

Acoustic Report

**Baseline Noise Survey and Impact Assessment
Proposed Change of Use from Garden Building to Private
Day Nursery at 35 Moat Hill, Birstall, Batley, WF17 0DX**

Application No – 2022/93918

Our Reference – J3175 Rev-0

Survey Dates – 22nd and 23rd February 2023

Survey and Report by – Paul Horsley MIOA

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Limitations

The assessments and interpretation have been made in line with legislation and guidelines in force at the time of writing, representing best practice at that time.

All of the comments and opinions contained in this report, including any conclusions, are based on the information obtained by Paul Horsley Acoustics Ltd during our investigations.

There may be other conditions prevailing on the site which have not been disclosed by this investigation and which have not been considered by this report. Responsibility cannot be accepted for conditions not revealed by the investigation.

Any diagram or opinion of the possible configuration of the findings is conjectural and given for guidance only and confirmation of intermediate ground conditions should be considered if deemed necessary.

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1.0 Client

N Beaumont
35 Moat Hill
Birstall
Batley
WF17 0DX

2.0 Subject

Change of Use of former garden building to private children's day nursery and formation of vehicular access at 35 Moat Hill, Birstall, Batley, WF17 0DX

3.0 Aims

The aim of this report is to determine the pre-existing baseline noise levels at the noise sensitive boundary of the closest residence to the applicant site.

Monitor the external background noise during a typical week day period. This will be achieved through noise monitoring the pre-existing noise climate at the above site, in accordance with the requirements of BS4142:2014+A1:2019.

Execute a sound insulation test on the existing garden building external wall to determine its acceptability for use.

Provide an impact assessment of the monitored results in accordance with the rating method within BS4142:2014+A1:2019, and other relevant Standards, to determine the likely effect of converting the garden building into a private day nursery with respect to noise impact on the amenity of the nearby residents.

Provide mitigating noise control recommendations, if necessary, to maintain the pre-existing amenity of the nearby residential premises.

4.0 Location and Description of Existing Site and Noise Sources

There is a proposal to convert the existing garden building, consisting of a garage with side extension, currently used by the occupant as a games room and family activity space, for use as a private day nursery. The day nursery will be used for birth to 5-year-old children.

The existing site consists of a semi-detached residential property occupied by the applicant. The residential property building does not form part of the application and as such is not considered within this report.

The site under consideration within the application is the garden building, the rear garden area, and the front garden of the property, which is being considered for external parking. The whole property occupies a rectangular plot with maximum dimensions approximately 28m x 10m. The garden building is a single storey garage with extensions located to the north-eastern corner of the site, is 'L' shaped measuring 10m x 7.8m having a width of 3m. The enclosed northern garden measures 8m x 6.5m and has a terraced section up from the main property to the entrance of the garden building. The garden building currently includes mains power, water supply and lighting, with a toilet, wash facilities and a shower unit, which will be retained to serve the needs of the day nursery following the change of use.

The applicant property is bounded to the south west by the neighbouring semi-detached house of No 33 Moat Hill, having a 1.2m high boundary fence dividing the 2 No garden spaces to the north. The north-western boundary is formed by the neighbouring residential premises of No 37 Moat Hill, separated by 2 No driveways between the premises. There is an open field forming the north-western site boundary, with residential premises beyond at a distance of 45m. Moat Hill forms to the southern site boundary, with residential premises located on the opposite side of the road and a junction leading to Larch Close in front of the applicants driveway.

The primary noise source within the vicinity of the site is due to traffic movement noise along Moat Hill, with distant traffic noise associated with the M62 motorway 1Km north and the A62, Geldard Road 150m west of the site boundary. Birdsong and aircraft are also significant noise sources.

The proposed opening times for the private day nursery will be 07.20 to 18.00, Monday to Friday only.

5.0 Guidance on the Assessment of Noise Levels

The purpose of any criterion or standard for environmental noise should be to safeguard against unacceptable levels of community response, deemed as a feeling of annoyance during daytime or disturbance at night. WHO defines annoyance as “a feeling of displeasure evoked by noise”

The main source of information relating to noise and the community response are field studies including noise measurements and social surveys. These surveys attempt to establish a correlation between the two sets of results.

In the absence of any definitive guidance and in order to establish suitable noise criteria, it is necessary to rely on general guidance and assessment methods used for community noise sources. Discussions on the current methods are given below.

5.1 BS4142:2014+A1:2019 'Method for Rating and Assessing Industrial and Commercial Sound'

This recently revised standard provides a method for rating and assessing sound of an industrial and/or commercial nature. The method uses outdoor sound levels to assess the effect of sound on people who might be inside or outside a dwelling or premises used for residential purposes. It is limited to applicable sounds and is not intended for noise amounting to nuisance or rating noise outside the scope of the Standard.

Unlike the previous version of the Standard, rating levels are not prescriptive, but more context based, with the following applicable to rating values:

- Typically, the greater this difference (variance between impact of background and rating level), the greater the magnitude of impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending upon the context.
- A difference of around +5 dB is an indication of an adverse impact, depending upon the context.
- The lower the rating level is relative to the measured sound level, the less it is that the specific sound source will have an adverse impact or a significant impact. Where the rating does not exceed the background sound level, this is an indication of the specific sound source having a negligible impact, depending upon context.

