

Report

New Place Nurseries, Horsham

Noise Assessment

For Barratt Redrow Southern Counties

12 August 2026

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1 Introduction

1.1 Scope and Background

1.1.1 This report describes the potential impact of noise on the proposed residential development (the "Development") at New Place Nurseries, Pulborough (the 'Site').

1.1.2 The Site falls within the administrative boundary of Horsham District Council (HDC). The preapplication for the Development contains a number of pre-commencement conditions including the below in relation to noise:

"Pre-Commencement Condition: No development shall commence until an Acoustics, Ventilation and Overheating Assessment has been submitted to and approved in writing by the Local Planning Authority. The assessment shall be carried out in accordance with the guidance presented in the Association of Noise Consultants (ANC) and Institute of Acoustics (IoA) 'Acoustics, Ventilation and Overheating Guide' (AVO Guide). The report should identify the predicted noise impacts (i.e. level and duration) in habitable rooms during the 'overheating condition' as defined in the AVO Guide and, where necessary, provide details of proposed mitigation measures. The development shall thereafter be carried out in accordance with the approved details."

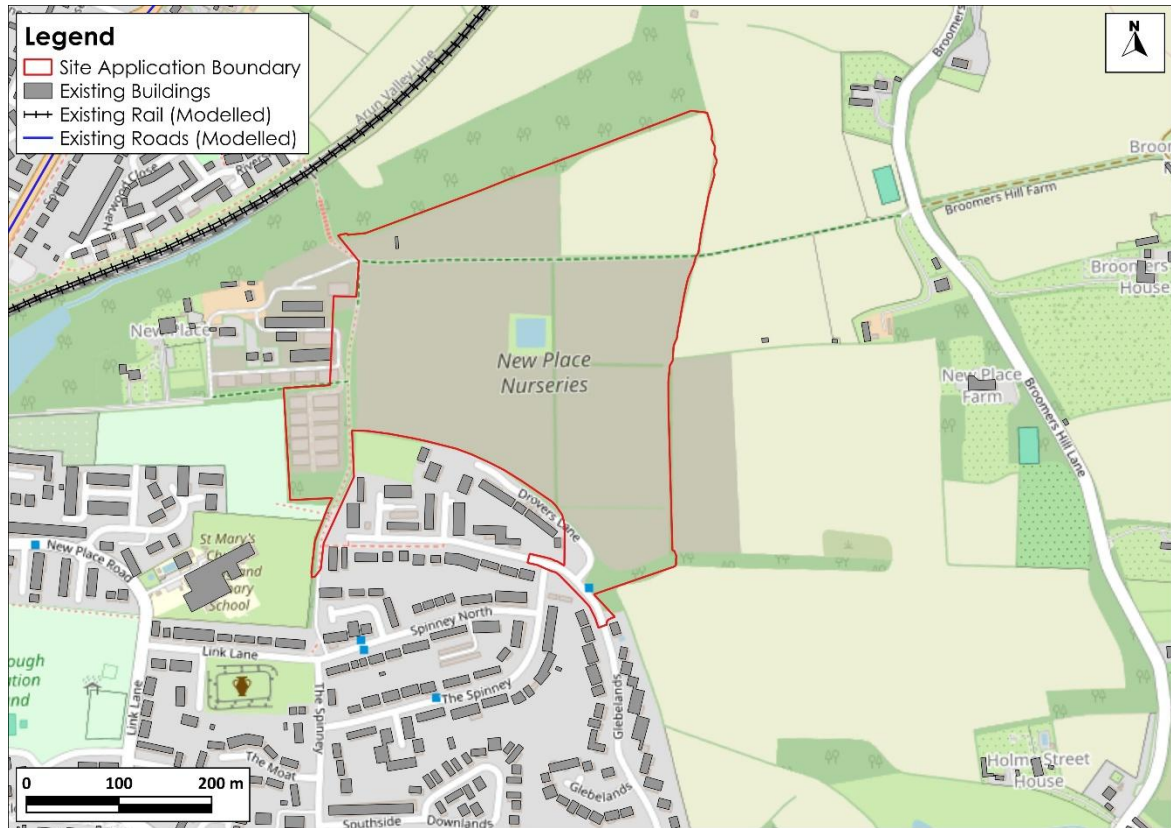
1.1.3 The purpose of this assessment is to support the discharge of this Condition with regards to the suitability of the proposed residential development in respect of environmental noise, with particular reference to internal noise levels, ventilation conditions and overheating-related noise constraints.

