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Proposed Residential Development
Main Avenue, Cowlersley, Huddersfield

Noise Impact Assessment

For:
Strata Homes & Thirteen Group

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Contents

1 Introduction

1.1 Overview

Environmental Noise Solutions Ltd (ENS) has been commissioned by Strata Homes and Thirteen Group to undertake a noise survey and assessment for a proposed new build residential development at Main Avenue, Cowlersley, Huddersfield (hereafter referred to as 'the site').

Following a planning consultation with Kirklees Council the following comments were made with regard to noise:

> *'The proposed development is adjacent to Cowersley Primary School, noise from which is likely to have an adverse impact on future occupiers of the site. We will therefore expect a noise impact assessment to be provided with any future application. The assessment should determine the existing noise climate taking all likely noise sources into consideration and then detail how this will affect the proposed development. It should also detail any noise mitigation measures that will be required so that satisfactory sound levels will be achieved both indoors and at any outdoor amenity areas at the development.*
>
> *If windows need to be kept closed to achieve satisfactory indoor sound levels then the mitigation measures will also need to include specific details of the alternative ventilation that will be provided as a substitute to opening windows. This needs to provide more than just background ventilation from trickle vent and in particular, needs to be capable of providing sufficient ventilation to give adequate cooling during hot weather to minimise the risks of overheating.'*

The objectives of the noise impact assessment were to:

- Determine external noise levels at the site
- Assess the potential impact of the external noise climate on the proposed residential development with reference to the pertinent requirements and the comments made by Kirklees Council
- Provide recommendations for a scheme of sound attenuation works, as necessary, to protect future occupants of the proposed residential development from a loss of amenity due to noise

This report details the methodology and results of the assessment and provides recommendations for the building envelope (fenestration and ventilation) and boundary treatments where required. It has been prepared to accompany a planning application to be submitted to Kirklees Council.

The report has been prepared for Strata Homes and Thirteen Group for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties referring to the report should consult Strata Homes and Thirteen Group and ENS as to the extent to which the findings may be appropriate for their use.

A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

1.2 Site Description and Development Proposals

The site is located to the south of Cowlersley Primary School and sits between existing residential developments of Main Avenue and Windsor Road, as shown (highlighted in red) in Figure 1.1.

Figure 1.1: Location of Proposed Development

The site is bound by:

- Open fields to the south
- Cowlersley Primary School to the north-west
- Existing residential housing estates to the north, north-east and south-west.

The proposals are for 57 no. dwellings with associated landscaping and access roads.

The ambient noise climate at the site is characterised by distant road traffic noise with occasional noise from the adjacent school playground.

2 Policy Context and Assessment Guidance

2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF)[1] was updated in December 2023 and sets out the Government's planning policies for England and how these are expected to be applied.

Where issues of noise impact are concerned the NPPF provides brief guidance in paragraph 180 where it states that 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…..noise pollution'.

Paragraph 191 advises that:

'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should…..mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life'.

The NPPF also refers to the 2010 DEFRA publication, the Noise Policy Statement for England (NPSE) which reinforces and supplements the NPPF.

2.2 Noise Policy Statement for England

The Noise Policy Statement for England[2] (NPSE) sets out the long-term vision of promoting good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development. This long-term vision is supported by the following aims:

- Avoid significant adverse impacts on health and quality of life
- Mitigate and minimise adverse impacts on health and quality of life
- Where possible, contribute to the improvement of health and quality of life

The NPSE describes the following levels at which noise impacts may be identified:

- 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

According to the explanatory notes in the statement, where a noise level falls between the lowest observable adverse effect level (LOAEL) and a level which represents a significant observable adverse effect level (SOAEL):

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

1 National Planning Policy Framework. Ministry of Housing, Communities and Local Government (2021)
2 Government Department for Environment, Food and Rural Affairs. Noise Policy Statement for England. March 2010.

2.3 Planning Practice Guidance on Noise

Planning Practice Guidance[3] (PPG) is an online resource which provides additional guidance and elaboration on the NPPF. It advises that the Local Planning Authority should consider the acoustic environment in relation to:

- 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
- Whether or not a good standard of amenity can be achieved

In line with the Explanatory Note of the NPSE, the PPG references the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that:

'...the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation'.

