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Noise Impact Report

Project Details

Client	Rockbourne Day Nursery Ltd
Client Address	Rockbourne Day Nursery Rockbourne Avenue Liverpool L25 4TN
Site Address	Land at Church Road and Okell Drive Halewood Merseyside L26 7YL
Reference	22302E

Quality Assurance

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1 Summary

A noise assessment has been conducted for a pre-school nursery with associated access and drop off area with provision for 15 car parking spaces at the land located at Church Road and Okell Drive, Halewood, Merseyside, L26 7YL.

The assessment is to be submitted as part of a new planning application for the development site to Knowsley Metropolitan Borough Council in response to an appeal decision by the Planning Inspectorate dated 11/10/2022.

The assessment considers the impact on potentially noise sensitive neighbouring residential premises in comparison with BS 4142: 2014.

Assessment of noise levels due to operation of the proposed pre-school nursery indicates no adverse impact on the amenity of the local community.



2 Introduction

Rockbourne Day Nursery Ltd instructed Spratt and Hamer Limited to undertake an environmental noise survey in order to assess the impact of the proposed pre-school nursery, which may have an impact on future residents of the proposed development. The nursery will accommodate 50 no. children, 9 no. car park spaces for staff and 6 no. drop off spaces for parents.

The proposed development site is turfed and has relatively little height variation. It consists of a single-storey building, set amongst grounds. The part of the site to be used as a play area will be sectioned off, by means of a vegetation barrier and encompass most of the land to the front and sides of site. The site will accommodate an access driveway with one point of access / egress, drop off / pick up area with 6no. car park spaces, and 9no. further car park spaces for staff parking, as presented below.

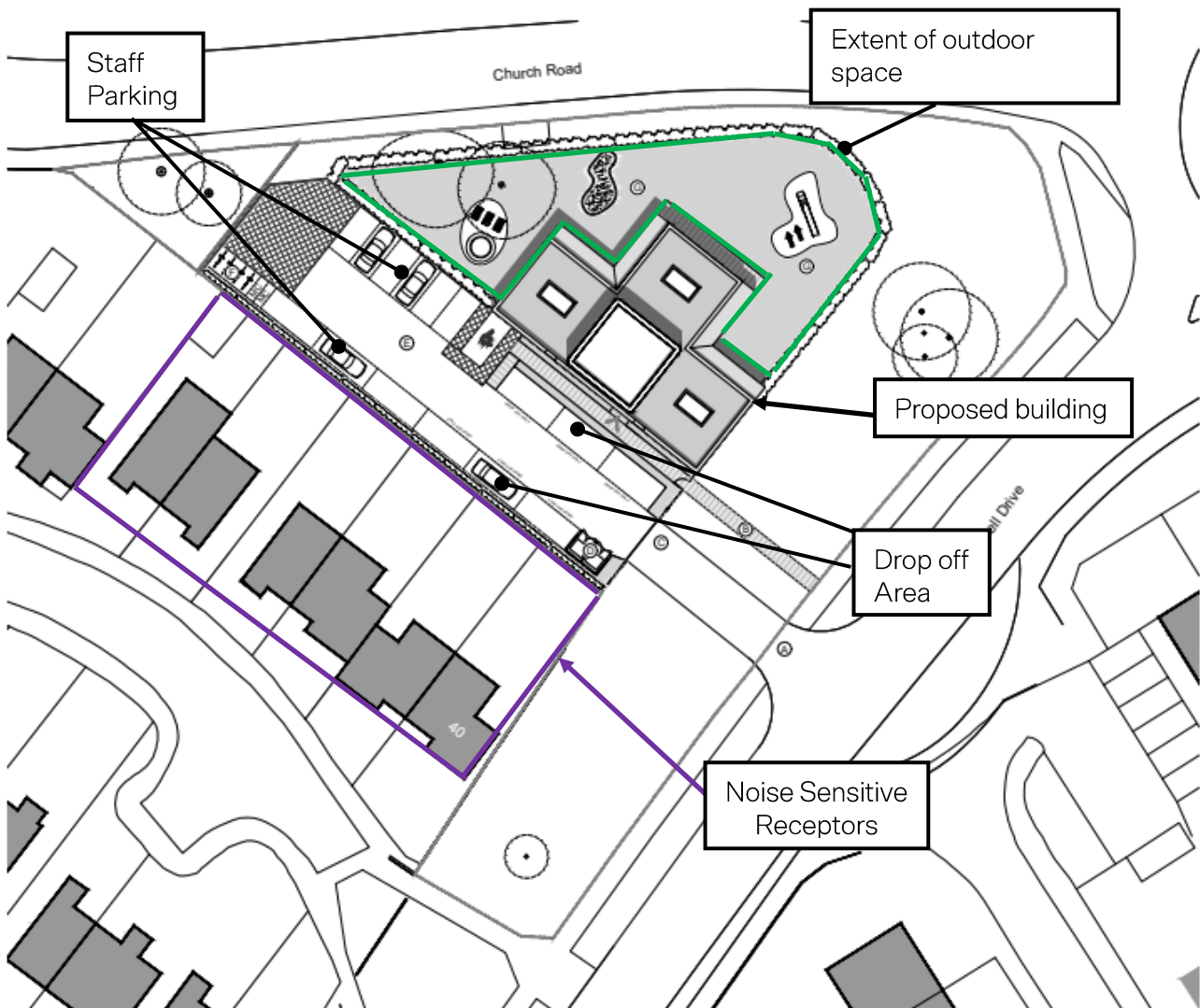


Figure 1: Proposed Development Plan.