The Standard introduces additional rating elements, these being subject assessments of tonality, and impulsivity of a sound source, with weighted rating values accordingly applied at the judgment of the assessor.

5.1.1 Description of Acoustic Features

If the assessed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc.), the plant should be designed or acoustically treated to reduce the appropriate output based on the type and impact of the features.

If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor:

- 0 dB where the tone is not perceptible.
- 2 dB where the tone is just perceptible.
- 4 dB where the tone is clearly perceptible.
- 6 dB where the tone is highly perceptible.

Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor:

- 0 dB where the impulse is not perceptible.
- 3 dB where the impulse is just perceptible.
- 6 dB where the impulse is clearly perceptible.
- 9 dB where the impulse is highly perceptible.

For noise, which is equally both impulsive and tonal, then both features can be considered by linearly summing the corrections for both characteristics.

If the plant has other distinctive characteristics, such as intermittency, then a +3 dB correction can be made.

If a subjective assessment is not appropriate, then an objective assessment can be made. A noise source is deemed to be tonal if the time averaged sound pressure level in a one-third octave band exceeds the level in adjacent one-third octave bands by the level differences given below:

- 15 dB in the low frequency one-third octave bands (25 Hz to 125 Hz)
- 8 dB in the mid frequency one-third octave bands (160 Hz to 400 Hz)
- 5 dB in the high frequency one-third octave bands (500 Hz to 10000 Hz)

If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.

5.1.2 Uncertainty

The introduction of Uncertainty has been applied to the measured values; again, consideration of this is left to the professional executing the survey and assessment. However, steps are provided within the Standard for the reduction of uncertainty in both measurement and calculations of the sound source and rating value.

Actual meteorological conditions are now required to be recorded and reported upon for the survey and report.

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

The scope of British Standard 8233: 2014: *Sound insulation and noise reduction for buildings* is the provision of guidance for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations; the primary intention of these is to guide the design of new buildings or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the external noise climate.

The standard suggests suitable internal noise levels within diverse types of buildings, including residential dwellings, as shown in Table below.

Indoor Ambient Noise Levels in Spaces When They Are Unoccupied

Activity	Typical Situations	Design Range LAeq, T dB	
		0700h to 2300h	2300h to 0700h
Resting	Living rooms	35	--
Dining	Dining Room / Area	40	--
Sleeping	Bedrooms	35	30

BS 8233:2014 states in Note 4 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."

As such it has been considered appropriate to define a limit for regular maximum indoor noise levels of 45 dB(A) with sporadic events not exceeding 50 dB(A).

BS8233 also suggests noise limits for external areas or a property such as gardens or balconies. It states that:

'For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq, T}$, with an upper guideline value of 55 dB $L_{Aeq, T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centre's, 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.'

5.3 National Planning Policy Framework, NPPF.

The newly incumbent National Planning Policy Framework, NPPF, provides advice to planning authorities in England on how they must seek to minimise the adverse impact of noisy activities on noise sensitive receptors. This NPPF, replacing PPG 24, and is not prescriptive with respect to specific noise levels, and is concerned with the advising on good practice for environmental noise assessment.

In the absence of definitive noise criterion within the NPPF most Local Authorities in England default to the daytime noise levels inside dwellings not to exceed NR 35; and NR 25, to be achieved inside dwellings at night to avoid sleep disturbance, based upon ingress of external noise sources.

5.4 Noise Policy Statement for England, NPSE.

The document "Noise Policy Statement for England" sets out the following vision for ongoing noise policy:

"Promote good health and a quality of life through the effective management of noise within the context of Government policy on sustainable development."

This vision should be achieved through the following Noise Policy Aims:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on 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."

To achieve this vision the Noise Policy Statement sets three noise levels to be defined by the assessor:

NOEL – No Observed Effect Level

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

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The Noise Policy Statement considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable. Where the assessed noise levels fall between the LOAEL and the SOAEL Noise levels, the Policy Statement requires that:

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

Where noise levels are below the LOAEL it is considered there will be no adverse effect. Once noise levels are below the NOEL there will be no observable change.

5.5 World Health Organization 1999 "Guidance for Community Noise"

This document provides a review of the effects of noise and a description of the principles of the WHO health criteria and guidelines for Community Noise.

The effects of noise in dwellings are identified as sleep disturbance, annoyance, and speech interference. For bedrooms, the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30 dB LAeq for continuous noise and 45 dB LMax for sound events. At nighttime, outside sound levels about 1 metre from facades of living spaces should not exceed 45 dB LAeq, so that people may sleep with bedroom windows open. This value is equivalent to that specifies in the Criteria 12 document; however, it is now assumed that the noise reduction from outside to inside with the window open is 15 dB.

To enable casual conversation indoors during the daytime, the sound level of the interfering noise should not exceed 35 dB LAeq.