1.1.4 The assessment has been carried out by Noise Consultants (NCL), part of Logika Group, and has been prepared in accordance with National and local policy and guidance and by reference to relevant acoustics standards and guidance. A glossary of acoustic terminology is provided in **Appendix A1**.

1.2 Existing Site

1.2.1 The Site is bounded to the north by the Arun Valley Line railway (approximately 75 metres from the Site boundary) and open fields. To the east, the Site is bounded by open fields. To the south of the Site there are residential dwellings and to the west the Site is bounded by dwellings and London Road at approximately 370m from the Site boundary.

1.2.2 **Figure 1-1** presents the Site location and application boundary and wider Site context.



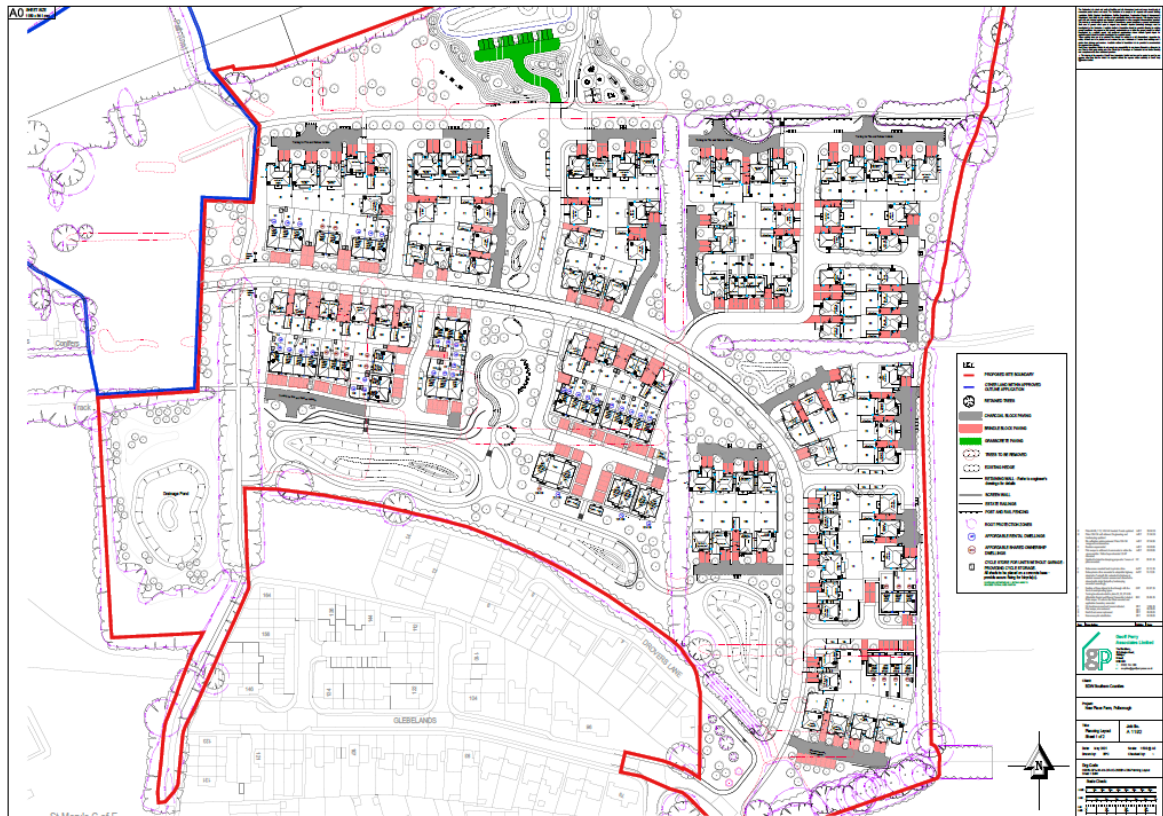
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Figure 1-1: Site Location Plan

1.3 Proposed Development

1.3.1 **Figure 1-2** presents the proposed as built master plan¹.

