

Noise impact assessment of a proposed nursery

7 Moor End, Northenden, Manchester, M22 4JQ



Client: The Harkalm Group

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0. SUMMARY

- 0.1. ACA Acoustics Limited has been commissioned to assess the acoustic impact of a proposed nursery at Moor End, Northenden, Manchester on existing noise-sensitive properties.
- 0.2. A sound level survey has been carried out between the 21st – 22nd July 2021 at two positions representative of the acoustic soundscape at the most affected noise sensitive residential dwellings. Whilst on site, the author considered the sound climate during the daytime was low and comprised primarily of levels from people within nearby gardens, and traffic activity from Moor End Road and surrounding routes. Existing ambient sound levels during the daytime were measured at LAeq 50dB to the side, and LAeq 46dB to the rear of the site.
- 0.3. A computer model has been set up to calculate sound emissions from use of the proposed outside play garden to nearby existing residential occupants. Calculated noise emissions from the play garden are LAeq 49dB to the properties to most affected residential properties to the north, and LAeq 41dB to the east. This equates to a “None/Not Significant” impact when assessed in accordance with the Institute of Environmental Management and Assessment’s *Guidelines for Environmental Noise Impact Assessment*, achieve the level for a good standard of amenity recommended in BS 8233:2014, and will be below the Lowest Observed Adverse Effect Level, as defined in the National Planning Policy Framework and Planning Practice Guidance – Noise.
- 0.4. The assessment includes the benefit of a proposed 2.3m high fence to the northern boundary of the play garden. A comprehensive management plan will be implemented, including limiting the number of children in the garden at any one time and to establish breaks between play sessions throughout the day.
- 0.5. Design of proposed mechanical services equipment serving the development has not yet been finalised and so maximum permissible levels for any future equipment has been specified to ensure no loss of amenity for nearby residents. Once the equipment design and selection are finalised then detailed assessment can be undertaken.
- 0.6. In accordance with relevant Policies, Standards, and guidance documents, it is the author’s opinion that the site is suitable for use as a day nursery.

1. INTRODUCTION

An application is to be submitted to Manchester City Council for the change of use to a day nursery along with associated external play area at 7 Moor End, Northenden, Manchester.

ACA Acoustics Limited has been commissioned by The Harkalm Group to carry out an assessment of noise emissions from the proposed use and, where necessary, make recommendations to reduce sound levels to ensure that the amenity of nearby noise-sensitive properties is not compromised.

This report presents results of the sound level survey and assessments.

2. RELEVANT POLICIES, STANDARDS, & GUIDANCE DOCUMENTS

2.1 National Planning Policy Framework and Noise Policy Statement for England

The National Planning Policy Framework (referred to as NPPF) sets out the Government's planning policies for England and provides guidance on how these are expected to be applied, providing a framework within which Local Authorities can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

Paragraph 174 of the NPPF states that,

"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".

Paragraph 185 also talks specifically about noise and advises,

"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:

- *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 quality of life.*
- *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

The Government's long-term policy aims relating to noise are contained in the Noise Policy Statement for England (referred to as NPSE). Stated aims of the NPSE are:

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

Paragraphs 2.19 to 2.24 clarify the above aims, referring to established concepts from toxicology; NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level). It also introduces a new concept relating to "significant adverse" of SOAEL (Significant Observed Adverse Effect Level), however noting,

"It is not possible to have a single objective noise-based measure that describes 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".

The first aim of NPPF Paragraph 185 and the second underlying aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also considering the guiding principles of sustainable development, as set out in the NPPF. As neither the NPPF nor NPSE includes any numerical criteria, it is necessary to consider guidance provided in other documents to determine suitable limits that would define the LOAEL on an individual basis.

Finally, it is also of benefit to consider Paragraph 2.7, which advises that,

"... the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications".

This provides clear guidance that noise must not be considered in isolation but as part of the overall scheme taking into account the overall sustainability and associated impacts of the proposed development; there is no benefit in reducing noise to an excessively low level if this creates or increases some other adverse impact. Similarly, it may be appropriate in some cases for noise to have an adverse impact if this is outweighed by the reduction or removal of some other adverse impact that is of greater significance to the development.

2.2 Planning Practice Guidance – Noise

Related to the NPSE and the NPPF, The Department for Communities and Local Government has published additional guidance and clarifications within the Planning Practice Guidance – Noise (PPG-N), available at <https://www.gov.uk/guidance/noise--2>.

Paragraph 003 of the PPG advises,

“Plan-making and decision making need to 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 ... is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.”

This guidance is like that set out in the NPPF and NPSE, however, Paragraph 005 of the PPG provides outline guidance on the definition of ‘significant adverse effect’ and ‘adverse effect’. A copy of the table appended to Paragraph 005 is repeated in **Error! Reference source not found..**

Although the table in **Error! Reference source not found.** provides descriptive definitions for the NOEL, LOAEL, and SOAEL, as with the NPPF and the NPSE there are no numerical values provided and it is necessary to consider guidance in other documents.

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

Figure 1: Noise exposure hierarchy, taken from Planning Practice Guidance - Noise

2.3 British Standard BS 8233:2014

The introduction to the Standard advises that,

“Noise control in and around buildings is discussed in this British Standard guide on an objective and quantifiable basis as far as is currently possible. For many common situations, this guide suggests criteria, such as suitable sleeping/resting conditions, and proposes noise levels that normally satisfy these criteria for most people.”

It also notes that,

“The standard is intended to be used routinely where noise sources are brought to existing noise-sensitive buildings”.

Section 7.7.3.2 relates to design criteria for external noise and recommends,

“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 50dB LAeq,T with an upper guideline value of 55dB LAeq,T which would be acceptable in noisier environments”.

The BS 8233:2014 upper desirable limit has been established based on guidance from the World Health Organisation’s “Guidelines for Community Noise 1999”. This recommended that to avoid “serious annoyance” during the daytime and evening the external sound level should not exceed LAeq,T 55dB. It is important to note however that the National Physics Laboratory has reviewed the WHO guidelines and advised that,

“Exceedance of the WHO guideline values does not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher levels of noise exposure are reached.”