To protect the majority of people from being **seriously** annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB LAeq on balconies, terraces and in outdoor living areas. To protect the majority of people from being **moderately** annoyed during the daytime, the outdoor sound level should not exceed 50 dB LAeq.

Table 1 of the document summarises the guideline values for community noise in specific environments and includes the noise indices to be adopted. Significantly, the corresponding time base to be used for the assessment is also included.

The relevant extracts of Table 1 are reproduced thus:

Specific Environment	Critical health effect (s)	LAeq dB	Time Base hours	LAMax dB
Outdoor living area	Serious annoyance, daytime, and evening	55	16	-
	Moderate annoyance, daytime, and evening	50	16	-
Dwelling, Indoors	Speech intelligibility & moderate annoyance daytime & evening.	35	16	-
	Sleep Disturbance, night-time	30	8	45
Outside Bedroom	Sleep disturbance, window open (Outdoor Values)	45	8	60

5.6 Subjective Impression of Noise Changes

The following Table provides a semantic scale that may be used to “subjectively” rate changes in sound pressure level.

Table 1: Subjective effect of changes in sound pressure level

Change in sound level dB	Change in Power		Change in apparent loudness
	Decrease	Increase	
3	1/2	2	Just perceptible
5	1/3	3	Clearly noticeable
10	1/10	10	Half / Twice as loud
20	1/100	100	Much quieter / louder

After Bies and Hansen

This table is taken from Professor Colin H Hansen’s publication “Fundamentals of Acoustics” page 41, for the Department of Mechanical Engineering, University of Adelaide.

This table also appears in “Engineering Noise Control” by Colin Hansen and David Bies, a comprehensive reference book, amongst others.

6.0 Survey Equipment

Svantek Sound and Vibration Analyser, SVAN 979, Type 1, Serial No 92932

Svantek Preamplifier, SV 17 Microphone Serial No 106523

GRAS Pre-Amplifier, Type GRAS 40AE, Serial No 370153

RION NC-74 Calibrator Serial No 530712

Windshield

Tripod

ANV Measurement Systems Sound Source

Alesis RA500 Amplifier

Dodecahedron Speaker

Cabling

7.0 Survey Method

The writer carried out noise monitoring of the background noise climate within the rear garden area of No 35 Moat Hill during a full daytime period, as this area will be utilised for the external play of the children occupying the site once operational. This location can be classified as representative of the relevant background. Additional noise monitoring was completed outside the front of the premises during an early morning period to represent the potential drop off time for the children.

Sound insulation testing was completed on the façade of the existing garden building to allow for determination of the current acoustic properties of the existing façade of the building. The sound insulation testing was completed in accordance with the requirements of Building Regulations Part E and utilized BS EN ISO 140-4 testing methodology for airborne tests with the graphic representation in accordance with ISO717-1.

Refer to Appendix A for a marked up locational plan of the site and survey position.

The noise monitoring was executed on 22nd and 23rd February 2023 in accordance with the requirements of BS4142:2014+A1:2019.

LA_{eq} , LA_{10} , LA_{90} and LA_{Max} indices sound measurements were taken using the sound analyser.

The measurement indices noted above are defined as follows:

LA_{eq}, T	the "A" weighted equivalent continuous noise level of sample period T
LA_{10}, T	the "A" weighted level exceeded for 10% of sample period T
LA_{90}, T	the "A" weighted level exceeded for 90% of sample period T
LA_{max}	The "A" weighted maximum level during the sample period T

The Sound Level Meter was mounted on a tripod at a height of 1.5m above the floor. The meter was set to record continuous data with 15-minute data point cycles.

The sound level meter was calibrated before and after the measurements using the calibrator to ensure accuracy of the results. No variations were noted between calibrations and the results obtained can be deemed to be an accurate representation of the levels recorded.

8.0 Prevailing Weather Conditions

22 nd February 2023	8°C, 60% cloud cover, wind 0-6 mph NW, 1011 mb, 70% rh.
23 rd February 2023	4°C, 20% cloud cover, wind 0-5 mph NNW, 1023 mb, 75% rh.

All road surfaces were dry throughout the monitoring sessions.

9.0 Noise Survey Results

During the monitoring period noise samples were recorded, using 1/1 Octave Centre Band analysis. These monitoring samples were collected from the rear garden of the site. Additional monitoring was made outside the eastern façade of the property in the front garden overlooking Moat Hill.

The table of results below indicate the noise levels recorded during the monitoring period, with a brief description of the noise sources contributing to the monitored noise levels recorded.

An overview of monitoring positions is given below:-

1. Location 1 relates to the external area of the property in the rear garden.
2. Location 2 relates to the external area of the property in the front garden.

Note

The above monitoring locations should be read in conjunction with the site layout appearing in Appendix A of this report.

10.0 Noise Survey Results Tables

The table below provides the details of the results collected during the noise monitoring sessions.

10.1 Results Table Overview

Location	Position	Start date & time	Duration	LA Max	LA eq	LA10	LA90	Source Description
				dB	dB	dB	dB	
1	Rear Garden	22/02/2023 10:42:24	07:30:00.000	79.6	49.0	50.1	45.8	Traffic, Birdsong, Aircraft
2	Front Garden	23/02/2023 07:01:09	01:00:00.000	78.6	53.0	53.2	47.4	Traffic dominant

Refer to Appendix B for frequency analysis details.