¹Geoff Perry Associates Limited, H9376-GPA-XX-XX-DR-UD-203001-C08-Planning Layout Sheet 1 B&W



©Geoff Perry Associates Limited

Figure 1-2: Proposed Development

1.4 Noise Sources

1.4.1 Baseline

- 1.4.2 The existing baseline at the boundary of the Site is dominated by rail noise as the Arun Valley train line runs approximately 60m from the northern boundary of the Site. The baseline is also influenced by road traffic noise from London Road approximately 370m from the western boundary of the Site.
- 1.4.3 Due to the treeline in close proximity to the Site, it is expected that birdsong and noise related to wildlife around the Site will have an impact on the baseline noise levels across the Site.

2 Assessment Approach

2.1 Baseline Conditions

- 2.1.1 Representative baseline conditions have been determined by way of a series of baseline noise measurements surveys. The most pertinent surveys comprise one conducted from 13 to 26 January 2016 (Jan 2016 Survey) and another conducted from 11 to 12 May 2022 (May 2022 Survey), both of which comprise long term untended noise measurements at locations LT1 and LT3 respectively. It has not been necessary to rely on short-term measurements for the purposes of this assessment.
- 2.1.2 Details of the baseline noise surveys are presented in appendices **A2.1** (Jan 2016 Survey) and **A2.2** (May 2022 Survey). It is not anticipated that the future baseline conditions will be materially different from the data sets used.

2.1.3 Noise Modelling

- 2.1.4 The results of the noise measurement survey have been used to calibrate a noise model of the Site.
- 2.1.5 In respect of the $L_{Aeq,T}$ metric, the noise model has been prepared using the iNoise noise modelling software which implements the ISO 9613-2:2024² calculation methodology.
- 2.1.6 In respect of the L_{AFmax} metric, the noise model has been prepared using the Predictor-LimA noise modelling software which implements the ISO 9613-2:1996³ calculation methodology.
- 2.1.7 Noise modelling assumptions are provided in **Appendix A3**.

Road and Rail Traffic Noise

- 2.1.8 Road and Rail traffic were modelled based on the baseline noise measurements, with the relative contribution from each co-ordinated to ensure calibration with the measured data.
- 2.1.9 In respect of the L_{AFmax} metric at night, rail noise was modelled as being the primary source.

2.2 Assessment Criteria

- 2.2.1 In considering suitable internal noise criteria for residential development, it is important to consider both the internal target noise levels and the proposed means of ventilation.
- 2.2.2 In respect of ventilation, it is important to consider the 'non-overheating' condition by reference to Building Regulations Approved Document F – Ventilation (ADF)⁴ as well as the 'overheating condition' by reference to Building Regulations Approved Document O – Overheating (ADO)⁵.
- 2.2.3 The Association of Noise Consultants (ANC) and Institute of Acoustics (IoA) 'Acoustics, Ventilation and Overheating Guide' (AVO Guide) was published in January 2020. The AVO Guide has been largely superseded by ADO which was issued in 2021 and came into force in June 2022.
- 2.2.4 Additionally, the Association of Noise Consultants Approved Document O Noise Guide (ADO Noise Guide), which was published in November 2024, provides a method to demonstrate compliance to

² ISO 9613-2: 2024 Acoustics – Attenuation of sound during propagation outdoors. Part 2: Engineering method for the prediction of sound pressure levels outdoors.

³ ISO 9613-2: 1996 Acoustics – Attenuation of sound during propagation outdoors. Part 2: General method of calculation.

⁴ Summarised in Appendix A4.2

⁵ Summarised in Appendix A6

the Building Control Body of the noise constraints in ADO. It provides clarity for both practitioners and regulators so that assessments can be carried out consistently and the outcome is repeatable and reliable.