The PPG also provides general advice on the typical options available for mitigating noise, suggesting that Local Plans may include noise standards applicable to proposed developments within the Local Authority's administrative boundary, although it states that:

'Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed'.

The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation. The following guidance documents provide some meaningful context.

2.4 ProPG Planning and Noise: New Residential Development

ProPG Planning and Noise: New Residential Development (ProPG)[4] was published in 2017 by the Association of Noise Consultants, Institute of Acoustics and the Chartered Institute of Environmental Health.

Stage 2: Element 2 of ProPG sets indoor ambient noise levels for residential dwellings based on the guidance contained in British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'[5] (BS 8233), see Table 2.1.

Table 2.1: Indoor Ambient Noise Levels in Dwellings

Activity	Location	Good Indoor Ambient Noise Levels	
Resting	Living Room	35 dB $L_{Aeq\ (0700\text{-}2300)}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq\ (0700\text{-}2300)}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq\ (0700\text{-}2300)}$	30 dB $L_{Aeq\ (2300\text{-}0700)}$ 45 dB $L_{AFMax\ (2300\text{-}0700)}$

3 Planning Practice Guidance on Noise: http://planningguidance.planningportal.gov.uk/blog/guidance/noise/

4 'ProPG Planning and Noise: New Residential Development (ProPG)', 2017. Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH)

5 British Standards Institution (2014). *British Standard 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.*

Note 4 to the above table states:

'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. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night.'

Note 5 to the above table states:

'Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7'.

This is consistent with the guidance contained within the PPG, which states that:

'… consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations'.

On the basis of the above, the following criteria (with windows closed and an alternative means of ventilation provided) are considered appropriate for the proposed residential development and considered to represent good resting and sleeping conditions:

- ≤ 35 dB $L_{Aeq\ (0700\text{-}2300)}$ during the daytime
- ≤ 30 dB $L_{Aeq\ (2300\text{-}0700)}$ and 45 dB L_{AFMax} not regularly exceeded during the night-time

With regard to external amenity, ProPG reflects the advice in BS 8233, which states:

'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 centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.'

3 Noise Survey

3.1 Overview

In order to determine the level of external noise affecting the proposed development, noise monitoring was undertaken on Wednesday 13th December 2023.

For the purpose of the assessment a single noise monitoring position (MP1) was adopted on the north-western site boundary (approximate location shown in Appendix 2).

Noise measurements were undertaken at 4 metres above ground level using a Bruel & Kjaer 2250 Type 1 integrating sound level meter. The meter was connected to a windshield covered microphone positioned at the locations detailed above. The measurement system calibration was verified immediately before and after the survey period using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration levels greater than 0.5 dB was noted.

Measurements consisted of A–weighted broadband parameters including L_{Aeq}, L_{A10} L_{A90}, and L_{AFMax} together with linear octave and 1/3rd octave band data.

The noted weather conditions during the survey were dry with wind speeds < 5 m/s. Weather conditions were therefore considered appropriate for noise monitoring.

3.2 Summary

Table 3.1 presents a summary of the noise data for each measurement session, at each measurement position, rounded to the nearest decibel.

Table 3.1: Summary of Noise Measurement Data

Date	Time (hh:mm)	Length (hh:mm)	L_{Aeq} (dB)	$L_{Amax,F}$ (dB)	L_{A90} (dB)	L_{A10} (dB)	Comment
13/12/2023	11:20	01:00	47	66	44	48	Distant road traffic noise only
	12:20	00:40	60	77	50	64	School lunch time, raised children's voices and ball games against metal fence creating higher levels
	13:00	01:00	46	71	43	49	Distant Road traffic to north of site controlling background levels. Occasional dog barks from open area to south. No commercial/industrial noise noted. Slightly raised levels associated with end of school day
	14:00	01:00	49	71	43	51	
	15:00	01:00	48	72	44	51	
	22:00	01:00	38	55	34	40	
	23:00	01:00	35	53	31	37	

3.3 Analysis

Noise levels at the site were predominantly controlled by distant road traffic noise from the north, with no other noise sources noted during the survey other than the local school.