10.2 Sound Insulation Test Results

The calculations indicate that the Weighted Standardized Level Difference, $D_{nT,w}$, (C, Ctr) dB provided by the existing garden building facade is as follows:

Test Number	Location	Airborne Sound Insulation Achieved $D_{nT,w}$ (C; Ctr) dB
J3175-1	Garden Building Façade	39 dB (-2,-4) dB

Refer to Appendix C for a copy of the sound insulation test certificate.

11.0 Discussion and Design Targets

The above results table indicates the noise data collected during a typical daytime period and can be deemed as representative of the noise climate for the site.

The general noise climate was dominated by traffic movements along the A62, Geldard Road, and the M62 motorway producing a constant background drone.

In order not to unduly affect the existing amenity of the nearby noise sensitive residential premises, it is advisable to take reference from the available standards and guidance, noted in section 5 above.

If we consider BS4142:2014+A1:2019, we find that a noise level rating of a difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending upon the context. A difference of around +5 dB is an indication of an adverse impact, depending upon the context. The lower the rating level is relative to the measured sound level, the less it is that the specific sound source will have an adverse impact or a significant impact. Where the rating does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon context.

Taking reference from W.H.O., we find that the maximum allowable external noise level has been deemed as 35 LAeq dB for continuous sources internal within noise sensitive premises and 50 dBA externally for daytime periods.

As can be seen from 5.3 above, an increase in noise levels of up to +3 dB is just perceptible and not likely to give rise to complaints. However, the baseline should not be increased such that it exceeds the W.H.O or BS4142:2014+A1:2019 limits, and as such it is intended that the design target for the internal spaces should be in line with this figure so that the amenity is preserved. If we compare these levels of the existing background recorded, we find that the baseline noise climate falls above these figures and as such noise is currently considered an issue likely to give rise to annoyance within outdoor living spaces due to the constant traffic flow.

If we now consider the potential impact of children playing outside, which is the primary noise source attributable to the site, we must take account of the pre-existing noise climate and not unduly impact upon the baseline figures monitored. The baseline noise climate should not be increased such that it exceeds the WHO or BS4142:2014+A1:2019 limits.

Taking account of the above standards and their recommendations and the existing noise climate for the specific area, it would be prudent to set the design target noise levels in accordance with accepted limits recognised both nationally and internationally for the site noise output contribution.

Table of Recommended Design Target Noise Limits When Considered at the Site Boundary

Location	Existing Noise Climate	Target Noise Limits
Rear Garden Area	$L_{Aeq} - 49 \text{ dB}$	$L_{Aeq} - 50 \text{ dB}$
Front Garden Area	$L_{Aeq} - 53 \text{ dB}$	$L_{Aeq} - 55 \text{ dB}$

The above recommendations assume that the noise output will be non-tonal in nature without any significant features, when considered against the context of the local environment.

If we account for the internal noise, it would be prudent to set the noise ingress limits in accordance with BS8233:2014, set at a value of 35 LAeq dB for daytime periods. The 35 LAeq dB value is approximately equivalent to a Noise Rating Curve value of NR30 dB, as noted within BS8233:2014 Section 7.4 Noise Indices and Annex B, Noise Rating. This curve is prescriptive across a full sound spectrum and will therefore be used within the calculations below.

12.0 Impact Assessment

The primary noise source within the vicinity of the site is due to the traffic movements, birdsong, and aircraft.

The proposal under consideration and for which planning permission is being sought is to convert the existing garden building into a private day nursery for children ages 0 months to 5 years with up to 10 No children, all overseen by up to 2 No staff members.

There are 3 No considerations that need to be made with an establishment of this type (i) the external noise generated with the use of the garden for play periods, (ii) the internal breakout noise from within the building to the nearby premises, and (iii) the traffic noise associated with drop-off and collection of the children.

12.1 External Play Area Considerations

If we consider the external garden area use as the primary noise source, following change of use, this would be due to children playing outdoors. The garden has an existing wooden fence along the south-western boundary between the 2 No premises. The fence is 1.2m high and runs between the garden building and the facade of the house.

It is anticipated that there will be no more than 4 No children outdoors at any one time, based upon age group. It can easily be determined that the noise attributable to the birth to 2 years group are classified as toddlers who are just becoming mobile independently. The primary group, likely to give rise to activity noise, are the 2-5 year olds. These children would be free to use the external space and encouraged to make independent use of the toys and activities available.

Since the premises have not been commissioned as yet, no direct measurement could be made for children at play, however, library data from a similar sized day nursery has been utilized, based upon children of this age range at play. The children were playing outdoors, talking, and making use of ride on toys and climbing frames available.

The recorded noise levels demonstrate child play volumes of 60 LAeq dB. These noise levels are based upon measurement at a distance of 1m from 4 children at play simultaneously, with 2 No carers present.