- 2.2.5 In summary, under the non-overheating condition it is considered that target internal noise levels set out in BS 8233:2014^{6,7} should be met in habitable rooms (bedrooms and living rooms) under whole dwelling ventilation conditions⁸ as a minimum. The target noise levels are reproduced in **Table 2-1**.

Table 2-1: Target Noise Levels

Location	Activity	Daytime Noise Level (07:00 – 23:00)	Night-time Noise Level (23:00 – 07:00)
Living Room	Resting	≤ 35 dB L _{Aeq,16hr}	-
Dining Room	Dining	≤ 40 dB L _{Aeq,16hr}	-
Bedroom	Sleeping (daytime resting)	≤ 35 dB L _{Aeq,16hr}	≤ 30 dB L _{Aeq,8hr} ≤ 45 dB L _{AFmax} (normally less than 10 times a night)

- 2.2.6 Importantly in respect of purge ventilation as defined in ADF⁹, there is no requirement for target internal noise levels set out in BS 8233:2014^{6,7} to be met.
- 2.2.7 Under the overheating condition, both AVO and ADO adopt less onerous internal noise criteria than those set out in BS8233:2014^{6,7}, reflecting a pragmatic approach which recognising the acoustic limitations of an open window, in the interests of promoting the use of natural ventilation over mechanical ventilation and active cooling.
- 2.2.8 AVO guidance, in Table 3-3 identified BS8233:2014^{6,7} internal noise limits as being of negligible risk and considered the following internal noise criteria as increasingly unacceptable:
- Daytime (living rooms and bedrooms) - 50 dBL_{Aeq,16h}
 - Night-time (bedrooms) - 42 dBL_{Aeq,8h}
 - Night-time (bedrooms) - 65 dBL_{AFmax} (10th highest)
- 2.2.9 ADO, in Section 3-3 identified the following internal noise criteria as constraints, intended to underpin any thermal assessment / modelling of overheating:
- Night-time (bedrooms) - 40 dBL_{Aeq,8h}
 - Night-time (bedrooms) - 65 dBL_{AFmax} (10th highest)

2.3 Building Envelope Sound Insulation Calculations

- 2.3.1 Conservative assumptions on the sound insulation performance of the building envelope constructions are provided in **Appendix A5**.

⁶ British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings.

⁷ And L_{AFmax} not exceeding 45dB more than 10 times per night

⁸ As required by The Building Regulations Approved Document F - Ventilation.

⁹ Intended for short term rapid dilution of indoor air pollutants and dispersal of water vapour; usually via an open window.