For the prediction of daytime road traffic noise, the Department of Transport's Memorandum on the Calculation of Road Traffic Noise (CRTN) explains that the following shortened measurement procedure may be used. Measurements of L_{A10} are made over any three consecutive hours between 10:00 and 17:00 hours. Using $L_{A10\ (3\ hour)}$ as the arithmetic mean of the three consecutive values of hourly L_{A10}, the $L_{A10\ (18\ hour)}$ can be calculated from the equation:

$$L_{A10\ (18\ hour)} = L_{A10\ (3\ hour)} - 1\ dB$$

A study prepared by TRL Limited on behalf of the Department for Environment, Food and Rural Affairs (DEFRA) entitled 'Converting the UK Traffic Noise Index $L_{A10\ (18\ hour)}$ to EU Noise Indices for Noise Mapping' presents a methodology for calculating daytime $L_{Aeq\ (0700\text{-}2300)}$ and night time $L_{Aeq\ (2300\text{-}0700)}$ ambient noise levels based on the $L_{A10\ (18\ hour)}$ noise levels, as follows:

$$L_{Aeq\ (0700\text{-}2300)} = \frac{10 * \log\left([(10^{((0.95 * L_{A10\ (18\ hour)} + 1.44)/10)} * 12] + [10^{((0.97 * L_{A10\ (18\ hour)} - 2.87)/10)} * 4]\right)}{16}$$

$$L_{Aeq\ (2300\text{-}0700)} = 0.90 * L_{A10,\ 18\ hour} - 3.77$$

Based on the above formulae, the daytime and night-time ambient noise levels at MP1 have been measured / calculated at **47 dB $L_{Aeq\ (0700–2300)}$** and **40 dB $L_{Aeq\ (2300–0700)}$**. Maximum noise levels were measured at up to **53 dB L_{AFMax}** during the night-time period.

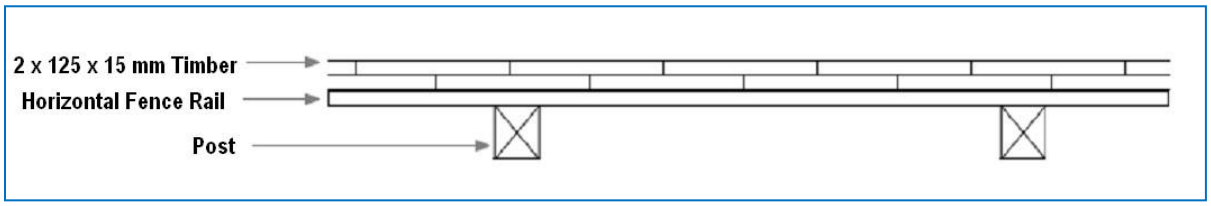
Noise levels during the school lunch break were measured at up **60 dB $L_{Aeq,T}$**. at MP1. No noise was audible from fixed external services to the school.

4 Noise Assessment

4.1 Boundary Treatment

In order to screen the site from the school playground to the north-west, it is recommended that a circa 2.2-metre-high close-boarded timber fence is installed along the entire northern boundary of the site (see Appendix 3 for recommended barrier location).

The timber fence should be built in double-thickness solid timber construction as illustrated below. The fence should have no gaps or holes (cover strips should also be used to prevent gaps forming over time) and should be fully sealed at the ground (i.e. include a gravel board).



4.2 School Noise Levels

Noise measurements encapsulated the school lunch break and included raised voices from children playing, and were measured at circa **60 dB $L_{Aeq,\,T}$** at MP1.

Adopting this as a representative noise level, noise propagation from the school playground has been calculated using iNoise acoustic modelling software. This is a software program specifically developed for the prediction and assessment of environmental noise.