This confirms that the LAeq 55dB limit is not the SOAEL but is likely to be between the LOAEL and SOAEL. Section 7.7.3.2 continues that,

“It is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres ... a compromise between elevated noise levels and other factors, such as ... making efficient use of land resources ... 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.”.

This compliments guidance within the NPPF, such that significant adverse impacts are avoided, but adverse impacts are mitigated and minimised to the lowest practicable level.

The author considers that an upper criterion of LAeq 55dB should be targeted to ensure noise emissions from the proposed nursery do not have a significant adverse impact on the amenity of nearby residential occupants. It is also of benefit to consider that this criterion is typically assessed over a full 12-hour or 16-hour daytime. Children will only be playing outside for a portion of the time and therefore the overall 12-hour or 16-hour sound level will be consequently lower.

2.4 IEMA Guidelines for Environmental Noise Impact Assessment

Noise emissions from the external play area will comprise almost exclusively of children’s voices. While BS 8233:2014 establishes the upper limit there is no specific formal methodology for undertaking an assessment of noise from voices potentially affecting nearby residential occupiers.

A general principle that can be employed in situations of potential noise disturbance where there is no formal assessment methodology is to consider whether the new noise source will likely cause a significant increase over the current sound level, or a change of character compared to the existing noise climate.

This assessment method forms the basis of the *Guidelines for Environmental Noise Impact Assessment*, written by the Institute of Environmental Management and Assessment (IEMA).

Having established the likely change in sound levels due to the new activity, an initial indication of the significance of the change can be determined from the table below, taken from Table 7-12 of the Guidelines.

Effect Description	Definition
None / Not significant	Less than LAeq 2.9dB change in sound level and/or all receptors are of negligible sensitivity to noise.
Slight	A LAeq 3dB to 4.9dB change in sound level at a receptor of some sensitivity.
Moderate	A LAeq 3dB to 4.9dB change in sound level at a sensitive or highly sensitive receptor, or a greater than LAeq 5dB change in sound level at a receptor of some sensitivity.
Substantial	Greater than LAeq 5dB change in sound level at a noise-sensitive receptor, or a LAeq 5dB to 9.9dB change in sound level at a receptor of high sensitivity to noise.
Severe	Greater than LAeq 10dB change in sound level at a receptor of high sensitivity to noise.

Table 1: Effect descriptors for change in sound level taken from Table 7-12 of the Guidelines for Environmental Noise Impact Assessment

Note that defining the change of loudness to one decimal place is not a reflection of the accuracy of any assessment undertaken but rather to provide a clear threshold between adjacent effect descriptions.

Section 7 of the Guidelines advises that the change in sound level provides an initial estimate of the impact, which should then be examined considering the context of the development, the type of noise source, nature of the change, and other factors.

Paragraph 7.6 summarises that,

“In some situations, the conclusions about the degree of the impact will be clear and straightforward; but in others it is likely that, ultimately, a professional judgement will have to be made by the assessor. It must be remembered that the effects of noise are primarily subjective, and while it is desirable to include as much objectivity as possible into the assessment process in order to obtain consistency, there should be no concern in allowing professional judgement to

come into the final analysis. However, the basis for the judgement made must be clearly set out so that it is clear how the conclusion has been reached."

Once the initial estimate of the impact has been corrected to account for the context of the assessment, the magnitude of the impact and significance of the effects can be reviewed against Table 7-7 of the Guidelines, copied below.

Magnitude of Impact	Description of Effect
Negligible	No discernible effect on the receptor.
Slight	Receptor perception = Non-intrusive Noise impact can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.
Moderate	Receptor perception = Intrusive Noise impact can be heard and causes small changes in behaviour and/or attitude. Potential for non-awakening sleep disturbance. Affects the character of the area such that there is a perceived change in the quality of life.
Substantial	Receptor perception = Disruptive Causes a material change in behaviour and/or attitude. Potential for sleep disturbance. Quality of life diminished due to change in character of the area.
Severe	Receptor perception = Physically harmful Significant changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects.

Table 2: Relationship between noise impact and noise effects

It is of benefit to notice the similarity between the effect descriptions in Table 2 with the examples of outcome in **Error! Reference source not found.**, taken from the PPG-N. From this, achieving a magnitude of impact of “*slight*” corresponds to designing noise to below the LOAEL. ACA Acoustics therefore recommends that where an assessment indicates an impact of “*negligible*” or “*slight*” this is fully acceptable in accordance with the NPPF, NPSE, and PPG-N. Where an assessment indicates a “*moderate*” impact then this would potentially have an adverse impact on nearby residents and would only be acceptable where it can be adequately mitigated and minimised.

2.5. Noise from Mechanical Services Equipment

It is understood that Manchester City Council would require mechanical services equipment to adhere to a condition similar to the following, taken from a previous project in the district.

Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location.

The scheme shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site. The approved scheme shall be completed before the premises is occupied.

Upon completion of the development a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that the noise criteria has been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.

Although not specifically noted as this condition refers to the 'rating level' it is anticipated that the assessment should be carried out in accordance with BS 4142:2014+A1:2019.

2.6 Acoustic Design of Schools: Performance Standards – Building Bulletin 93

Acoustic Design of Schools: Performance Standards – Building Bulletin 93 (BB93) advises that it “sets out minimum performance standards for the acoustics of school buildings”.

Section 0.3.4 discusses nursery and community education premises and advises,

“Part E of the Building Regulations covers rooms used for nursery and adult/community education within school complexes but does not apply to nursery schools which are not part of a primary school.

The School Premises Regulations and Independent School Standards cover all types of schools, including nursery schools.”

Section 0.2.2 reviews the requirements of the School Premises Regulations and Independent School Standards. This confirms a statement included within the regulations,

“The acoustic conditions and sound insulation of each room or other space must be suitable, having regard to the nature of the activities which normally take place therein.”