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A previous application (ref:20/00360/FUL) dated 18/06/2020 has been refused. A subsequent appeal has been submitted by the applicant and an appeal decision (ref: APP/V4305/W/22/3301426) issued by the planning inspectorate (J Williamson) on the 21/11/2022. The decision states the following:

"I note that the Council is concerned that no up-dates were provided to the Noise Report following the amendments to the proposal. The noise assessment was carried out for the original proposal. In summary, the Noise Report concludes that, primarily, subject to either the replacement of the existing rear boundary fences of properties adjacent to the site on Elworthy Avenue with a suitable fence, or installation of a new acoustic fence adjacent to the existing fences, the proposal would not result in unacceptable levels of noise disturbance to occupiers of existing properties, particularly those on Elworthy Avenue."

This report is prepared solely for Rockbourne Day Nursery Ltd. Spratt and Hamer Limited accept no responsibility for its use by any third party.

This document has been prepared using the various documents listed within the appendices of this report, together with drawings, technical information and additional verbal representations made by third parties. We have not audited nor independently verified the content or accuracy of any of the documents and information provided to us in the preparation of this report.

If additional information comes to light subsequent to the production of this report, we reserve the right to revise our opinions, and the conclusions reached within this report.



3 Assumptions, Limitations & Uncertainty

- a. It is assumed that the sound pressure levels measured on site during the environmental noise survey are typical of the site.
- b. It is assumed that drawings and all information supplied are up to date and correct.
- c. It is assumed that information provided by the client in respect to no. of children attending, operating hours and internal schedule of activities is correct and up to date at the time of writing.
- d. All distance attenuation calculations and noise maps have been conducted using the CadnaA noise modelling software; to take account of the spread of noise across such a large area of space.
- e. It is assumed that the staff vehicles and the parent vehicles travel at an average speed of 16 kph when using the proposed access road / drop off road.
- f. It is assumed that the transport statement provided is correct and up to date.



4 Planning Policies, Guidance and Criteria

The planning policies and criteria listed below are taken from associated relevant guidance documents, all of which should be considered for the internal and external noise levels.

4.1 National Planning Policy

The National Planning Policy Framework (NPPF) December 2023 set out the Government's planning policies for England and how they are expected to be applied. It provides a framework within which the Local Authorities are to prepare local plans and use their planning powers to minimise the adverse impact of noise. It should contain the following in relation to noise impacts.

180. Planning policies and decisions should contribute to and enhance the natural and local environment by:

'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.'

191. 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 impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life'

NPPF previously characterised noise by grading and recommending actions and different effect levels as reproduced in Table 1.



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Perception	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

Table 1: Noise exposure hierarchy based on likely average response.



4.2 Criteria

4.2.1 Local Planning Authority Criteria

At the time of writing the report, the consultant is unaware of any conditions or specific criteria provided by the Local Planning Authority. Therefore, the following noise impact assessment will be undertaken in order to meet the criteria of BS4142:2014 and BS 8233:2014.

4.2.2 BS 4142+A1:2019 Method for rating and assessing industrial and commercial sound.

BS 4142:2014+A1:2019 Method for rating and assessing industrial and commercial sound is routinely used by local authorities in assessing noise associated with industrial and/or commercial activity.

In brief, BS 4142 provides a means of assessment whereby noise from industrial and commercial sources (the "specific sound level", $L_{Aeq,t}$) is compared with background noise ("background sound level", L_{AF90}).

The specific sound level may be corrected by a numerical penalty if it includes acoustic features that are considered to be distinctive. The corrected specific sound level is termed a "rating level" ($L_{Aeq,t}$) and is designed to reflect people's subjective reaction to noise characteristics that may be considered annoying.

The rating level is then compared to the background sound level to assess its impact. BS 4142 describes an indication of the impact according to the numerical difference between the rating level and the background sound level. This is shown below in Table 2.

Rating Level – Background Sound Level	Indication of Impact
+ 10 dB	Significant Adverse Impact
+ 5 dB	Adverse Impact
≤ 0 dB	Low Impact

Table 2: BS 4142 Rating Level Impact.

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

The British Standard BS 8233:2014, Guidance on Sound Insulation and noise reduction for buildings, provides appropriate internal levels of noise within dwellings, flats, and rooms in residential use when unoccupied.

Section 7.2.2 'Internal ambient noise levels in dwellings' of BS 8233: 2014 states that 'In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values in Table 4'.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	–
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	–
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Table 3: Table 4 of BS 8233:2014 Indoor ambient levels for dwellings



Note 7 of section 7.7.2 states 'Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed up to 5 dB and reasonable internal conditions still achieved'.

4.3 Criteria Summary

In order to meet the requirements of Knowsley Metropolitan Borough Council, the assessment and recommendations will be made in accordance with BS 4142+A1:2019 Method for rating and assessing industrial and commercial sound. The assessment will also draw upon guidance from BS 8233:2014 where appropriate.



5 Site Description

The site is located adjacent the northeast of the rear gardens of the houses located on Elworthy Avenue (nos. 33-40) and is turfed with relatively little height variation. It is in a predominantly residential area approximately 750m west of Halewood town centre. Flanking the north and southeast of the site are Church Road and Okell Drive, respectively. The noise profile of the area is dominated by nearby road traffic.

5.1 Subjective Observations

During site attendance, subjectively the main source of noise was vehicular traffic.

5.2 Weather

Table 3 presents the weather conditions during the measurements at Rockbourne Avenue and Okell Drive.

Description	01/12/2020	23/10/2024
Temperature	2 – 7 °C	9.9 – 14.5 °C
Wind Speed	0.0 m/s	0.0 – 3.4 m/s
Precipitation	Nil	Nil
Damp road/ wet ground	Dry	Dry
Cloud cover	0 %	100 %

Table 4: Weather Conditions.



