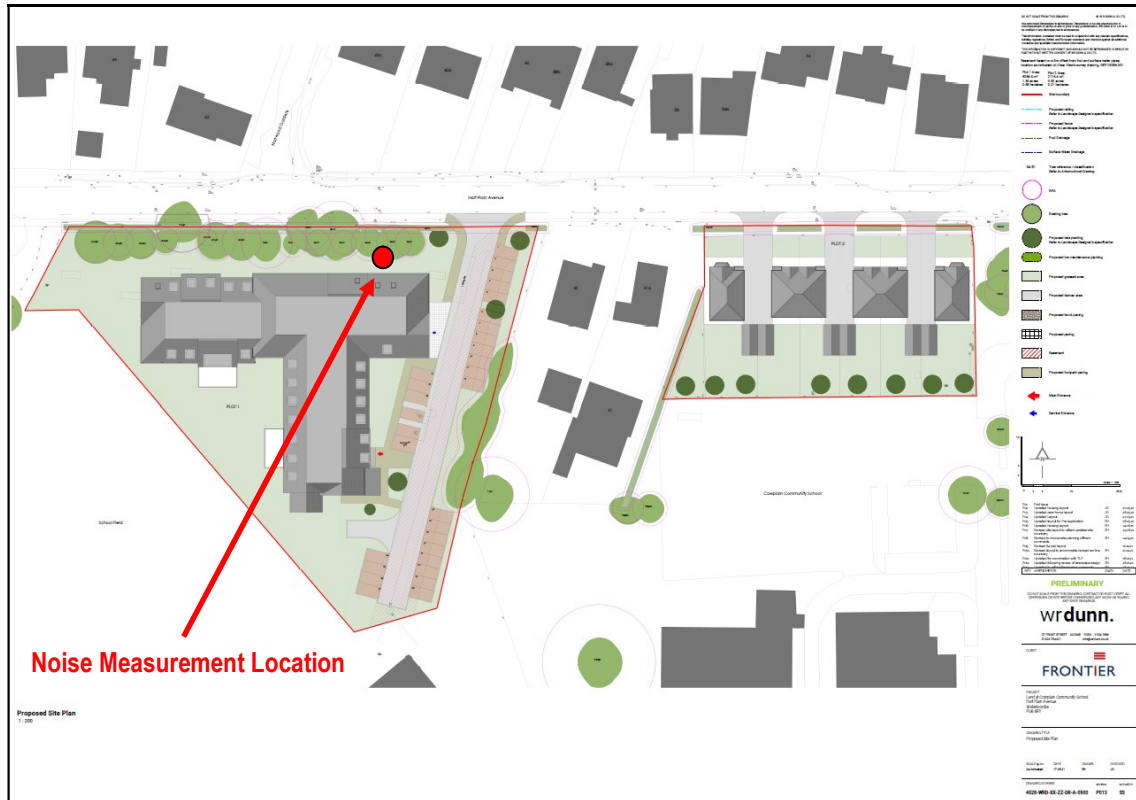


The guidance goes on to state that “where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.” Consequently, when considering the impact of a BS 4142 assessment, 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.

4. SOUND MEASUREMENT STUDY

A noise survey was conducted in September 2021 to characterise the noise environment. Full details of the assessment can be found in the report “H3331 - Cowplain School, Waterlooville - Noise Assessment - v2” dated May 2022. The location of the noise measurements can be seen in **Figure 4.1**.

Figure 4.1: Noise Measurement Location & Proposed Site Plan



The noise measurement study has identified that the primary noise source is road traffic noise on Hart Plain Avenue. Noise from Hart Plain Infant and Junior Schools was audible during the daytime, as was Cowplain Community School to a lesser extent. The noise survey indicated that the daytime $L_{Aeq,16hrs}$ was 50.2 dB(A). Daytime $L_{Amax,5mins}$ noise levels were 59.5 dB(A) to 71.2 dB(A).

5. IMPACT OF THE DEVELOPMENT

5.1. Methodology

When dealing with noise from car parks, there is no single guidance or standard one should use to assess such noise. Whilst BS 4142:2014+A1:2019 is typically used to assess industrial or commercial noise sources, the British Standard notes that noise such as noise from vehicles is beyond the scope of the standard. In a situation such as this, it is generally recommended that the noise from the car park should be compared to both the existing ambient and maximum noise levels, as well as having regard to the 2014 IEMA Guidelines.

5.2. Source Noise Data – Car Parks

Hawkins Environmental have an extensive database of noise measurement data collected over several years, from previous acoustic assessments. Based on noise measurements conducted at a similar sized car park at a site in Greater London, **Table 5.1** summarises the source noise data collected and utilised in this assessment. The data is present normalised to 10m, as a Single Event Level (SEL). A SEL is a logarithmic measure of the sound exposure and is similar to the L_{Aeq} ; However, instead of averaging over the measurement period, a reference duration of 1 second is used. In addition, the L_{Amax} noise level is also presented.