Table 1 of BB93 sets out maximum permissible indoor ambient sound levels for new nursery schools and the relevant elements are repeated below for ease of reference. Adherence with these values will demonstrate compliance with the School Premises Regulations.

Type of Room	Upper Limit for Indoor Ambient Sound Level LAeq, 30 mins
Nursery School Rooms	35dB
Atrium, circulation space not intended for teaching and learning	45dB
Kitchen	50dB
Office	40dB
Toilet	50dB

Table 3: Indoor ambient sound level criteria in nurseries

The design should achieve appropriate internal sound levels allowing for the ventilation systems to be operating in their normal conditions, intermittent boost ventilation, and when controlling overheating during the warmest summertime periods. Tolerances on the ambient sound levels for different ventilation system types are shown in Table 4 below.

Condition	Ventilation System	Sound Level Limit
Normal – ventilation for normal teaching and learning activities	Mechanical	Table 2 values
	Natural	Table 2 values + 5dB
	Hybrid	Total sound level: Table 2 value + 5dB
Summertime – ventilation under local control of teacher to prevent overheating	Mechanical	Table 2 values + 5dB
	Natural or hybrid	≤ 55dB
Intermittent Boost – ventilation under local control of teacher for dilution of fumes during practical activities	Mechanical	Table 2 values + 5dB
	Natural or hybrid	≤ 55dB

Table 4: Tolerances on internal ambient sound level for ventilation strategy

3. REVIEW OF SITE LOCATION & DEVELOPMENT PROPOSALS

The development site is located at 7 Moor End, Northenden, Wythenshawe, Manchester.

The surrounding area is predominantly residential properties. Residential windows to the rear of flats to the north of the site, along with windows from residential properties to the east have been identified as the most sensitive windows.

An aerial photograph of the site and surrounding area, taken from Google Earth, is shown in Figure 2 below. The figure shows the location of the closest sensitive receptor and measurement positions. The proposed play area is located to the northern side of the proposed nursery building.



Figure 2: Aerial photograph of the site - Available at www.google.com/maps

Proposed operating times of the nursery are understood to likely be between 07:30 and 18:30 hours Monday to Friday, and will not open over weekends or bank holidays. It is anticipated that any mechanical equipment will operate over the same period.

4. BACKGROUND SOUND LEVEL SURVEY

To assess the acoustic impact of the new nursery it is necessary to establish the existing residual and background sound levels in the vicinity. Details of the sound level survey carried out by ACA Acoustics are provided below.

Two measurement positions were selected to the side and rear garden areas. Levels to the side garden space are dominated by traffic activity on Moor End, along with other routes. To the rear levels from the road are screened, with the dominant sources coming from domestic activity within nearby gardens.

The site was considered secure and therefore an unattended survey was carried out over nominally a 24-hour period between 21st – 22nd July 2021.

Weather conditions at the time of setting up the survey consisted of a temperature of 25°C, 20% cloud with negligible wind and dry ground conditions. Weather conditions have been reviewed at www.worldweatheronline.com, using the closest available commercial weather station. The extended nature of the survey ensures that a reasonable sample of results have been recorded with appropriate weather conditions and meteorological conditions are not considered to have adversely impacted the outcome of the assessment.

Sound level measurements were recorded in terms of 15-minute samples of overall LAeq, LA90, and LAfmax values along with other statistical indices and octave band spectra.

The following equipment was used during the survey; the sound level meters were calibrated before the survey and checked after with no deviation noted.

Equipment	Serial Number
NTi Audio Class 1 sound level meter type XL2 complete with weatherproof and lockable outdoor environmental kit	A2A-06294-E0
Rion Class 1 sound level meter type NL-52 complete with weatherproof and lockable outdoor environmental kit	00564867
Svantek calibrator type SV33B. Compliant to IEC 60942-1:2003	83826

Table 5: Equipment used for the sound level survey

Results of the survey are shown in graphical form in Figure 3 to the side garden space and Figure 4 to the rear space below.