The model calculates noise levels on horizontal and vertical grids with a user defined spacing of receiver points. From these levels, calculated at thousands of points, contour lines of constant noise levels are generated and printed as noise maps. All scaling was based on direct import from Google Earth, with 2nd order reflections considered.

An area source was entered into the location of the school playground and calibrated to a sound pressure level of 60 dB(A) at MP1 (see Appendix 4)

The model was then populated with the recommended boundary treatment and surrounding buildings in order to predict noise levels at the site.

The following assumptions were used in the model:

- Meteorological conditions: Temp. 20 °C, Relative Humidity 60%
- Foliage/woodland areas not considered to provide any reduction

A noise level contour map is contained in Appendix 4.

The predicted resultant noise level at the nearest proposed dwelling associated with the school playground and incorporating the recommended boundary treatment is **50 dB L_{Aeq}**.

4.3 Design Noise Levels

Design noise levels for the site have been measured / calculated as follows:

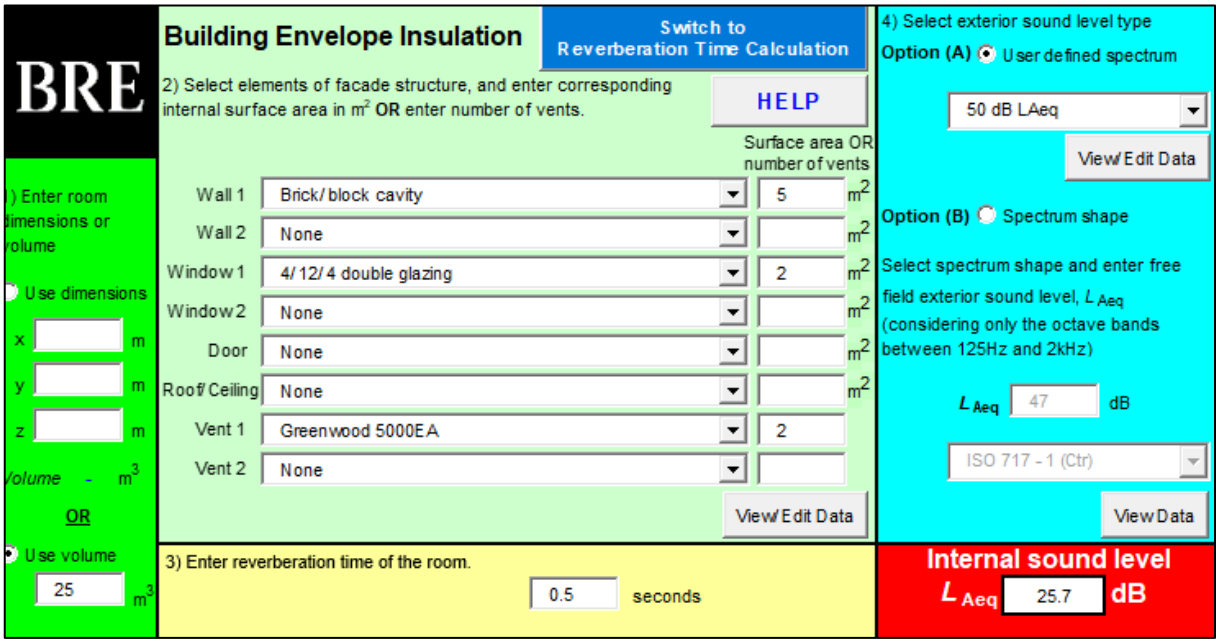
- **≤ 50 dB $L_{Aeq\ (0700\text{-}2300)}$** during the daytime
- **≤ 40 dB $L_{Aeq\ (2300\text{-}0700)}$** during the night-time
- **≤ 53 dB L_{AFMax}** during the night-time

4.4 Scheme of Sound Attenuation

In order to calculate the sound insulation requirements of the building envelope for habitable rooms throughout the development, the Building Research Establishment (BRE) building envelope insulation calculation spreadsheet was used. This spreadsheet is based on the calculation methodology advocated in BS 8233. The spreadsheet allows input of external noise levels, typical room dimensions and reverberation time together with parameters for the various elements of the building envelope and calculates the internal noise level in terms of the external noise level metric (L_{Aeq} and L_{AFMax} in this case).