Table 5.1: Summary of the Source Noise Data – Normalised to 10m

Noise Source	Single Event Level (SEL) dB(A)	Maximum Noise Level L_{Amax} dB(A)
Car Pass By at Low Speed	67	66
Door Slam	64	71
Engine Start and pull away	72	70

Noise in car parks are generally characterised by three separate noise. The highest maximum (L_{Amax}) noise levels are characterised by door slams, which would normally occur (albeit briefly) both on arrival and departure. Cars departing are generally louder than on arrival. The sound of engines starting and pulling away (especially in cold weather) can be significantly louder than a car on arrival, which is often only characterised by the sound of a vehicle passing by, into a car parking space.

To calculate the period noise level (L_{Aeq}) over a given time period, the following formula can be used:

$$L_{Aeq,T} = 10 \log_{10} [(n \times 10^{SEL/10}) / T]$$

where:

SEL = the Single Event Level

n = number of event occurrences

T = reference time period, in seconds

5.3. Noise from the Car Park

Figure 5.1 shows a plan of the car park. The car park has 29 car parking spaces, including 2 disabled spaces. The Transport Assessment submitted with the planning application (prepared by Royal HaskoningDHV) notes that *“Over the course of a 12-hour day, a two-way total of 114 vehicle movements to/from the care home site are predicted: 56 arrivals and 58 departures”*. This is an average of 9.5 vehicle movements per hour. However, to characterise a worst case hour, it is assumed that there could be up to 14 vehicle movements per hour. It is therefore assumed that in a worst case hour, the following noise events will occur:

- 7 cars arriving and passing through the car park;
- 7 cars will start up and depart; and
- 20 door slams will occur, associated with both arrivals and departures (and some will have more than one slam).

43 Hart Plain Avenue is the closest neighbour and likely to be the most affected by the proximity of the proposed car park. It has been noted that the car park is split into three distinct areas:

- **Area A:** Spaces 1 to 12 (total 12 spaces) – On average 12m from the façade of 43 Hart Plain Avenue;
- **Area B:** Spaces 13 to 20 & Spaces 24 to 27 (total 12 spaces) – On average 52m from the façade of 43 Hart Plain Avenue; and
- **Area C:** Spaces 21 to 23 & 2x Disabled spaces (total 5 spaces) – On average 32m from the façade of 43 Hart Plain Avenue;

As a relatively small car park, it would be anticipated that the traffic would be relatively evenly distributed across the car park; therefore, it is estimated that 45% of the noise will be experienced each in Area A & B, with the remaining 10% in Area C.