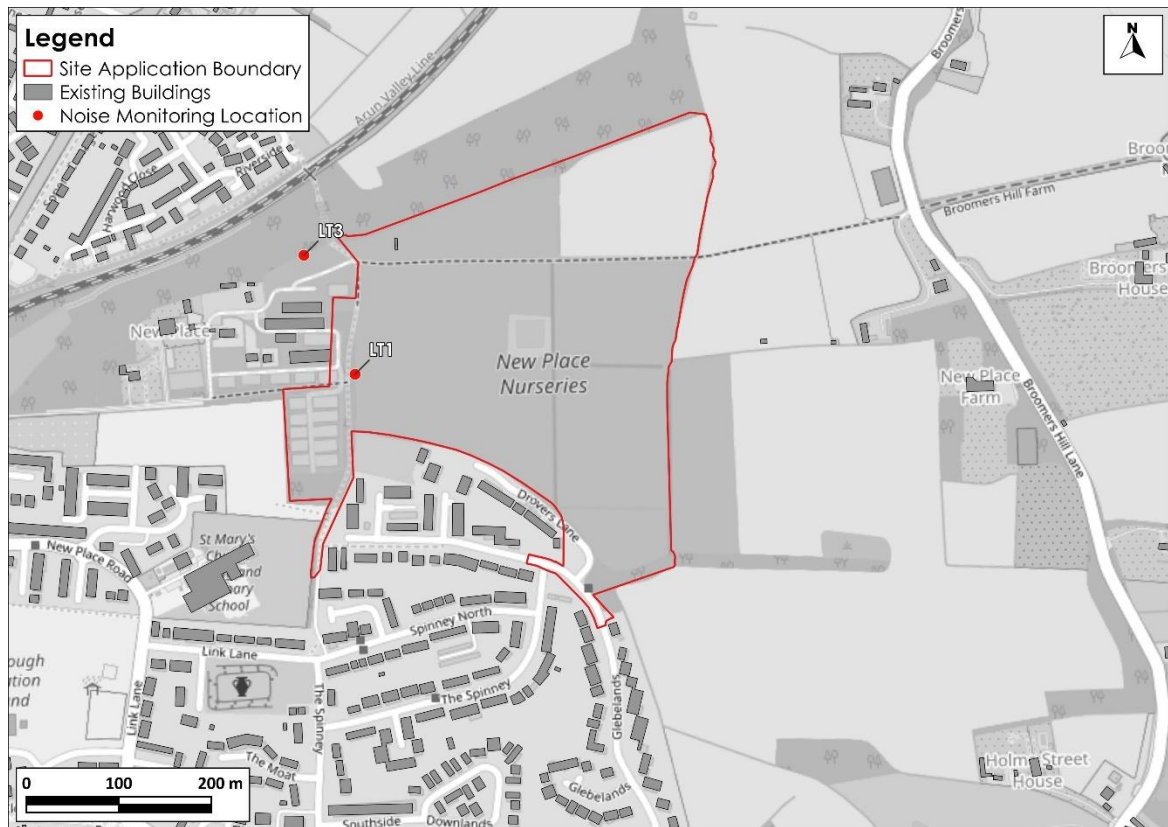
- 2.3.2 For generic living room and bedroom volumes and window sizes, a composite façade construction comprising a brick and block cavity wall, standard double glazing and a non-acoustic background ventilator provides a sound level difference from outside to inside of approximately 23 dB(A). Where open windows are considered in the assessment, a sound level difference from outside to inside of 13 dB(A) has been assumed for a partially open window¹⁰. From a ventilation perspective, this equates to an equivalent open area of approximately 2% of the floor area of the associated habitable room.
- 2.3.3 Assuming the use of the ADO Simplified Method, the minimum equivalent areas for moderate risk locations represents 4% of the floor area of the bedrooms. The ADO Noise Guide estimates the resultant level differences from outside to inside as 10 dB. **Table A6-1** reproduces the external noise levels below which the ADO Simplified Method can be used.

¹⁰ Waters-Fuller, T., Lurcock, D., Mackenzie, R. & MacKenzie, R. (2007). NANR 116: 'Open/Closed Window Research' Sound Insulation Through Ventilated Domestic Windows.

3 Baseline Conditions

3.1 Noise Measurement Survey

3.1.1 **Figure 3-1** presents the noise monitoring locations which are described in **Table 3-1** below. The noise monitoring locations were chosen to provide a good understanding of the noise conditions across the site as well as to establish emission levels for key noise sources.



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Figure 3-1: Noise Monitoring Locations

Details of the measurement surveys are provided in **Appendix A2**.

Table 3-1: Summary of Noise Survey Locations

Location	Date	Description	Observations
LT1 (2016)	13 th January 2016 – 25 th January 2016	Unattended free-field long-term measurement. Approximately 240m south of the railway and 400m east of London Road.	During the survey, it was noted that the Site was affected by noise from: Plant nursery operations, birdsong, passing pedestrians and children playing in the playground of St Mary's Church of England Aided Primary School to the south west of the Site. Approximately 200m from LT1.
LT3 (2022)	11 th May 2022 – 13 th May 2022	Unattended free-field long-term measurement. Microphone was mounted to a pole, approximately 1.2m above the ground. Approximately 70m from the railway and 370m from London Road.	During the survey, the main noise sources at the Site were observed to be from: Nursery operations, passing trains, pedestrians and distant road traffic.