6 Noise Measurement Procedure

6.1 Survey Date(s)

01/12/2020: Measurement of specific sound levels
23/10/2024: Background noise level monitoring

6.2 Personnel Present

Paul Klabou BA – 01/12/2020
Ben Bielicki BSc (Hons) – 23/10/2024

6.3 Measurements Conducted

Spratt and Hamer Limited has undertaken an environmental noise impact assessment at the above site with noise levels measured externally as presented in the following table.

Measurement Description	Date	Monitoring Period	Reference Interval Period
Ambient and Background Sound at Proposed Site	23/10/2024	07:45 – 11:20	$L_{Aeq,5min}$ and $L_{A90,5min}$
Vehicle Noise at Existing Site (specific Sound)	01/12/2020	08:03 – 08:44	$L_{Aeq,1min}$
Children’s Play Area Noise at Existing Site (Specific Sound)		09:34 – 11:02	
		13:37 – 14:07	
		14:10 – 14:42	

Table 5: Measurements Conducted.

It should be noted that a previous survey (07/12/2020) was conducted to obtain background noise measurements at the proposed site. However, given this data is over 3 years old, a further site survey to obtain current representative background noise levels has been undertaken.

6.4 Survey Equipment Used

Manufacturer	Model	Serial No.	Description
Rion	NL-52	1032413	Real Time Analyser Sound Level Meter
Rion	NL-52	01054205	Real Time Analyser Sound Level Meter
Rion	NA-28	462266	Real Time Analyser Sound Level Meter
Pulsar	Model 105	59964	Acoustic Calibrator
Pulsar	Model 105	93357	Acoustic Calibrator

Table 6: Survey Equipment Used.



6.5 Calibration

The sound level meters were calibrated with the field calibrator to a level of 94.0 dB @ 1 kHz prior to and on completion of the survey. No significant drift in calibration was observed. The meters used during the survey are precision grade class 1.

Calibration certificates are available on request.

6.6 External Ambient Sound Measurements

The measurement locations chosen during the survey were deemed suitable for the determination of the ambient and background sound levels of the area.

The sound level meters were set to measure broadband and A-weighted 1:1 octave centre frequency bands L_{Aeq} and L_{A90} in 5-minute periods.

6.6.1 Monitoring Position 1 – Vehicle noise

A microphone was positioned on a tripod 1.5m above the ground and 3m horizontally from the kerbside of Quickswood Drive at the existing Nursery site. This position was chosen to sample the noise emanating from a car during drop off of children.

6.6.2 Monitoring Position 2a to 2c – Child activity noise

Various locations on the boundary fence of the existing play areas of the existing Rockbourne Avenue site, at a height of approximately 2.6m above ground. These positions were chosen to sample measurements of the various age groups of children playing in the outdoor areas. The meter was set to measure $L_{Aeq,1min}$.

6.6.3 Measurement Position 3 – Background Noise

A microphone was positioned at the proposed site, on a tripod 1.5m above the ground, approximately 5m from the nearest vertical surface (33-40 Elworthy Road garden fences), 25m from the centre of Okell Drive and 70m from the centre of the roundabout intersection of Church Road and Okell Drive. This position was chosen to measure the background $L_{A90,5minute}$ sound pressure levels at a location representative of the gardens at 33-40 Elworthy Road. Measurements were taken between hours of 07:45 – 11:20.



7 Results and Analysis

7.1 Residual Sound Measurements | Proposed Site

The following table shows the external noise measurements made at the proposed site.

Time, T (hh:mm)	$L_{Aeq,T}$ (dB)	$L_{A90,T}$ (dB)
08:00	58	54
09:00	56	50
10:00	55	50

Table 7: Noise Measurements at Okell Drive.

7.1.1 Predicted Residual Sound Measurements | Proposed Site

The residual noise climate is dominated by nearby road traffic. Whilst the pattern of road traffic is likely to be similar when the proposed site is built, the noise climate at the back-garden fences of Elworthy road is predicted to be slightly reduced, because the proposed building will function as a barrier to sound propagation. By using the measured average noise levels ($L_{Aeq,T}$) as a value for a line source of traffic noise in the CadnaA software, it is possible to make a before and after comparison. The result is that the presence of the proposed building is predicted to reduce average noise levels, incident upon the garden fences by approximately 1.0 dB.

The descriptor, Average noise levels ($L_{Aeq,T}$) is used because the same is a numerical representation of all the energy incident upon the Sound Level Meter at the time of the survey. The descriptor used for assessment; Background noise (L_{A90}) will not necessarily be 1.0 dB lower than the L_{A90} measured during the survey. The relative differences exist because the two descriptors are quantified differently:

$L_{Aeq,T}$ Average of all the sound energy in a given time period, T. (dB)

$L_{A90,T}$ That level, which is exceeded for 90% of the time, in a given time period, T. (dB)

It is likely that the background noise will reduce proportionally less, compared with the reduction in Average noise levels but, by using the same numerical value for reduction of Background noise, a more conservative prediction will be found.



7.2 Vehicle Measurements

Vehicle Measurements will be assessed against the criteria of BS 4142:2019.

7.2.1 Moving Vehicle | Engine and Movement Noise

Samples of car parking events were made and can be split up into steady engine/moving noise and impulsive, short-term maxima, door closing noise. Whilst the door closes were successfully captured on the survey day, engine/moving noise proved more difficult, due to the existing site layout. Consequently, it was deemed more prudent to use engine/moving noise levels measured for a similar previous survey, as they provided more consistent results, in conjunction with door closing events at the existing site.

The following considerations and assumptions have been taken into account:

- The access road will be used mostly by cars. No heavy vehicles are expected.
- The sound power level of 77 dBA of a car will be used. This value has been taken from a previous report by Spratt and Hamer Ltd for cars travelling at a speed of approximately 16kph.
- Staff vehicles will have to drive approximately 87m along the access road and parent cars approximately 155m (entering and leaving) at an average speed of 10mph.
- Maximum of 3 no. staff cars using the access road.
- Maximum of 10 no. parent cars using the access road.