As evidenced in the calculation sheet below, a typical standard double-glazed window rated at least **25 dB R_w+C_{tr}** (such as 4 mm glass / 12 mm cavity / 4 mm glass) in conjunction with 2 no. standard trickle vents rated at least **32 dB $D_{n,e,w}$** per 5000 mm² EA vent open (such as the Greenwood 5000EA, or equivalent) will provide circa 25 dB(A) sound insulation from external to internal at the site.

Figure 4.1: Example BRE Calculation Spreadsheet



For reference, the World Health Organisation (WHO) Guidelines for Community Noise (1999) states *"the noise reduction from outside to inside with the window partly open is 15 dB."*

The resultant internal noise levels are set out in the table below.

Table 4.1 – External Noise Levels and Resultant Internal Noise Levels

External Noise Level	Reduction	Resultant Internal Level	Comment
≤ 50 dB $L_{Aeq\ (0700\text{-}2300)}$ ≤ 40 dB $L_{Aeq\ (2300\text{-}0700)}$ ≤ 53 dB L_{AFMax}	–25 dB (closed windows)	≤ 25 dB $L_{Aeq\ (0700\text{-}2300)}$ ≤ 15 dB $L_{Aeq\ (2300\text{-}0700)}$ ≤ 28 dB L_{AFMax}	Very good internal noise levels with closed windows
	–15 dB (open windows)	≤ 35 dB $L_{Aeq\ (0700\text{-}2300)}$ ≤ 25 dB $L_{Aeq\ (2300\text{-}0700)}$ ≤ 38 dB L_{AFMax}	Good internal noise levels with open windows

On the basis of the above, standard double glazing (i.e. 4 mm glass / 12 mm cavity / 4 mm glass) and standard trickle vents are appropriate throughout the development.

The following points should be noted:

- The glazing recommendations apply to the window within a sealed unit. It is the responsibility of the window supplier to ensure that the window frame does not compromise the performance of the glazing.

- The opening and free area of the ventilation units should be checked by a mechanical service engineer before designs are finalised. Should the equivalent open area be insufficient to meet the minimum requirements of ADF, it may be necessary to increase the number of units per habitable room. Where this applies, the required sound reduction of the ventilation units may need to be increased accordingly.

- When selecting a glazing system to satisfy the requirements outlined above, it is important to ensure that the $R_w + C_{tr}$ value is achieved (rather than simply the R_w value). Published R_w values tend to be higher than corresponding $R_w + C_{tr}$ values; therefore, incorrect selection could result in an overestimation of sound reduction performance which in turn could result in higher internal noise levels.

4.5 External Amenity (Gardens).

Daytime noise levels across the site are expected to reach up to **50 dB L_{Aeq}** with the installation of the recommended 2-metre-high close-boarded timber fence. This level meets the guideline value for external amenity areas, as recommended by BS8233 / ProPG of 50 dB $L_{Aeq.}$

5 Summary and Conclusions

A noise impact assessment has been undertaken for the proposed residential development at Main Avenue, Cowlersley, Huddersfield.

The ambient noise climate at the site is characterised by distant road traffic noise with occasional noise from the adjacent school playground.

A scheme of sound insulation works and boundary treatments has been developed to protect the proposed residential development from the ambient noise climate.

Appendix 1 – Abbreviations and Definitions

Sound Pressure Level (L_p)
The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 μPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$L_p = 20 \log_{10}(p/p_o)$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_o = reference sound pressure (20 μPa).