The general background noise, between activity noise sources, was due to traffic flow from a nearby road, which is in keeping with the applicants site.

For the purposes of this exercise, we have assumed that all noise sources, both children and carers, are equal and they will be present at all times during the time period under consideration. This scenario is unlikely and therefore can be deemed as the worst case scenario. In reality, it has been advised that the external yard will be used for ½ hour periods at any one time.

If the existing boundary were to remain, then the noise arriving at the neighbouring premises, southwest of the site, could be up to the maximum value of 60 LAeq dB, which is a worst case and assumes that the children are all playing at 1m from the premises boundary. This is still in keeping with the local noise climate, however, if this were to be a constant source, then comparison of the pre-existing LA90 dB indices, generally acceptable as background noise, could potentially represent a +14 dB increase and likely to give rise to justifiable complaints.

Again, taking account of the neighbouring premises, located southwest of the site, consideration could be to provide additional fencing between the 2 No premises, positioned along the perimeter boundary.

If we assume that the fence will be built up to 2.2m high, up to the eaves of the existing garden building and the property extension and is of a solid construction having a superficial mass of 25Kg/m² achievable with a close boarded fence, this will provide an acoustic performance to reduce to direct transmission of the noise arriving at the neighbouring residence.

Calculations indicate that the attenuation due to the installation of a fence of this type would provide a noise reduction of the source to **41 LAeq dB**. This level of noise contribution is **-8 dB below** the recorded baseline LAeq dB figure and **-4 dB below** the LA90 dB value, and as such, if the fence were to be built, it is a clear indicator that noise due to children at play would not unduly affect the existing amenity of the neighbouring premises garden space.

Refer to Appendix D for further details of the above calculation.

For robustness the following is an assessment in accordance with BS4142:2014+A1:2019, which has been based upon the results above for the proposed worst case noise source associated with the children at play in the garden and the inclusion of the recommended perimeter boundary fence.

All readings have been rounded to the nearest whole number.

Description	Indices	Sound Level	Comments
Noise contribution due to children at play in the garden	L _{Aeq}	41 dB	Based upon 4 children and 2 carers with increased height barrier fence
Existing residual baseline noise climate	L _{Aeq}	49 dB	Traffic noise and birdsong dominant
Existing Background Noise Level	L _{A90} (1-hour)	46 dB	Background level consisted of existing traffic noise and birdsong.
Acoustic feature correction		+2 dB	Intermittent source
Rating Level	(41 + 2)	43 dB	
Background Noise Level	L _{A90} (1-hour)	46 dB	Traffic noise and birdsong dominant
Excess of Rating over background sound level	(43 – 46)	= -3 dB	
The excess of -3 dB is below the existing background level which, in the context, is classified as producing a low significance with respect to an adverse impact due to the children at play in the garden.			
<p>Uncertainty of the assessment</p> <p>There is uncertainty in the calculation as it is based upon a measurement with a correction applied, the uncertainty of the volume produced by children at play, which may account for a 3 dB variation in the actual values and the screening calculation. However, based upon a rating of -3 dB there is scope for this variation and as such, the measurements presented indicate that the confidence of the rating for the specific source.</p>			

Taking account of the potential **-3 dB**, the BS 4142:2014+A1:2019 rating would be below background when considered inside the neighbouring premises gardens. This rating value, of **-3 dB**, is below the level at which noise is considered as likely to generate justifiable complaints from the neighbouring premises.

This level also places the noise source below the 50 dBA WHO figure set as the design target, above which may give rise to only moderate annoyance from the majority of people.

The subjective impression is that the potential maximum noise source 41 LAeq dB with a 2.2m high fence would not be detrimental against the pre-existing are noise climate and as such the existing amenity of the neighbours would be preserved.

12.2 Building Sound Insulation

In order to determine the likely effect the worst case internal reverberant noise levels are going to have on the local environment around the site, the acoustic properties of the building fabric will need to be established.

The internal noise produced can only be “contained” within the building, provided that the sound insulation of the building fabric is high enough to provide a sufficient sound reduction against the transmission through the structure.

Since we are dealing with a noise sensitive residential property close to the proposed nursery area, a sound insulation test has been completed, with the overview of the results appearing within Section 10.2 above.

Taking account of the results from the sound insulation test completed for the facade, it is possible to assess the likely noise egress of the day nursery when considered inside the nearby residential premises of No 33 Moat Hill.

Below is a calculation showing the noise ingress based upon the same values of children at play inside as used for external play generated noise. The BS8233:2014 standard for internal noise climate will also be utilized.

The internal noise produced can only be “contained” within the building, provided that the sound insulation, SRI, of the building fabric is high enough to provide a sufficient barrier against the transmission of the sound through the structure.

Based upon the existing construction the building the sound insulation test produced a Weighted Sound Reduction Index of $R_w = 39$ dB. The frequency band reduction of the structure is as follows which includes for the glazing systems installed in the facade:

Sound Reduction Index (SRI)

Freq Hz	63	125	250	500	1000	2000	4000
SRI dB	23	31	36	41	44	47	50

12.2.1 Calculated Resultant

The purpose behind the calculation is so that an assessment of the likely noise levels at the closest noise sensitive dwelling can be made in advance of the actual occupation.