The following table outlines the time corrected sound power level of vehicle movement occurring between 08:00 – 09:00 due to vehicles using the access road and parking drop-off area.

Description	Staff Cars Traversing	Parent Cars Traversing
Vehicle Lw (dBA)	77	
Speed (kph)	16	
Distance (m)	87	155
Total Time (mins)	1.0	5.8
Time Corrected Lw (dBA)	59.0	67.0

Table 8: Vehicle Movement Time Corrected Sound Power Level.

7.2.2 Door Close Noise

Several door closes were measured, at a distance of 3m from the side of the respective vehicle, during the survey. The loudest event was 74.5 dB L_{AFMax} .



7.3 Playground Measurements

Samples of children playing outside, across 3 no. play areas, were measured to obtain the respective sound pressure levels (L_{Aeq}) generated. The children were organised by age and the level produced by a group varied depending on which group was monitored as shown in the following table.

Groups	Age (years)	No. Children	Description
1	0>2	16	Little vocal activity apart from occasional outbursts of crying which were dealt with by the staff. Most quiet of the 3 groups.
2	2>3	17	Conversation in varying degrees with children running around in 1 homogenous group, with a few outliers, who were less involved with the group.
3	3>4	16	Most vocal of the 3, self-organised into friendship groups, running around, using various play apparatus available. Loudest of the 3 groups.
-	Total	49	-

Table 9: Number of Children and Age Per Group.

The survey takes account for 49 children and the sound they will potentially create. The proposed nursery will accommodate a maximum of 50 children. Our calculations will take this increase in numbers into account by adding the following adjustment:

$$10\log(50/49) = 0.10 \text{ dB}$$

Both measurements were manned by the consultant and best represent what will likely happen in an hour of one of the play sessions that happen twice daily. They encompass all the children present on the day, have a similar number to the proposed facility. The SLM was placed at the perimeter of a given play area at approximately 1m from the noise source. The position was deemed to be within the nearfield of the noise source. Therefore, if the children's play area is modelled as an area noise source, the measured Sound Pressure level (L_P) is deemed representative of a unit area (m^2) of sound power. The Sound power level (L_W) of a children's play area is then found using the equation:

$$L_W = L_P + 10\log(\text{Play Area}) + 10\log(50/49)$$

The sound power values are then corrected for the duration of the activity in relation to the reference period of 1 hour. The measured results are presented in the following table.

SLM Position	Groups	Start (hh:mm)	Finish (hh:mm)	Duration (hh:mm)	Sound Pressure, $L_{eq,1hour}$ (dBA)	Play area (m^2)	Sound Power $L_{Weq,1hour}$ (dBA)
1	1 & 3	13:37	14:07	00:30	70	100	90
2	1 & 2	14:10	14:42	00:32	63	135	85
-	-	-	-	Sound Power, 50 Children, $L_{Weq,1hour}$ (dBA)			91

Table 10: Sound Power Values for Groups of Children



8 Noise Impact Assessment

All noise predictions are based on the estimated worst-case hour of a given day. For vehicle activity, this will likely be 08:00 – 09:00 and for child activity it will be during outdoor playtime. The receiver positions for this model are the centre of the rear gardens and the rear facades at numbers 36 and 38 Elworthy Avenue.

Car activity will be assessed against BS 4142:2019. Children playing outside will be assessed against BS 8233:2014. Calculations are abbreviated in this section and are available in full in the Appendix.

A CadnaA noise model has been used to predict the Noise impact of the various noise sources. The model was scaled using Open Map data and where appropriate, noise was modelled as either a point source or a line source. All CadnaA illustrations can be found in the Appendix.

Initial calculations indicate that an adverse impact may be experienced at the receptors and therefore the model includes an acoustic barrier (see recommendations section for further details).

8.1 Assessment of Cars Entering and Leaving the Proposed Drop-off Area

The traversing of vehicles through the access road is assessed based on $L_{Aeq,T}$, however, the noise due to door closing being several short events will be separately assessed using L_{AFMax} .

8.1.1 Noise impact | Engine and Car Movement

During the hour 08:00 – 09:00, the Transport Statement 02 predicts that up to 10 no. parents will arrive, drop their children off at the nursery and exit the site and 3 no. staff members will arrive (and not exit the site). The modelled results for the worst-case garden receptor are as follows:

Type	$L_{eq,1hour}$ (dBA) at Gardens
Parent Drop off	47.3
Staff Parking space	37.5
Cumulative	47.7

Table 11: Modelled Results for Garden Receptor – Vehicle Movement.

The modelled results for the worst-case facade receptor are as follows:

Type	$L_{eq,1hour}$ (dBA) at Façade
Parent Drop off	49.3
Staff Parking space	39.6
Cumulative	49.7

Table 12: Modelled Results for Façade Receptor – Vehicle Movement.



8.1.2 Total Noise Impact | Vehicles | BS 4142:2019 Evaluation

BS 4142 states that where appropriate a rating penalty should be established on a subjective assessment of its characteristics and to correct the specific sound level if a tone, impulse or other characteristics occur.

BS 4142:2014 says of Impulsivity:

"A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."

BS 4142 says of tonality:

"... a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible."

There will not be tonal sound produced from cars.

Combining the parent and staff vehicle movement as a cumulative noise impact at the garden receptor can be seen in the following table:

NSR Gardens	$L_{eq,1hour}$ (dBA)	Rating level $L_{Ar,Tr}$ (dB)	Background L_{A90} (dB)	Exceedance
Parent	47	-	-	-
Staff	38	-	-	-
Combined Sound Level	48	48	54	-6

Table 13: Garden Receptor Modelled Results – Cumulative.