A-weighting
A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$
The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T, has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$
The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T. $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$
The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

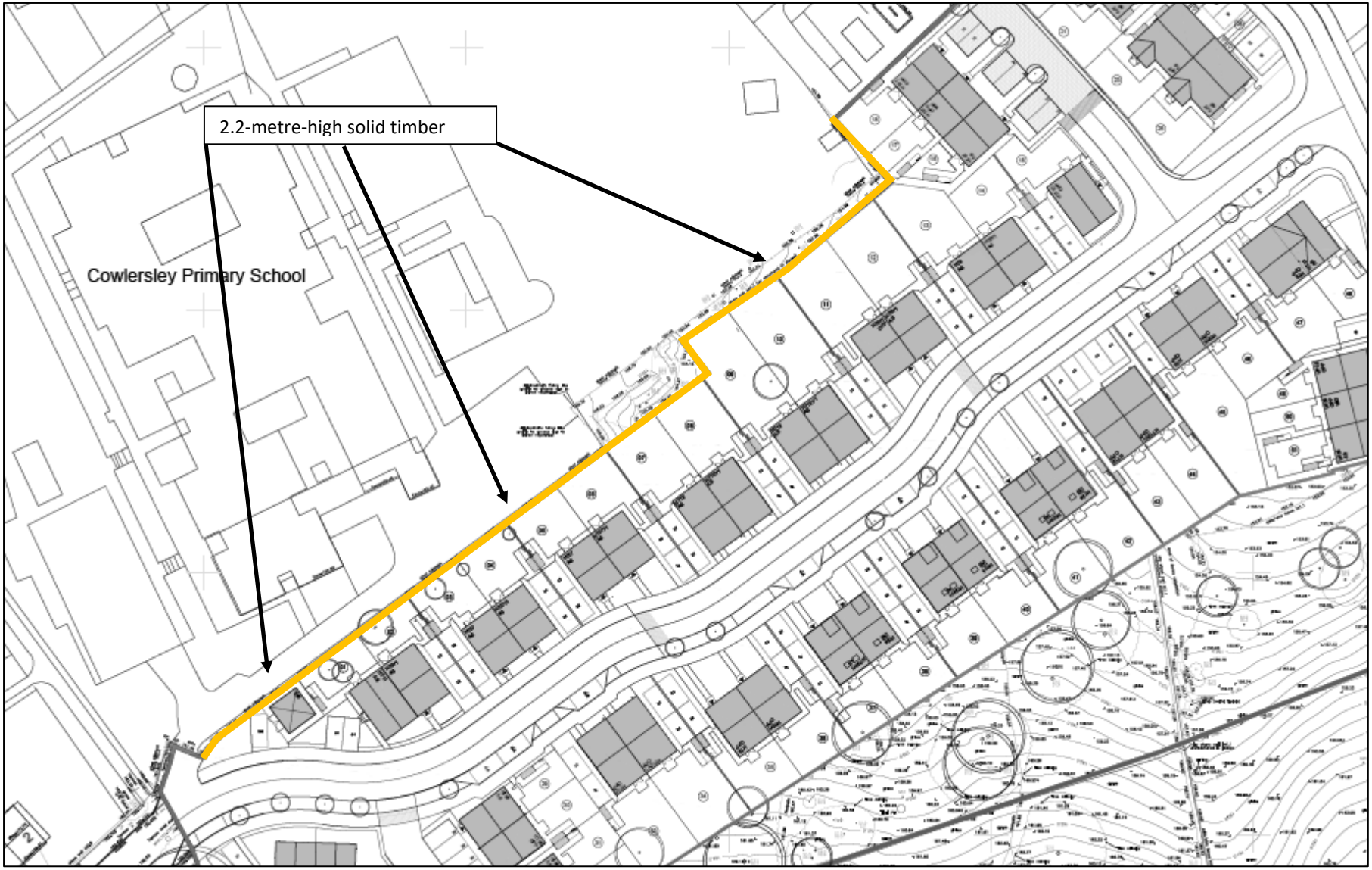
$L_{AF\ max}$
The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Single Event Level / Sound Exposure Level (SEL or L_{AE})
The energy produced by a discrete noise event averaged over one second, regardless of the event duration. This allows for comparison between different noise events which occur over different lengths of time.

Weighted Sound Reduction Index (R_W)
Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_W is used to characterise the insulation of a material or product that has been measured in a laboratory).

Appendix 2 – Noise Measurement Position

Appendix 3 – Boundary Treatment



Appendix 4 – Playground Noise Contour Map