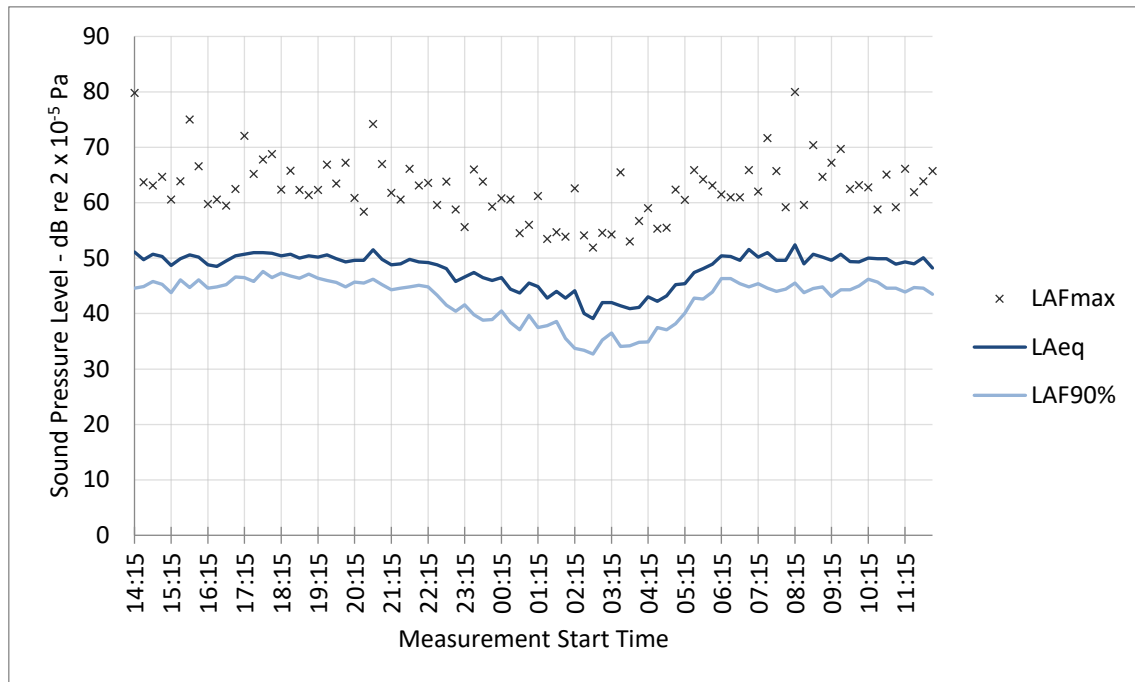


Figure 3: Sound level survey results to the side garden space

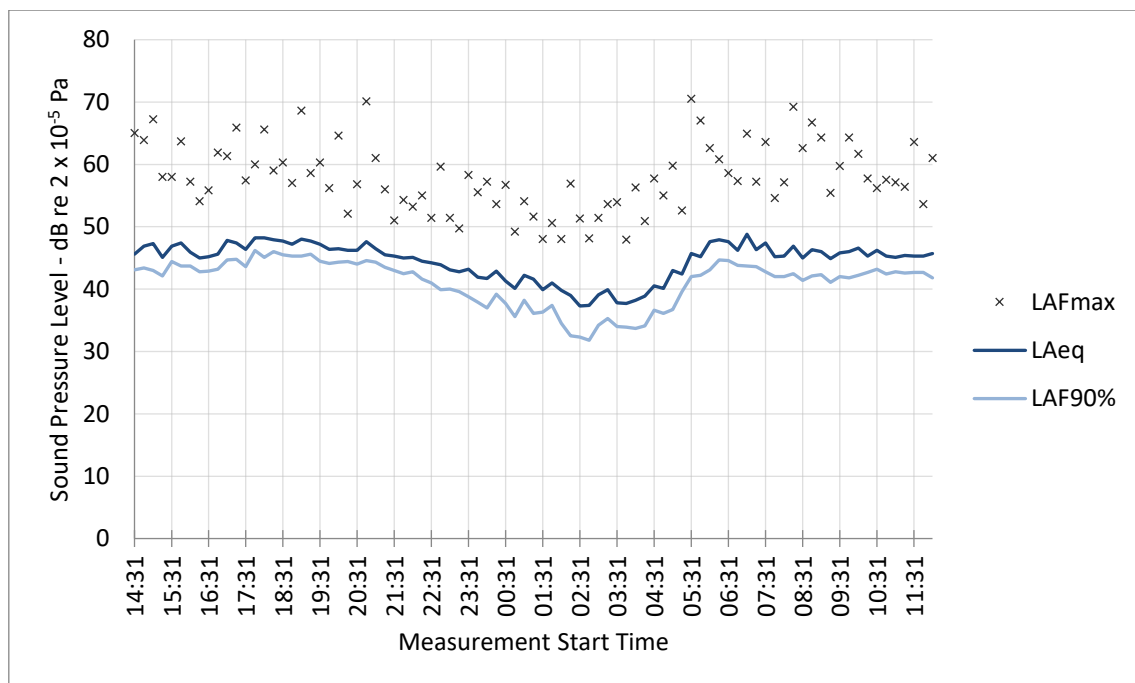


Figure 4: Sound level survey results to the rear garden space

In accordance with BS 4142:2014+A1:2019, the prevailing background sound level is not necessarily taken to be the lowest recorded values, but rather the level that best represents the typical background sound level in the area over a defined period. A statistical analysis of the measured background sound levels has been carried out, generally following suggested guidance contained in Section 8 of the Standard. A histogram of measured sound levels is shown below for use within the assessment of noise from mechanical equipment serving the nursery between 07:30 and 18:30 hours.

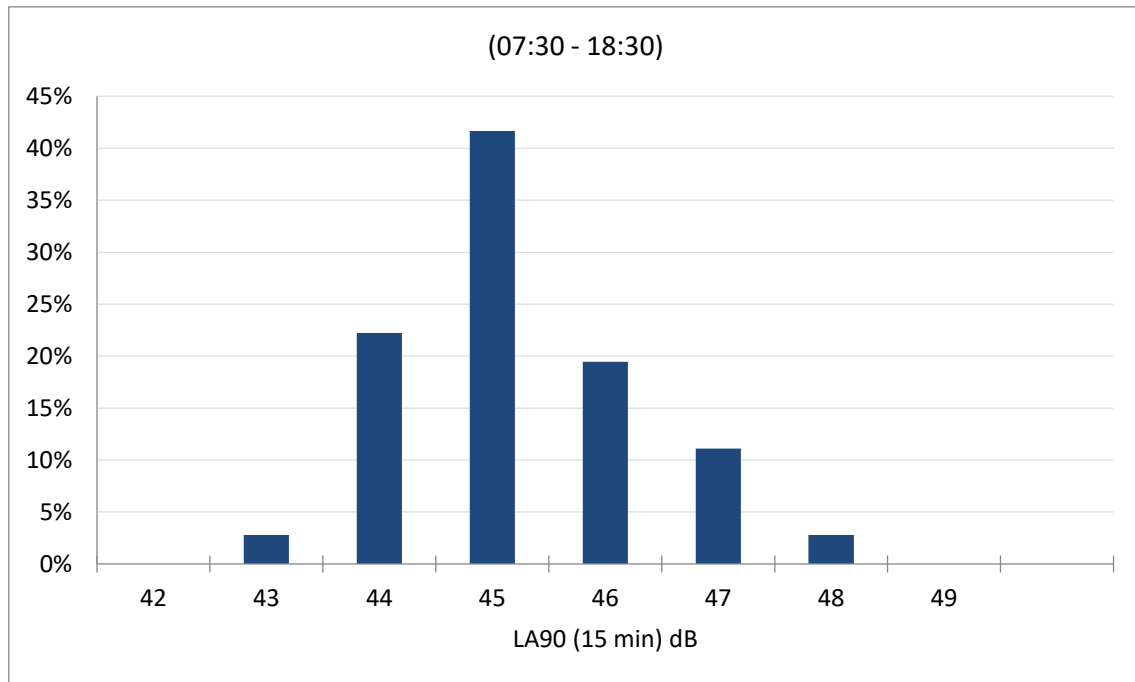


Figure 5: Statistical analysis of measured LA90 sound levels over the daytime measurement period to the side garden space