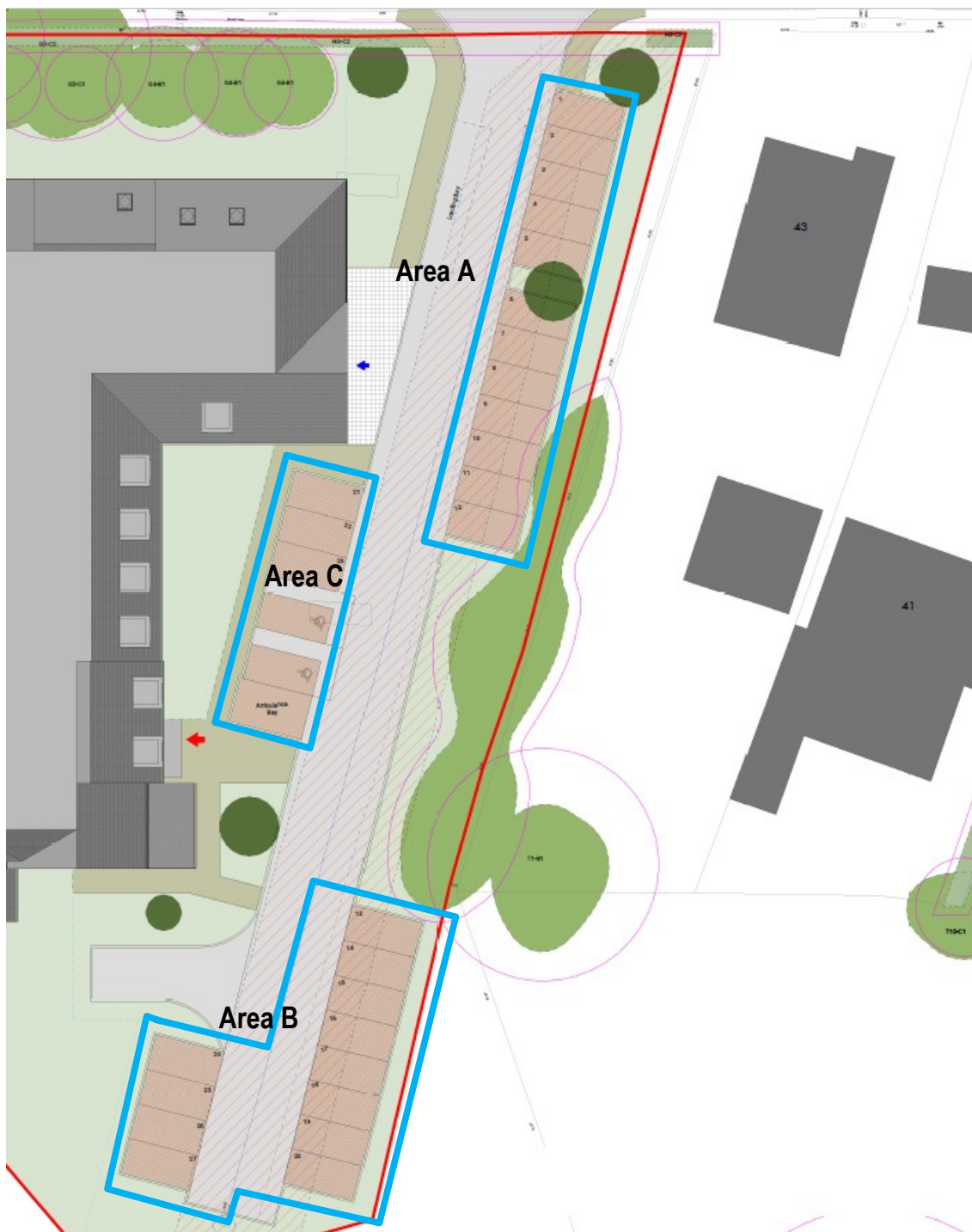
Figure 5.1: Location of the Car Parks

Table 5.2: Summary of the Noise Level Predictions from the Car Park

Area	Noise Source	Number of Events	Average Distance to Receptor	L _{Aeq,1hour}
A	Car Pass By at Low Speed	3	12m	34.6
	Door Slam	9		36.4
	Engine Start and pull away	3		39.6
B	Car Pass By at Low Speed	3	52m	21.9
	Door Slam	9		23.7
	Engine Start and pull away	3		26.9
C	Car Pass By at Low Speed	1	32m	21.3
	Door Slam	2		21.3
	Engine Start and pull away	1		26.3

If the noise levels from all noise sources at all three areas are added together, the total noise level at the closest receptor (43 Hart Plain Avenue) has been calculated. This cumulative noise level has been calculated to be 42.6 L_{Aeq,1hour} with L_{Amax} events of up to 69.4 dB(A).

5.4. Acceptability Criteria

The noise measurement survey indicated that typical $L_{Aeq,T}$ noise levels on site during the daytime are in the region of 50.2 dB(A). If the existing typical noise level (50.2 dB) is added to the worst-case noise level from the car park (42.6 dB), this results in a proposed total noise level of 50.9 dB(A). The results of this assessment can be seen in **Table 5.3**.

Table 5.3: Predicted Noise Levels from the Proposed Car Park

Address	Noise Level dB		
	Present L_{Aeq}	Proposed L_{Aeq}	Difference L_{Aeq}
43 Hart Plain Avenue	50.2	50.9	+0.7

When considering the acceptability in relation to the 2014 IEMA “*Guidelines for Environmental Noise Assessment*”, it can be determined that based on the results presented in **Table 5.3**, the proposed scheme will see an elevation in noise levels of 0.7 dB(A) in comparison to noise levels at present. According to the IEMA Guidelines, this increase would be considered “*negligible*”. Under the IEMA Guidelines, a “*negligible*” impact would be considered insignificant and not a constraint on the proposed scheme.

Regarding L_{Amax} noise levels, the highest L_{Amax} events are attributed to door slams. It has been predicted that these could be up to 69.4 dB(A) at 43 Hart Plain Avenue, although most door slams are likely to be less than these levels, with door slams attributed to areas B and C likely to be less than 60 dB(A). However, it has been noted that L_{Amax} events during the daytime are often in excess of 70 dB(A). Therefore, whilst these door slam events may be noticeable at 43 Hart Plain Avenue, maximum noise levels of this magnitude would be typical of noise levels already experienced in the area.

5.4.1. Overview

As the use of BS 4142 would not be appropriate to assess the noise impact of the proposed scheme, the IEMA Guidelines have been used. The results are considered below in **Table 5.4**.

Table 5.4: Summary of Noise Criteria & Results

Criteria	Summary	Conclusions
IEMA Guidelines	The proposed scheme will increase ambient noise levels by no more than approximately 0.7 dB	Long term impact magnitude is “negligible”

It can be seen from **Table 5.4** that when considering the IEMA Guidelines, the impact of the car park is likely to be considered acceptable; therefore, it is possible to conclude that the proposed development is likely to be considered acceptable at this location.

6. OVERALL CONCLUSIONS AND RECOMMENDATIONS

A detailed sound measurement study has been carried out to determine whether the proposed car park associated with a care home is likely to be acceptable in terms of noise and whether complaints would be considered likely. The criteria contained within the 2014 IEMA Guidelines have been considered in full. The impact of the car park is likely to be considered acceptable with a “negligible” long term impact magnitude. Therefore, it is possible to conclude that the proposed development is likely to be considered acceptable at this location.

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.