The appropriate model for the assessment of noise breakout from a building is given by considering the internal noise level within the room, the area of the wall likely to generate noise and the distance to the recipient. Additional to this is the consideration of the topography of the intervening land between source and recipient.

The calculation encompassing all these factors is given by:

$$L_2 = L_1 - R + 10 \text{ Log } S - 20 \text{ log } r - 14 - AS, \text{ dB}$$

L₂ is the sound pressure level in dB at distance **r** metres from the wall under consideration.

L₁ is the sound pressure level inside the unit adjacent to the wall where the breakout will occur.

S is the area of wall, m².

R is the Sound Reductive Index, SRI, of the wall, dB.

AS is the barrier effect of the intervening topography, dB.

Assessment of noise breakout when considered at No 33 Moat Hill

Frequency, Hz	63	125	250	500	1K	2K	4K
L ₁ within the room, based upon children at play, dB	62	46	54	58	56	52	45
Façade SRI, dB	-23	-31	-36	-41	-44	-47	-50
Façade Area, 6.0m x 2.3m = 13.8m ²	11	11	11	11	11	11	11
Distance to recipient at No 33 Moat Hill, 6m	-15	-15	-15	-15	-15	-15	-15
Constant - 14	-14	-14	-14	-14	-14	-14	-14
Existing Barrier Effect, dB	0	0	0	0	0	0	0
Resultant, dB	21	0	0	0	0	0	0

The above calculated noise contribution to the background level equates to **0 dBA**.

This level of contribution is **-46 dB below** the existing baseline background value recorded when considered at the No 33 Moat Hill.

If we take account of BS4142 rating a level of -46 dBA below background is a clear indicator that noise is not likely to give rise to justifiable complaints. Based upon the assessed internal value of 60 dBA and a calculated contribution level of 0 dBA the BS4142:2014+A1:2019 rating value has been calculated at -46 dB assuming no tonal or impulse noise is present in the source.

It should be noted that the above assessment is based upon worst case scenario children at play taken from library data. However, it should be noted that an internal noise level of up to 90 dBA can be achieved whilst still maintaining a value of only 30 dBA outside the residential premises. This level of internal noise is not likely and as such the amenity of the nearby residential premises will be maintained following development.

No additional mitigation measures are necessary to building fabric of the garden building to achieve acceptable sound insulation.

12.3 Traffic Noise Considerations

There is a proposal to form additional car parking outside the front of the property, with the formation of 2 No parking spaces in lieu of the existing lawned garden at the Moat Hill elevation of the property. This will allow for 6 No parking spaces in total, 4 No customer parking spaces and 2 No staff parking spaces.

Noise from the drop-off and collection of children will be assessed as commercial sources for the purpose of this assessment, and the activity associated with the noise will be restricted to the confines of the site only.

The activities of concern centre on arrival and departure of vehicles, together with associated events such as engine start-up, door slamming etc. To make predictions of the noise level at some distance from the car park, it is first necessary to establish reference noise levels. A series of detailed measurements have been conducted, the results of which are summarised in the following table. The results are based upon 1 metre from the activity for ease of comparison.

12.3.1 Car Parking Noise Sources Table

Activity	Duration, s	LAeq, T	LAmx
Open door, get in, close door, start engine, drive away to distance	20	73 dB	80 dB
Drive towards property, park, switch-off engine, open door, get out and slam door shut	20	69 dB	80 dB

Calculations have been conducted to determine resultant noise levels at the closest noise sensitive receptors to the activities of the formed carpark area. Consideration has been made to the closest residential premises to the site at No 33 Moat Hill at 5m from the closest formed car park space.

The anticipated use of the car parking will be phased in the morning, with only 3 No drop-offs allowed in any 10-minute period from 07.20 to 08.00, and a similar collection allocation from 17.00 to 17.40. However, since the day nursery will serve the local community, it is anticipated that there would be arrivals and collections by foot, reducing vehicular use.

Predicted LAeq_(1hr) dB and LAmx dB façade noise levels are set out in the table below. For the purposes of this exercise, consideration of 3 No car parking spaces in simultaneous use will be used to predict the likely worst case noise levels at any noise sensitive receptors.

The following façade noise levels are calculated taking account of the "on-Time" of the activity defaulted to 1 hour, or 3600 seconds, and the natural attenuation due to distance to the recipient, assuming 20 Log r, dB for sound transmission.

Barrier attenuation has been calculated at 0 dB for the vehicle noise sources noted as a conservative value for line of sight.

12.3.2 Calculated Car Park Noise Levels – 33 Moat Hill Premises

Activity	Distance Correction, dB	Barrier Correction, dB	On-Time Period Correction, dB	No of Sources	Calculated Noise Level	
					LAeq, 60 Mins dB	LAFmax dB
Open door, get in, close door, start engine, reverse out of parking space, drive away to distance	20 Log (5) = -14	0 dB	10 Log (3600/20) = -23	10 Log (3) = +4	73-33 = 40	80-10 = 70
Drive towards bay, park, switch-off engine, open door, get out and slam door shut	20 Log (5) = -14	0 dB	10 Log (3600/20) = -23	10 Log (3) = +4	69-33 = 36	80-10 = 70
Cumulative External Total, dB					41 LAeq, 60 Mins	70 dBA

The existing early morning period has been recorded at 47 LA90 dB.