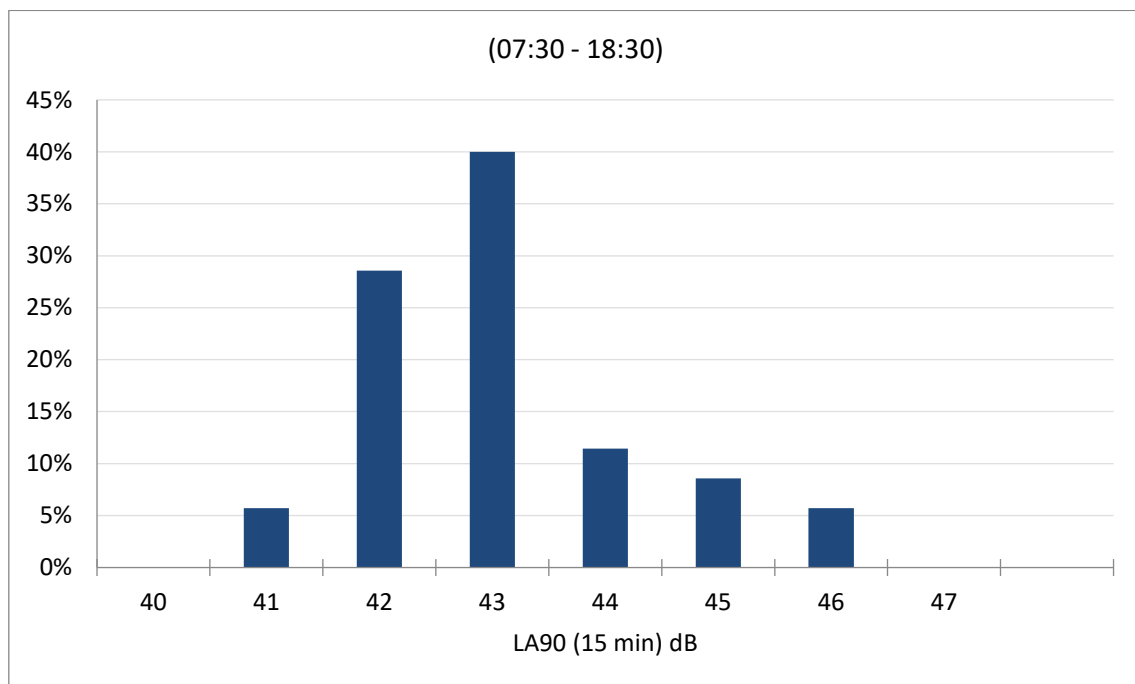


Figure 6: Statistical analysis of measured LA90 sound levels over the daytime measurement period to the rear garden space

From results in Figure 5 and Figure 6, sound levels taken as being representative of the background are LA90 45dB to the side and LA90 43 to the rear during the proposed nursery operating period.

Summary results are shown in Table 6 below. As the nursery is only operating between the hours of 07:30 and 18:30, the values shown below are for these time periods.

Date	LAeq, 12-hour 07:30-18:30	LA90 07:30-18:30	LAfmax ¹ 07:30-18:30
Entire measurement period to side garden (21 st – 22 nd July 2021)	50dB	45dB	59dB – 80dB
Entire measurement period to rear garden (21 st – 22 nd July 2021)	46dB	43dB	53dB – 69dB

Table 6: Summary sound level survey results

Table 6 confirms that the residual sound level in the vicinity is LAeq 50dB to the side and LAeq 46dB to the rear. LAfmax sound levels ranged between 53dB and 80dB over the survey at the two positions.

5. SOUND LEVEL SURVEY AT EXISTING NURSERY PLAY GARDEN

ACA Acoustics have previously undertaken a sound level survey in the outdoor play space at an existing nursery.

The nursery chosen for the survey was N Family Club, 13 Woodchurch Road, London, NW6 3PL. The site is on a quiet residential street and with adjoining residential neighbours, allowing the specific sound level of noise from the play space to be determined with a good degree of accuracy. The nursery and play space are open and in use at this site from 07:00 to 19:00 daily.

A photograph of the play space is included below.



Figure 7: Photograph of play space at N Family Club - West Hampstead (available at www.google.com/maps)

The operator of the nursery confirmed that at times at least 50 children would have been using the play space during the survey.

ACA Acoustics fixed sound monitoring equipment at the boundary of the play space nominally at the centre of the longer side to record sound levels over a typical week.

An initial survey was conducted between Monday 14th September and Tuesday 15th September 2020 and the survey repeated from Tuesday 22nd September to Friday 25th September 2020 to complete a weeks' monitoring.

Weather conditions have been reviewed from the closest available commercial station at worldweatheronline.com. It is understood there was light rain at times on Wednesday 23rd September and wind speeds slightly above ideal conditions on Friday 25th. Weather over the remainder of the survey included dry and calm conditions.

Sound level measurements were recorded in terms of 15-minute samples of overall LAeq, LA90, and LAFmax values along with other statistical indices and octave band spectra.

The following equipment was used during the surveys; a calibration check was conducted on the sound level meters before the surveys and checked after with no deviation noted.

Equipment	Serial Number
Svantek Class 1 sound level meter type SVAN971, complete with MOLES weatherproof outdoor environmental kit	84045
Rion Class 1 sound level meter type NL-52, complete with weatherproof outdoor environmental kit	00564867
Svantek calibrator type SV33B. Compliant to IEC 60942-1:2003	83826
Svantek calibrator type SV33B. Compliant to IEC 60942-1:2003	57595

Table 7: Equipment used for the sound level survey

Results of the surveys are shown in graphical form below.