- 3.1.2 Observed weather conditions were suitable for noise measurement survey. The weather conditions for both surveys describe wind speeds below 5m/s, dry conditions during when measuring at LT3 and short periods of rain when measuring at LT1. These periods of rainfall were not believed to have a detrimental effect on results and as a result no data was removed from the assessment. As detailed in **Appendix A2**.
- 3.1.3 Details of the monitoring instrumentation (model/serial numbers and calibration details) are presented in **Appendix A2**.
- 3.1.4 The results of the unattended noise measurement survey are summarised in **Table 3-2**, rounded to the nearest decibel. For the 2022 survey, at LT3, the results are presented per day, for simplicity in this report, the daily results have been logarithmically averaged to provide a single result. The full noise measurement survey results are presented in **Appendix A2**.

Table 3-2: Summary of Unattended Measured Free-Field Noise Levels

Location	Period	L _{Aeq,T} (dB)	L _{Afmax} (10 th Highest) (dB)
LT1 (2016)	Daytime (07:00 – 23:00)	47	n/a
	Night-time (23:00 – 07:00)	39	n/a
LT3 (2022)	Daytime (07:00 – 23:00)	51.2	n/a
	Night-time (23:00 – 07:00)	42.5	67.1

4 Noise Assessment

4.1 Initial Site Noise Risk Assessment

- 4.1.1 An initial noise risk assessment has been undertaken to provide an indication of adherence to internal noise criteria, having accounted for the massing introduced by the development proposals.
- 4.1.2 **Figure 4-1** presents the external free-field equivalent daytime noise exposure at receptors which represent the facades of the proposed Development, in respect of the $dB_{LAeq,16h}$ metric. The daytime noise results are presented at 1.5 m above ground level which is representative of the ground floor level of dwellings.
- 4.1.3 **Figure 4-2** and **Figure 4-3** present the external free-field equivalent night-time noise exposure at receptors which represent the facades of the proposed Development, in respect of the $dB_{LAeq,8h}$ and LA_{Fmax} metric respectively. The night-time noise results are presented at 4.0 m above ground level which is representative of the first floor level of dwellings.

4.1.4 Daytime $LA_{eq,16hr}$ Noise Levels



Figure 4-1: Daytime $LA_{eq,16hr}$ Noise Results at 1.5m

- 4.1.5 **Figure 4-1** shows that that external free-field levels at the facades of the proposed Development are below 50dB $LA_{eq,16h}$. By inspection, the external levels are conducive to suitable internal noise exposure.

4.1.6 Night-time $L_{Aeq,8hr}$ Noise Levels



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Figure 4-2: Night-time $L_{Aeq,8hr}$ Noise Results at 4m

4.1.7 **Figure 4-2** shows that external free-field levels at the facades of the proposed Development are below 40dB $L_{Aeq,8hr}$. By inspection, the external levels are conducive to suitable internal noise exposure.

4.1.8 Night-time $L_{A_{Fmax}}$ Noise Levels



Figure 4-3: Night-time $L_{A_{Fmax}}$ Noise Results at 4m

- 4.1.9 **Figure 4-3** shows that external free-field levels at the facades of the proposed Development are below 55dB $L_{A_{Fmax}}$. By inspection, the external levels are conducive to suitable internal noise exposure.

4.2 Detailed Consideration of Internal Noise Levels

- 4.2.1 A more detailed consideration of internal noise levels has been undertaken based on a sound level difference for a partially open window (13 dB(A)) and standard double-glazed windows and non-acoustic background ventilators (23 dB(A)).
- 4.2.2 **Figure 4-4** identifies those properties where BS8233⁶ daytime internal noise criteria are achieved on a windows-open basis or, otherwise, would be achieved on a closed-windows basis. The daytime noise results are presented at 1.5 m above ground level which is representative of the ground floor level of dwellings.
- 4.2.3 **Figure 4-5** identifies those properties where BS8233^{6,7} night-time internal noise criteria are achieved on a windows-open basis or, otherwise, would be achieved on a closed-windows basis. The night-time noise results are presented at 4.0 m above ground level which is representative of the first floor level of dwellings.

4.2.4 Daytime $L_{Aeq,16hr}$ Noise Levels (Internal)



Figure 4-4: Daytime $L_{Aeq,16hr}$ Internal Noise Level Assessment

4.2.5 **Figure 4-4** shows that BS8233⁶ daytime internal noise criteria are achievable with open windows across the entirety of the Site.