To ensure that there is no loss of amenity, a value -5 dB below the existing background level is a clear indication that noise is not likely to impact upon the premises.

As can be seen from the above the calculated cumulative effect of the customer car park use is 41 LAeq dB. The above calculation indicates that there will be no cumulative increase in background due to the carparking activities and as such no loss of existing amenity.

Accounting for the impulse noise, assessed as 70 LAMax dB due to parking activities, the existing noise climate includes for impulse noise up to 79 LAMax dB, therefore it can be concluded that the introduced noise will be in keeping with the pre-existing noise climate.

13.0 Report Summary

A noise assessment of the baseline background noise levels at the premises of No 35 Moat Hill, Birstall has been executed in accordance with BS4142:2014+A1:2019 during a typical weekday on 22nd and 23rd February 2023.

Planning permission is being sought under Application No 2022/93918 for the change of use of a garden building for use as a private day nursery for children aged from birth to 5 years of age.

The maximum noise associated with children at play outdoors within the rear garden area of the site has been assessed as 0 LAeq dB at 1m average, based upon 4 No children and 2 No carers present.

A BS4142:2014+A1:2019 assessment has been completed and provides a rating value of -3 dB when considered at the neighbouring premises of No 33 Moat Hill with the inclusion of increased height perimeter boundary fence of 2.2m high.

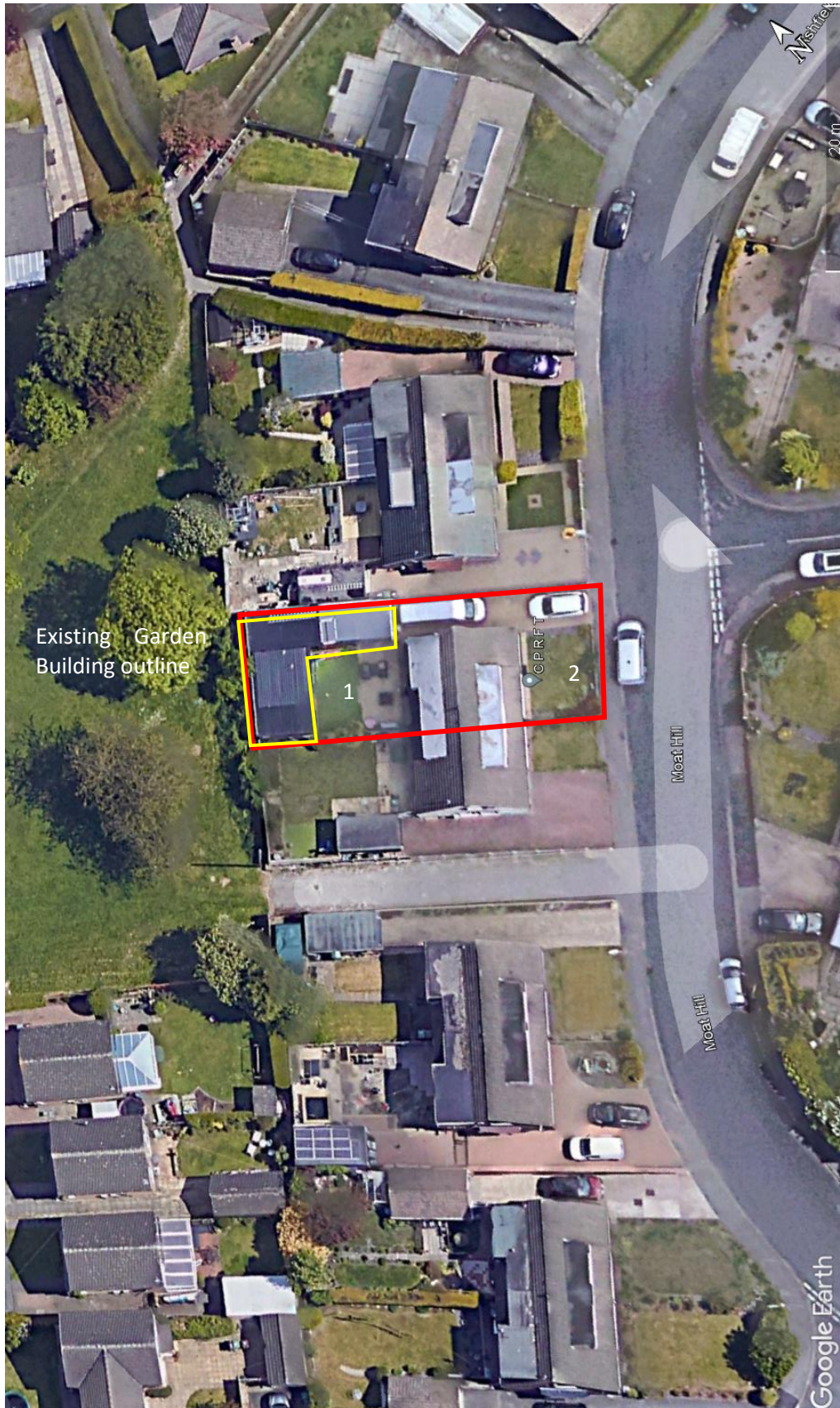
Consideration has been made of the potential internal noise levels produced within the building and a sound insulation test has been completed for the existing facade. The results of the sound insulation testing have been utilized in a calculation to determine the likely noise arriving at the premises of No 33 Moat Hill. Using the data for children at play and accounting for this noise source level within the building, the noise ingress calculation indicates that there will be a contribution level of 0 dBA at the neighbouring premises. The existing background recorded in the vicinity of the garden is 46 LA90 dB. The assessed value of 0 dBA represents a value of -46 dB below this level and as such not likely to be either audible above the background or result in any adverse comment.