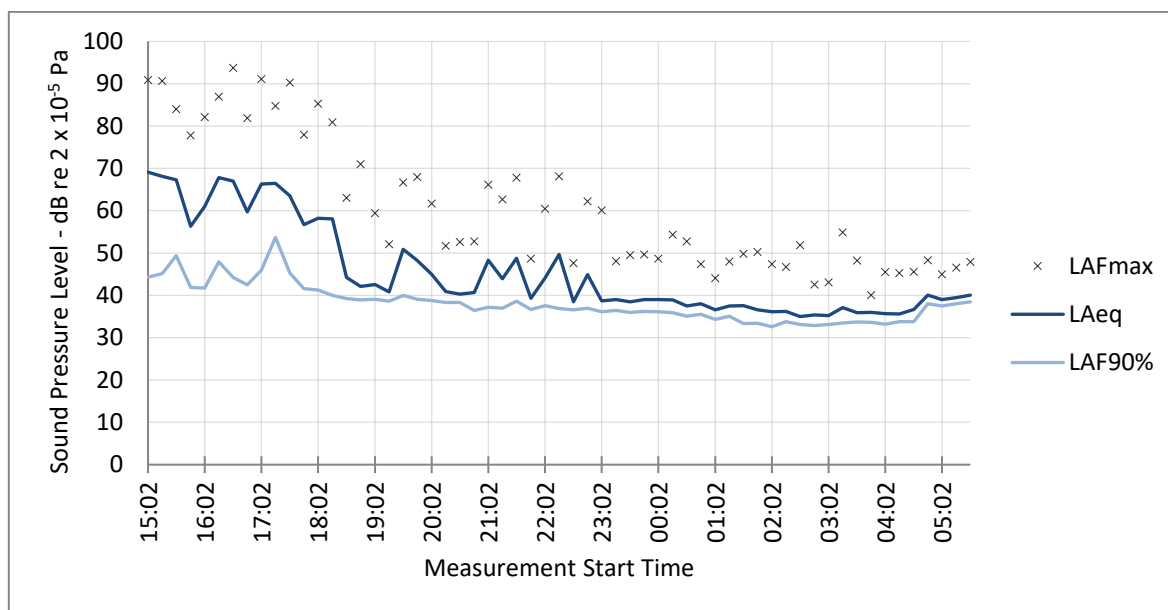


Figure 8: Sound level survey results in existing nursery play garden - Monday 14th September 2020

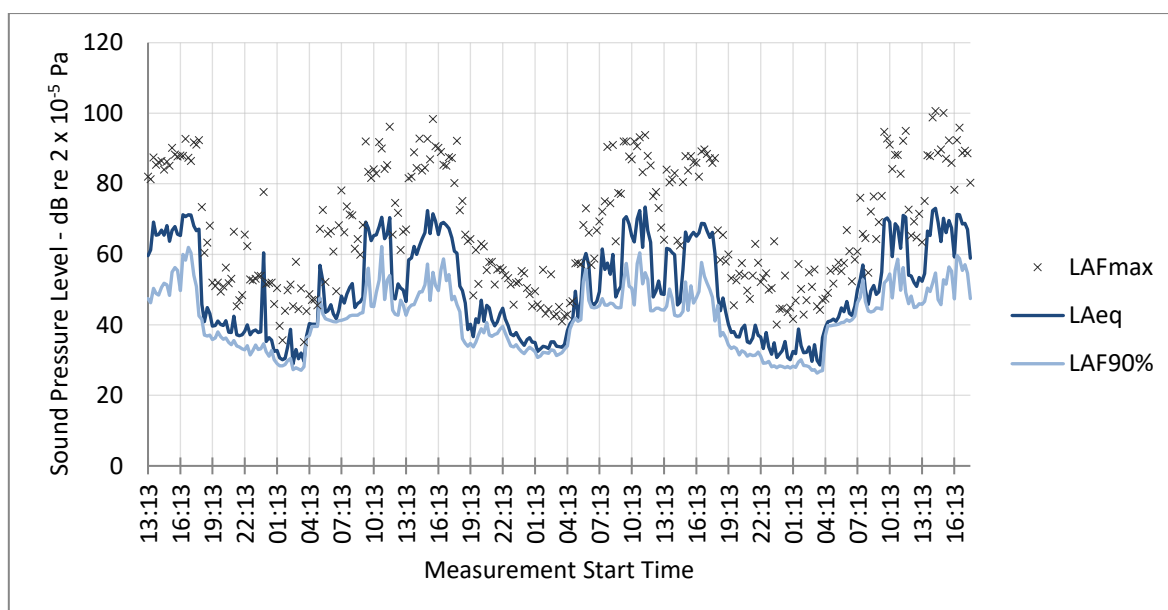


Figure 9: Sound level survey results in existing nursery play garden - Tuesday 22nd-Friday 25th September 2020

Summary results are shown in Table 8 below.

Date	LAeq, 12-hour 07:00-19:00	Highest LAeq, 1-hour	LAfmax ¹
Monday 14 th September	65dB	67dB	82dB
Tuesday 22 nd September	67dB	70dB	88dB
Wednesday 23 rd September	65dB	70dB	90dB
Thursday 24 th September	65dB	71dB	89dB

Date	L _{Aeq} , 12-hour 07:00-19:00	Highest L _{Aeq} , 1-hour	L _{Afmax} ¹
Friday 25 th September	67dB	70dB	92dB
Average over 5-day period	66dB	70dB	90dB

Table 8: Summary sound level survey results

¹: The 10th highest measured L_{Afmax} values over the daytime period between 07:00 and 19:00 have been reported as being representative of a typical ‘high’ L_{Afmax} value.