Combining the parent and staff vehicle movement as a cumulative noise impact at the facade receptor over the hour can be seen in the following table:

NSR Facade	$L_{eq,1hour}$ (dBA)	Rating level $L_{Ar,Tr}$ (dB)	Background L_{A90} (dB)	Exceedance
Parent	49	-	-	-
Staff	40	-	-	-
Combined Sound Level	50	50	54	-4

Table 14: Façade Receptor Modelled Results – Cumulative.

The above tables show that the BS 4142:2019 estimated excess rating level at the garden receptor and the façade receptor is -6 dB and -4 dB, this indicates a low impact at the garden and at the façade, depending on the context.

A summary table is available in the Appendix.



8.1.3 Context

It is likely that the existing noise climate (dominated by road traffic noise) is barely influenced by any additional noise generated as a result of the proposal.

It is considered unlikely that a resident will choose to use the rear garden for relaxation between the hours of 08:00 and 09:00 and therefore the context in this case is considered to be the impact inside the habitable room at the rear façade. It should also be considered that during these times it is unlikely that a resident will require a partially open window for natural ventilation purposes. However, attenuation across a facade with a partially open window is typically considered to be 15dB, therefore the noise level internally would equate to 35 dB(A) which would achieve the BS 8233:2014 daytime criteria.

The model shows the worst-case noise level at the façade, which is at the first floor, it is considered reasonable to expect that the residents will be occupying the ground floor between 08:00 and 09:00 where the facade noise level is lower.

Taking the context into account, the overall outcome at the receptors is likely to be an even lower impact.

8.2 Maximum Level Assessment

Car doors slamming could be considered as the maximum levels within the nursery carpark / drop-off area. The following table demonstrates the impact of maximum levels L_{AFmax} on the nearest noise sensitive dwellings.

There is no specific L_{AFmax} criteria for the daytime. In order to account for applicable internal daytime L_{AFmax} maximum levels within the NSR, an additional 5 dB will be applied to the nighttime criteria of 45 dB L_{AFmax} , equating to 50 dB L_{AFmax} . The following considerations have been taken into account.

- The maximum L_{AFmax} level of 74.5 dBA, measured at 3m from source.
- The distance to the NSR has been taken from the centre of the carpark to the NSR at approximately 14m.
- Open window sound reduction of 15 dB R_w as per BS8233.
- BS8233 criteria for L_{AFmax} levels for the nighttime with an additional 5 dB to account for expected daytime L_{AFmax} limit level.

Description	Sound Level (dBA)
Max. Sound Level L_{AFmax} (dB) at 3m	75
Distance Attenuation (from 3m to 14m)	-13
Open window attenuation	-15
Calculated Sound Level at the NSR's façade	47
Criteria	50
Exceedance	-3

Table 15: Maximum Level Assessment

The assessment indicates that the maximum levels by door slamming would fall below the criteria by 3 dB. As such, impact caused by any door slamming are likely to cause negligible impact. It should also be



noted that the calculation does not account for the acoustic barrier therefore, the estimated level at the façade shown in the table above is likely to reduce.

8.2.1 Uncertainty

It should be noted that while every endeavour has been taken to ensure the accuracy of measurements and subsequent calculations, all acoustic measurements and assessments are subject to a degree of uncertainty.

8.3 Assessment of Children Playing in the Outdoor Play Area

The Average sound power of a given play session has been estimated as 91 dB $L_{WAeq,1hour}$. This figure is used to inform an area noise source in CadnaA, cantered in the proposed play area. The resulting impact, as experienced in the centre of the worst-case garden receptor was found to be 45 dB $L_{Aeq,1hour}$.

The lowest measured $L_{Aeq,1hour}$ of 55 dB(A) is considered a conservative representation of the full 16-hour day given the levels are likely to drop during the evening. It is understood that there are 2 no. occasions when children are outside. The following table estimates the increase in $L_{Aeq,16hour}$ when the noise from the playground is added to the existing ambient noise.

Description	Sound Level (dBA)
Existing Ambient $L_{Aeq,16hour}$	55
Playground Noise $L_{Aeq,1hour}$ at Receptor	45
Playground Noise $L_{Aeq,16hour}$ at Receptor	33
Calculated $L_{Aeq,16hour}$ for 2 outdoor play times	36
Cumulative $L_{Aeq,16hour}$ (Existing ambient + 2 outdoor play times)	55
Increase (Cumulative minus Existing Ambient)	0

Table 16: Estimated Worst Case Cumulative Noise Level

The table indicates that the predicted cumulative noise level does not increase and does not exceed 55 dB(A), the upper guideline stated in BS 8233:2014 for outdoor amenity noise levels.



9 Recommendations

The fence at the rear of the gardens was composed of varying levels of substance. To ensure that the estimations and predictions contained within this report can be achieved, a suitable acoustic barrier should be erected at the perimeter of the carpark to a height of approximately 1.5m as indicated by the red line below.