4.2.6 Night-time Combined $L_{Aeq,8hr}$ and L_{AFmax} Noise Levels (Internal)



Figure 4-5: Night-time $L_{Aeq,8hr}$ Internal Noise Level Assessment

4.2.7 **Figure 4-5** shows that BS8233^{6,7} night-time internal noise criteria are achievable with open windows across the entirety of the Site.

5 Conclusions

- 5.1.1 This report describes the potential impact of noise on the proposed residential development (the "Development") at New Place Nurseries, Pulborough (the 'Site'). The assessment has been carried out by Noise Consultants (NCL), part of Logika Group.

5.2 Existing Site

- 5.2.1 The Site is bounded to the north by the Arun Valley Line railway (approximately 75 metres from the Site boundary) and open fields. To the east, the Site is bounded by open fields. To the south of the Site there are residential dwellings and to the west the Site is bounded by dwellings and London Road at approximately 370m from the Site boundary.

5.3 Baseline Survey and Noise Modelling

Representative baseline conditions have been determined by way of a series of baseline noise measurements surveys. The most pertinent surveys comprise one conducted from 13 to 26 January 2016 (Jan 2016 Survey) and another conducted from 11 to 12 May 2022 (May 2022 Survey), both of which comprise long term untended noise measurements.

- 5.3.1 The results of the noise measurement surveys were used to calibrate a noise model of the Site, based on ISO 9613-2:2024 and ISO 9613-2:1996 calculation methodology.

5.4 Initial Site Noise Risk Assessment

- 5.4.1 An initial assessment was conducted in relation to external noise exposure, which indicated that noise levels were conducive to achieving suitable internal noise exposure.

5.5 Detailed Consideration of Internal Noise Levels

- 5.5.1 A more detailed consideration of internal noise exposure has been undertaken based on a sound level difference for a partially open window (13 dB(A)) and standard double-glazed windows and non-acoustic background ventilators (23 dB(A)).
- 5.5.2 In respect of both the daytime and night-time, the exercise shows that BS8233^{6,7} internal noise criteria are achievable with open windows across the entirety of the Site. Importantly, under the overheating condition, internal noise criteria would be relaxed further.

5.6 Conclusions

- 5.6.1 On the basis of the baseline noise surveys, noise modelling and internal noise assessment undertaken, the Site is considered suitable for residential use in noise terms. External noise levels are predicted to be sufficiently low that the relevant BS 8233:2014 internal noise criteria can be achieved across the Development with open windows during both daytime and night-time periods, on a windows open basis. Consequently, the Development is not expected to give rise to significant adverse noise effects on future occupants and is considered acceptable in noise terms.

6 Appendices

A1 Glossary

Term	Definition
dB	Decibel. The logarithmically scaled measurement unit of sound.
A-weighting	Frequency weighting applied to measured sound in order to account for the relative loudness perceived by the human ear.
Ambient Sound Level, $L_{Aeq,T}$	A-weighted equivalent continuous sound level over a given time period. It is the sound level of a steady sound that has the same energy as a fluctuating sound over the same time period. Daytime is typically 07:00 – 23:00 and night-time is typically 23:00 – 07:00.
Background Sound Level $L_{A90,T}$	The A-weighted sound level exceeded for 90% of the measurement period. Often referred to as the background sound level.
$D_{n,e,w}$	Standardised (normalized to a reference reverberation time of 0.5 s), weighted (single-number quantity representing a spectra of values), sound level difference between an external location and a receiving room.
Façade Sound Level	A sound level which is measured or calculated typically 1 m in front of a window, door, wall or other structure or reflective surface other than the ground which therefore includes reflections from the façade.
Free-field Sound Level	A sound level which is measured or calculated in the open without any reflections from nearby surfaces except the ground. Measurements are typically carried out at 1.2 m to 1.5 m above ground level and at least 3.5 m from other reflective surfaces such as buildings which is in accordance with British Standard 7445-2: 1991 <i>Description and measurement of environmental noise - Part 2: Guide to the acquisition of data pertinent to land use</i> .
L_{Amax}	The A-weighted maximum recorded noise level during a measurement period. L_{AFmax} noise levels are measured using a fast (F) measurement weighting (125 ms) and L_{ASmax} noise levels are measured using a slow (S) measurement weighting (1 s).
R_w	The weighted Sound Reduction Index which characterises the airborne sound insulation of a building element over a range of frequencies with a single number quantity.
Sound Reduction Index Spectrum Adaptation Terms, C and C_{tr}	Spectrum adaption terms that use a standard reference curve to determine the weighted value of airborne sound insulation. C and C_{tr} take into account different source spectra, where C considers the A-weighted pink noise spectrum and C_{tr} considers the A-weighted urban traffic noise spectrum.