²: Measurement times on Monday 14th and Tuesday 22nd are shorter than the full 12-hour period. Values for these days have been reported as measured.

Table 8 confirms that the average source sound level from the play space over the operating period is L_{Aeq} 66dB daily. The highest measured level over any one-hour period throughout the survey was L_{Aeq} 71dB between 11:00 and 12:00 hours on Thursday 24th September. Over the rest of the entire week the highest measured levels were very consistent at around L_{Aeq} 70dB.

These levels correlate exactly with data previously recorded by ACA Acoustics at several schools and nurseries, including long-term monitoring of children playing on playgrounds at Ark Paddington Green Primary Academy and Wilberforce Primary School, as well as at an N Nursery & Family Club site at Defoe Road, London. Measured sound levels at the edge of the playground at lunchtimes/breaktimes was L_{Aeq} 70dB at all three sites. This also correlates with published data included in the *Development of Noise Assessment Method for School Playground Noise* (Weixiong Wu, Inter-Noise, 2006), which predicts a worst-case sound level of L_{Aeq} 71dB at the boundary of a playground.

Results of ACA Acoustics’ previous surveys and the published report provides a high degree of confidence in the computer model. Noise emissions from the play space will not normally exceed a level of L_{Aeq}, 1-hour 70dB at the internal boundary of the play space. L_{Afmax} sound levels do not regularly exceed a level of 90dB at the internal play area boundary.

It is also of benefit to consider that the sound level over the full operating period of the play space is around 4dBA lower than the highest one-hour value used in the computer model.

6. ASSESSMENT OF INDOOR AMBIENT SOUND LEVELS WITHIN NURSERY

Results of the sound level survey have been used to assess potential sound intrusion through the building envelope to noise-sensitive spaces within the proposed nursery.

As discussed in Section 2.6, in accordance with Table 1 of BB93 (Table 3 of this report) internal ambient sound levels within nursery classrooms should not exceed L_{Aeq}, 30 minutes 35dB. However, in

accordance with Table 2 of BB93 a +5dB relaxation on this criterion would be acceptable where a natural or hybrid ventilation scheme is proposed. Notes to Table 2 of BB93 advises that,

“Where external ambient free field noise levels at the façade expressed as the LAeq, 30 mins, do not exceed the IANL figures given in Table 1 by more than 16dB for single sided ventilated spaces and 20dB for cross ventilated or roof ventilated spaces, the criteria for natural ventilation can usually be achieved.”

Measured external LAeq values are 50dB. Levels to the front façade, closer to the road, are around 5dBA higher than those measured to the side facade. This is around 15dBA above the relaxed criterion allowing for natural or hybrid ventilation and therefore demonstrates that a natural ventilation strategy utilising open windows or other un-attenuated natural ventilation would be appropriate to achieve the indoor ambient sound level criteria specified in BB93.

No specific acoustic performance strategy is applicable to other façade elements.

Should any future operator of the nursery wish to incorporate mechanical ventilation or air conditioning systems then noise from these systems should be designed such that the cumulative sound level in the classrooms does not exceed the criteria set out in Table 3 Table 4 of this report.

7. NOISE IMPACT ASSESSMENT OF PLAY GARDEN

To calculate noise emissions from the proposed play garden to noise-sensitive properties in the vicinity a computer calculation model has been set up using iNoise proprietary noise mapping software, based on the calculation procedures of ISO 9613-1/2 standards and the associated ISO 17534 quality standard.

The following data and assumptions have been included within the computer model:

- The model uses an area source over the full extents of the proposed play space at a height of 0.75m.
- The source sound power level has been corrected to achieve a sound pressure level of LAeq, 1-hour 70dB at the perimeter of the play space, correlating with the measurement survey described in Section 5.
- The receptor heights are 1.5m to the nearest houses, and 4.5m to upper floor flats.
- The existing fence along the eastern boundary of the site has been included and configured to a height of 1.8m. To the north, the fence is included at the raised height of 2.3m as detailed within Section 8.
- Slight downwind propagation (from source to receiver).

Printouts from the computer calculation model are provided in Appendix A. Calculated sound emissions from the play garden to 1m outside the closest noise sensitive residential properties is shown in Table 9 below.

Receptor Location	Sound Level from Play Garden	Existing Residual Sound Level	Cumulative Change in Sound Level	BS 8233:2014 Criteria
Properties to the north of the development site	LAeq 49dB	LAeq 50dB	2.5dBA	LAeq ≤55dB
Properties to the east of the development site	LAeq 41dB	LAeq 46dB	1.1dBA	

Table 9: Summary noise emissions from play garden to adjacent noise-sensitive properties

Table 9 confirms that the highest 1-hour noise emissions from the proposed play garden when the play garden is at its busiest will cause a cumulative increase to the existing residual sound level of around 2.5dBA. When assessed in accordance with the IEMA Guidelines, as shown in **Error! Reference source not found.** this gives an initial impact of “none/not significant”.

Correcting the computer model pro rata, average noise emissions over the day will be around 4dBA lower. At this level noise emissions would be 5dBA below the existing residual sound level and result in a cumulative change in sound level of around 1dBA.

Correcting the computer model pro rata for individual high noise events from the play space, such as children shouting or laughing, LAfmax sound levels at the receptor will be LAfmax 69dB. Existing LAfmax values recorded during ACA Acoustics’ background sound level survey regularly exceeded LAfmax 69dB. This confirms that noise emissions from individual short-term events will not exceed existing extraneous noise events in the vicinity and would not result in significant adverse impacts on neighbouring residents.

In accordance with the IEMA Guidelines the calculated initial impact should be corrected, taking into account the context of the development. Relevant factors which should be considered are shown in Table 7-2 of the Guidelines and have been used as headings to guide the assessment in the table below.