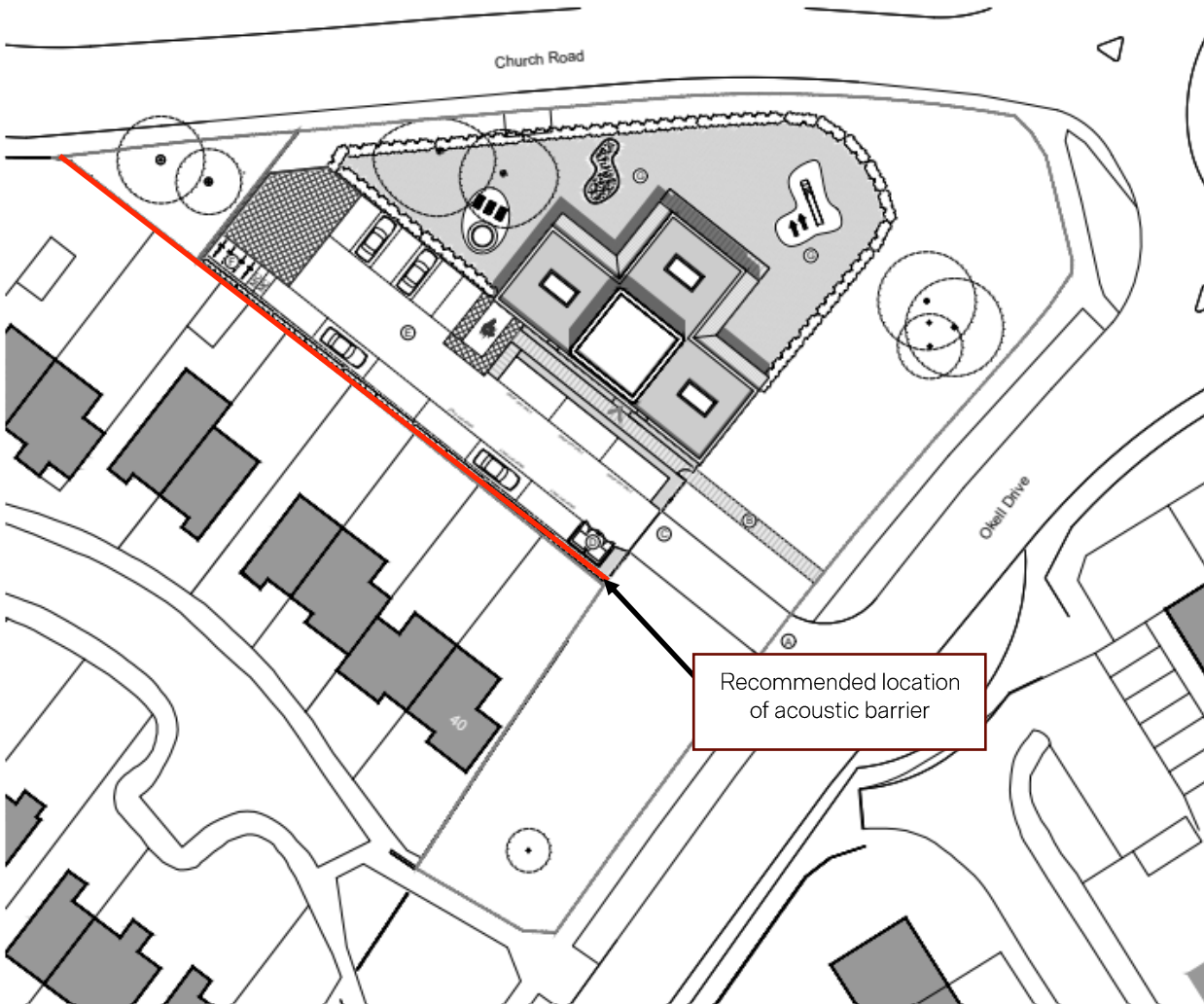


Figure 3: Suggested Location for Play Area.

It should be noted that any acoustic barriers constructed must be solid and have a surface density of 10kg/m^2 with no gaps or holes.

Further ancillary recommendations include installing signs in the drop off area requesting users to maintain a level of 'quietness' when using the drop off area. The sign may request users not to use car horns and keep voice levels to a minimum. Practical measures to reduce noise from children would be to limit the number of apparatus that will be noisy when dropped. This can be done in conjunction with using a soft exterior floor surface.



10 Conclusions

Taking the appropriate guidance of BS 4142:2019 and BS 8233:2014 into consideration and with the addition of the recommended acoustic barrier, the estimated sound impact will be negligible, when compared to:

- The absolute BS 8233:2014 of 50 – 55 dB $L_{Aeq,16hour}$.
- The relative existing noise climate.

The BS 4142:2014 assessment presents a low impact at the worst-case façade and garden receptor. The context specifically discusses the current noise environment of the surrounding road network and how it is likely to have a masking effect, and therefore reduce the degree by which a given noise event is noticeable in the back gardens and houses of Elworthy Drive.

Whilst the presence of a new building will function as a barrier to some of the traffic noise, incident upon the back garden fences, it will only provide a small amount of noise reduction.



11 References

Noise Policy Statement for England (NPSE).

National Planning Policy Framework (NPPF).

BS 4142:2019 Method for rating and assessing industrial and commercial sound.

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

Google Maps.

Google Earth.

Little Red Book of Acoustics, Version 1.

Knowsley Borough Council Planning application, 19/00056: Supporting documents.

Proposed Day Nursery Okell Drive, Halewood, Liverpool – Transport Statement 02: September 2024.