The formed and existing car parking has been assessed and has been calculated that the contribution due to vehicle use of the spaces will be 41 LAeq dB and 70 LA Max dB, equating to - 7 dBA and -9 dBA below the existing area levels respectively.

If we take account of all relevant standards and guidelines pertaining to noise, it has been established that the potential site activity noise would fall below the level at which noise is likely be considered a justifiable annoyance or nuisance and will not result in any loss of amenity for the adjacent residential premises.

Taking all of the above results for the guidelines into consideration it would be the writer's recommendation to allow planning permission to be granted for change of use of the existing garden building to be converted to a private day nursery since it has been shown that it would be operating within the limitations of relevant guidance.

Appendix A Locational Outline and Monitoring Positions



Appendix B Noise Survey Results Frequency Analysis Table

Location	Position	Linear Leq dB in Frequency Band Hz											
		LA Max	LA eq	LA10	LA90	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
		dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB
1	Rear Garden	79.6	49.0	50.1	45.8	51.0	48.4	46.5	45.8	46.0	39.6	33.9	29.8
2	Front Garden	78.6	53.0	53.2	47.4	60.9	52.6	49.1	49.5	49.3	44.4	40.8	40.4

Appendix D Barrier Attenuation Calculation

Project: Day Nursery Perimeter Barrier Assessment

SWL	63	125	250	500	1k	2k	4k	8k
Existing Sound Pressure Level at Receiver (A)	59	49	48	52	53	49	41	36

POSITIVE SCREEN

Source to Barrier	4
Barrier to Receiver	3 (estimated distance to receiver)
Barrier Height	2.2
Source Height	0.75
Receiver Height	1.75 (direct line of sight assumed between source & receiver)
Path Difference	0.27

Attenuation due to Screens

Path Difference	63	125	250	500	1k	2k	4k	8k
-0.30	1	0	0	0	0	0	0	0
-0.20	2	1	0	0	0	0	0	0
-0.10	3	2	1	0	0	0	0	0
-0.05	3	3	2	1	0	0	0	0
-0.01	4	4	4	3	3	2	1	1
0.00	5	5	5	5	5	5	5	5
0.01	5	6	6	6	7	8	8	8
0.05	7	7	8	9	10	12	13	13
0.10	7	8	9	10	11	14	16	16
0.20	8	9	10	11	14	16	19	19
0.30	8	9	10	13	16	18	20	20
0.40	9	10	12	14	17	20	22	22
0.50	9	10	12	15	18	20	23	23
1.00	11	12	14	18	20	23	25	25
2.00	14	15	18	20	24	27	29	29
3.00	15	17	20	22	25	28	30	30
4.00	16	18	20	24	26	30	31	31
5.00	16	18	21	25	27	30	32	32

Screening Effect from above table (B):	8	9	10	13	16	18	20	20
SRI of Screen Panels (C):	17	18	22	29	31	34	36	35
Level at Receiver due to Screening Effect (A - B)=D:	51	40	38	39	37	31	21	16
Level at Receiver due to Direct Transmission (A - C)=E:	42	31	26	23	22	15	5	1
Resultant Level at Receiver (log add'n of D & E):	52	41	38	39	37	31	21	16
NR Level Required: NR40	67	57	49	44	40	37	35	33
Additional Attenuation Required:	-15	-16	-11	-5	-3	-6	-14	-17

dBA Correction:	-26	-16	-9	-3	0	1	1	-1
A-Weighted Equivalent:	25	24	29	36	37	32	22	15
dBA Level at Receiver (with no additional attenuation):	41	dBA						
NR65	87	78	72	68	65	62	61	59
NR60	83	74	68	63	60	57	55	54
NR55	79	70	63	58	55	52	50	49
NR50	75	65	59	53	50	47	45	43
NR45	71	61	54	48	45	42	40	38
NR40	67	57	49	44	40	37	35	33
NR35	63	52	45	39	35	32	30	28
NR30	59	48	40	34	30	27	25	23
NR25	55	44	35	29	25	22	20	17

Completed By: Paul Horsley **Date:** 06.03.23