Factor	Issue	Discussion
Averaging period	Is the averaging time so long that it might mask a greater impact at certain times, or does the noise change occur for such a small proportion of the time that it therefore can be considered of little consequence?	The play garden will be open for a reasonable proportion of the day however there will be breaks between play sessions. The assessment has not taken into account these break periods and therefore the cumulative impact on the overall sound level will be lower

Factor	Issue	Discussion
		than that reported. A shorter averaging period may be considered however this is unlikely to result in a change in the impact.
Time of day/night/week	Is the change occurring at a time that might increase or reduce its effect from that implied by the basic noise change?	The play garden will only be open between 07:30 and 18:30 hours. These daytime hours reduce the impact.
Nature of the noise source	Is there a change in the nature of the noise source which might alter the effect?	The proposals would introduce a new character to the acoustic climate, however any additional small impact this may cause would be carefully managed through the use of a noise management plan. This may have a slight increase in the potential for adverse impact.
Frequency of occurrence	How does the frequency of the occurrence of the noise source affect the effect?	The nursery will be open daily. This regularity may have a slight increase in the potential for adverse impact.
Spectral characteristics	Is there a change in the spectral characteristics which might affect the effect?	As discussed above, the nature of the source may have a small impact on the spectral characteristics compared to the existing acoustic environment at the receptor. This may have a slight increase in the potential for adverse impact
Noise indicator	Has the indicator(s) which best correlate with the specific effect been correctly identified? (i.e., does the change in level as described by the indicator used adequately reflect the change that would be experienced by those exposed to it and could be affected by it?)	The play garden will be in use over a reasonable portion of the day and therefore the LAeq – equivalent energy averaged sound level – has been used. The alternative indicator would be to consider the LAfmax sound levels; the short-term peak sound level from individual high-noise events such as a child shouting or laughing during play. As discussed above, based on measured levels of LAfmax 90dB at the existing play space and other previous nurseries and school playgrounds, the LAfmax level from use of the play garden will be around 69dBA to outside the most-affected residential receptor.

Factor	Issue	Discussion
		Comparing these levels to measured existing LA _{max} values, shown in Table 6, it is evident that noise emissions from the play garden would not exceed the typical LA _{max} levels measured over the survey.
Absolute level (benchmark)	How does the change relate to any applicable published guidance?	BS 8233:2014 recommends that to provide a reasonable standard of amenity, sound levels outside a residential property should ideally achieve a level of LA _{eq, 16-hour} 55dB. The calculated sound level over the 12-hour period the play garden will be in use is LA _{eq, 10-hour} 49dB. Use of the play garden will not cause the average level to exceed the BS 8233 guideline limits and there is no increase to the potential for adverse impact.
Impact and assessment of effects	Taking the relevant factors into account, as discussed above, the author considers that the proposed development will have a slightly higher adverse impact than the initial numerical assessment, however when considering guidance in Figure 1 and Table 2: Relationship between noise impact and noise effects the use of the play space will remain below 'slight' and below the Lowest Observed Adverse Effect Level. The proposed nursery play garden would be heard but would not result in any change in behaviour or attitude of adjoining occupants and would not result in any adverse impact in the quality of life for adjacent residents.	

Table 10: IEMA Assessment factors and assessment outcome

As discussed in Table 10, in accordance with relevant Standards, guidance documents, and government planning policy it is the author's opinion that the noise impact of the proposed play garden should not be detrimental to the amenity of nearby residential occupants and the site is suitable for the proposed development.

8. NOISE MITIGATION SCHEME

As discussed in Section 6, it is recommended that an acoustic fence is installed to the northern boundary of the play garden.

In order to protect the amenity of residents to upper floor flats to the north of the site, it is recommended that the fence height is raised to a height of minimum 2.3m. At this height levels from the play space will be screened from residents.

A suitable fence would be formed of nominally minimum 15mm thick timber laths, tongue and grooved or with overlapping joints to ensure no gaps between boards. The fence should be imperforate.

In addition to the boundary fence, to protect the amenity of nearby residents further it is recommended that an appropriate management plan is put in place. Whilst development of a full management plan is outside the scope of ACA Acoustics and would be established by the operator of the premises, taking into consideration their own preferred working practices, it is anticipated a suitable plan is likely to incorporate the following elements relating to the external garden:

- Except for access when children arrive/leave the premises, outdoor areas should only be used between the hours of 07:30 and 18:30. Areas should not be constantly used, and the play garden will contain periods of inactivity during the day.
- Staff should be mindful of residential neighbours and use calm, gentle voices when interacting with children and others.
- Musical instruments or similar high noise activities should not regularly be used outside.
- Upset children who cannot be calmed should be taken back inside after a reasonable period (e.g., 5 to 10 minutes).
- Incorporate awareness of noise-management issues into regular staff training.
- An appropriate procedure should be put in place to enable the prompt investigation should any complaints or concerns be raised by nearby residents.

9. NOISE FROM MECHANICAL SERVICES PLANT AND EQUIPMENT

The development may incorporate mechanical services equipment. However, the scheme is at an early stage and therefore design of the scheme is yet to be finalised.

Exact specification for individual equipment items will be dependent on the number of units installed, distance to nearby noise-sensitive properties and other acoustic conditions including any acoustic screening and acoustic reflections.

To ensure compliance with Manchester City Council's requirements, when assessed in accordance with BS 4142:2014+A1:2019 the cumulative maximum rating level for all new items of plant operating together should not exceed L_A 38dB during the proposed operating period between 07:30 and 18:30 hours at 1m from any noise-sensitive properties in the vicinity.

10. CONCLUSION

The client is preparing an application for a proposed nursery at 7 Moor End, Northenden, Wythenshawe, Manchester.

ACA Acoustics have undertaken a sound level survey in the vicinity and completed an assessment of the potential noise impact of the proposed use on existing residential occupants in the vicinity.

It is the author's opinion that, allowing for the recommended noise mitigation scheme set out in this report, noise emission from the proposed nursery will not result in an adverse impact on neighbouring properties and the site is suitable for the proposed development.

Appendix A

Computer Noise Map Print-Out of External Play Garden