Appendix

Monitoring Positions

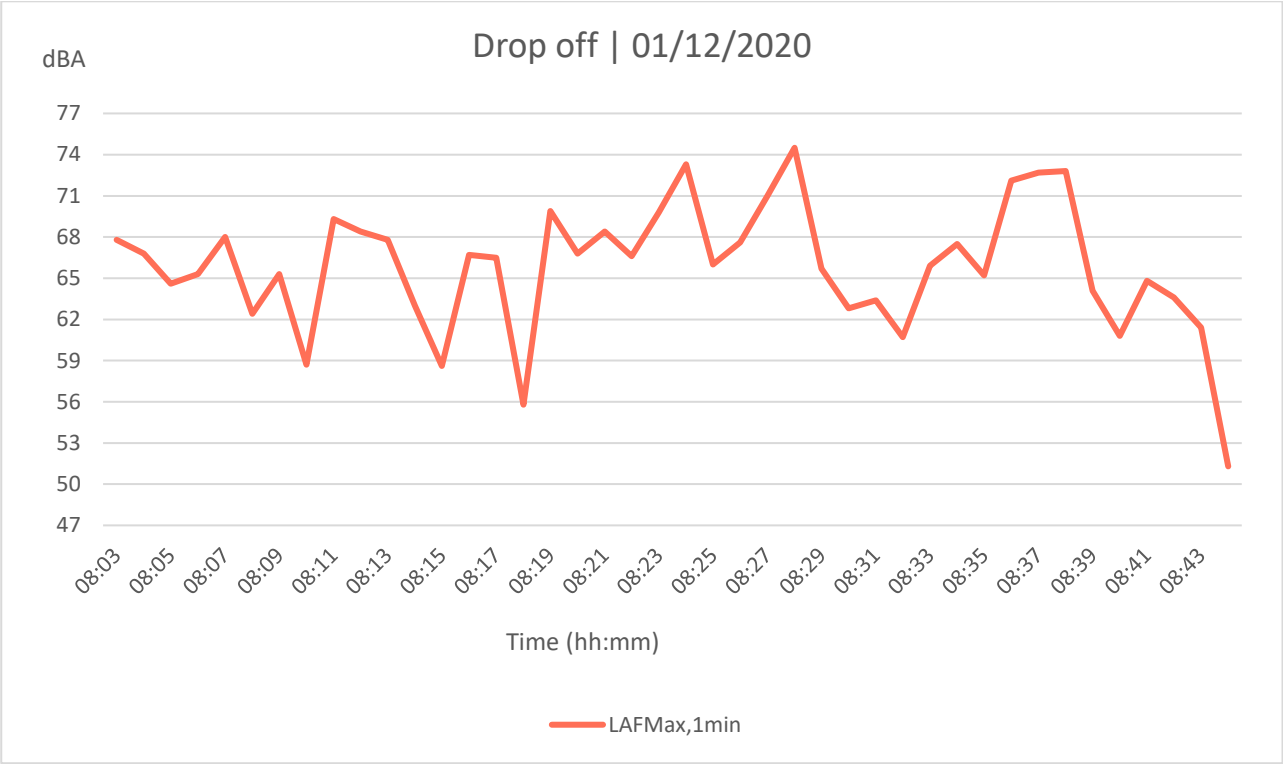


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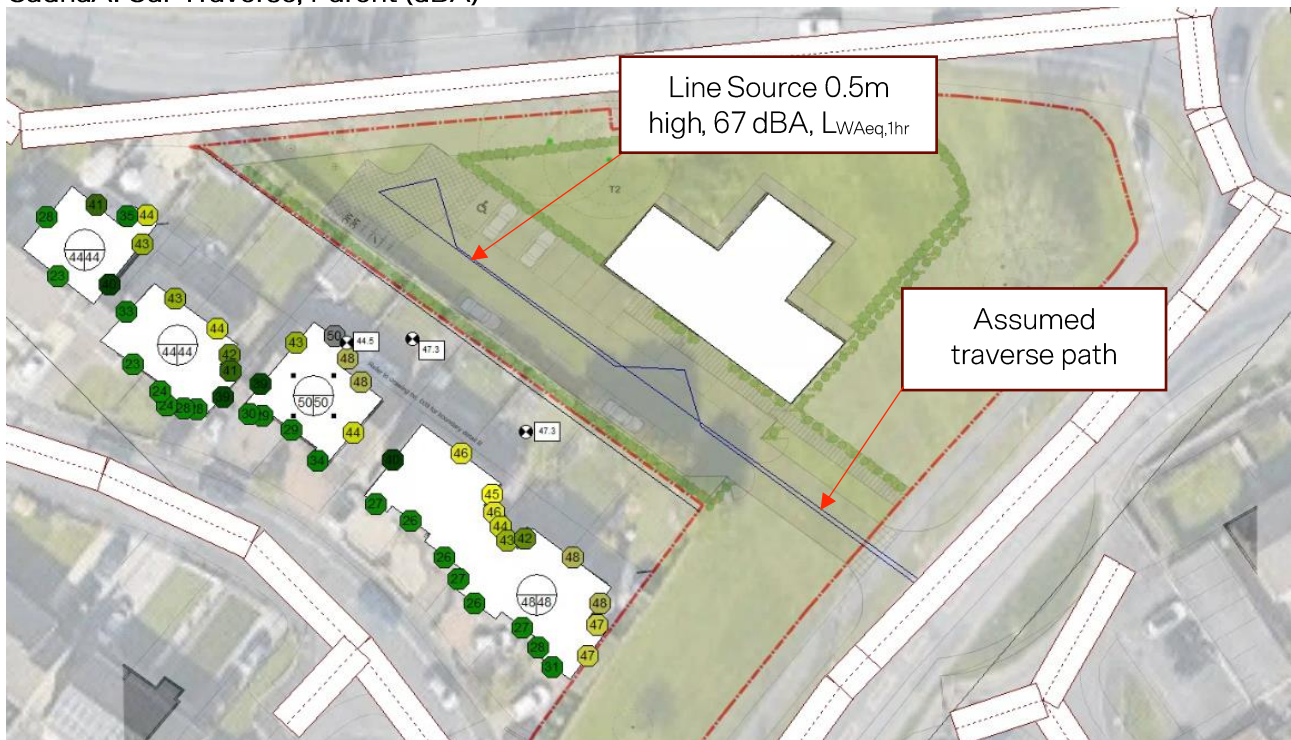
Measurement Results

Residual and Background Noise (Façade corrected)

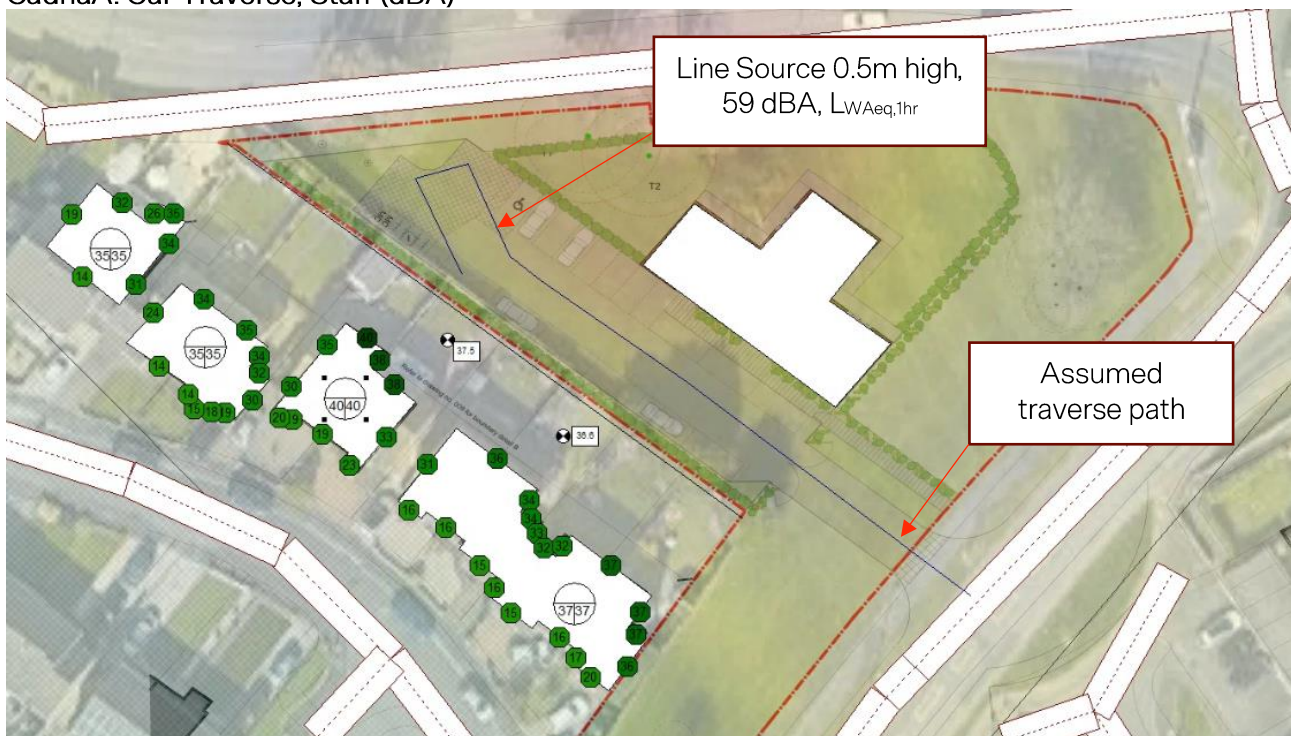




CadnaA: Car Traverse, Parent (dBA)



CadnaA: Car Traverse, Staff (dBA)



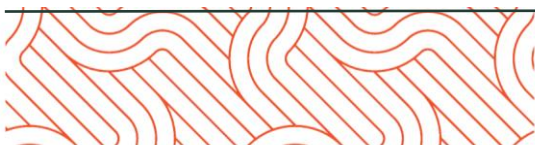
CadnaA: Children Playing, Main Playground, $L_{eq,1hr}$ (dBA)



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Summary of Noise Impact from Car Movements

Element	Garden Receptor		Façade Receptor	
	Traverse (Parent)	Traverse (Staff)	Traverse (Parent)	Traverse (Staff)
Source Power Level, L_{eq} (dBA)	77			
Speed of Vehicle (kph)	16			
Distance vehicle travels	155	87	155	87
Event time (s)	35	20	35	20
No. Events per hour	10	3	10	3
Time Corrected Sound Power, L_{eq} (dBA)	67	59	67	59
CadnaA: Resulting Pressure Levels at NSR Façade, (dBA)	47	38	49	40
Cumulative Level at NSR Receptor $L_{eq,1hour}$ (dBA)	48		50	



Glossary of Acoustical Terms

A-weighting

Noise levels are corrected to represent human response to sound.

L_{Aeq}

This is a continuous equivalent of time varying noise, or effectively the average measured (A weighted) noise level over a defined period of time.

$L_{Aeq,16hour}$

A 16 hour long measurement of the L_{Aeq} over the period between 07:00 and 23:00, also known as a daytime measurement.

$L_{Aeq,8hour}$

An 8 hour long measurement of the L_{Aeq} over the period between 23:00 and 07:00, also known as a night time measurement.

L_{AFmax}

The highest, or maximum A-weighted sound pressure level measured over a specified time period. The 'F' defines a time weighting in Fast.

L_{A90}

The A-weighted noise level or average level which is exceeded for 90 percent of the measured time period. Also known as a background level.

L_{A10}

The A-weighted noise level or average level which is exceeded for 10 percent of the measured time period.

1:1 & 1:3 octave spectrum analysis

A single measurement that is separated into frequency bands to allow for a more detailed analysis of the noise source in question.

R_w

The weighted sound reduction index of a partition or facade. A single number value based on the performance of a partition between two rooms across the frequency range 100Hz to 3150Hz. The level is adjusted for the effects of reverberation and background noise.



$D_{n,e,w}$

The weighted level difference of a partition or façade which takes into account a small element such as a grill or vent.

SEL (sound exposure level)

A measure of A-weighted sound energy used to describe a particular event, such as a train pass. It is the sound energy, which, if occurring over one second would contain the same energy as the event.

Free field sound pressure

Is where the radiation or spread of sound is completely unaffected by the presence of any reflecting surfaces or boundaries.

Low Frequency Noise

A term generally used for sound below a frequency of 100 to 150Hz.





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