A2 Baseline Survey Details

A2.1 January 2016 Baseline Survey

A2.1.1 RPS Report: JN JAE8855 dated 10/04/2016

Baseline Conditions

- 3.1 A plan of the proposed site is provided in Figure 3.1 below. The proposed development site is on land which is currently partially used for a plant nursery just north of Drovers Lane, approximately 250 m south-east of the Arun Valley train line and 500 m south-east of the A29 road 'Stane Street'. St Mary's Church of England Aided Primary School is located approximately 200 m south-west of the site. Existing residential properties are situated to the south of the site and the plant nursery occupies the land immediately to the north, east and west of the site.

Baseline Sound Level Survey

- 3.2 A long term baseline sound level survey was deployed on site to run from Wednesday 13th January 2016 to Monday 25th January 2016 and was carried out to determine the existing levels of environmental noise affecting the proposed development. A plan showing the approximate location of the measurement positions and site boundary is provided in Figure 3.1 below.

Figure 3.1: Approximate Survey Location and Site Boundary



- 3.3 The long term survey (LT1) was located towards the north-western boundary of the site, approximately 20 m from the north-west corner of the site. Survey location LT1 was selected

based on the relative proximity to the A29 and the Arun Valley train line, where on-site environmental sound levels would be expected to be highest and therefore ensure that the collected survey data would provide a robust assessment. During the time spent on site setting up the long term survey, the following sound sources were noted affecting the site: children playing in a playground, aircraft, plant nursery vehicles, passing pedestrians, birdsong and a distant train horn.

- 3.4 Sound level measurements were made using a 'Class 1' Rion NL-52 sound level meter (SLM) in accordance with BS 7445-2:1991 [6]. The SLM was calibrated before and checked after use with a Rion NC-74 calibrator with no significant drift occurring.
- 3.5 Data for weather conditions over the survey period were obtained from a nearby amateur weather station¹. During the survey period, measured wind speeds ranged between 0 and 5 m/s and there were some periods of rainfall; however these do not appear to have affected the measured sound levels and, consequently, no data have been removed as a result.
- 3.6 A summary of the measured data are provided in Table 3.1 below; further details are provided in Appendix B.

Table 3.1: Summary of Long Term Baseline Sound Level Data

Location	Daytime (07:00 to 23:00 hours)		Night-time (23:00 to 07:00 hours)	
	L _{Aeq,16h} (dB)	L _{A90,16h} (dB)	L _{Aeq,8h} (dB)	L _{A90,8h} (dB)
LT1	47	36	39	29

- 3.1 With reference to the guidance contained within BS 8233:2014, as reproduced in Table 2.1 of this report, the design criterion for bedrooms during the night-time is 5 dB lower than it is for living rooms during the daytime. The environmental noise levels affecting the proposed development, from the results of the LT1 survey, are 8 dB lower during the night-time than during the daytime. On this basis, the noise mitigation requirements for the development will be controlled by the daytime environmental noise levels.

A2.2 May 2022 Baseline Survey

- A2.2.1 RPS Technical Memo Rev A: JN JAE02241 dated 19/05/2022.

3 Survey Information

This section provides a summary of the survey methodology. Further details are available on request.

An additional unattended noise survey has been carried out a position representative of the closest proposed dwellings to the existing rail-line to the north of the site. This location was very close to the short term measurement position ST3 used in the original noise impact assessment (ref. JAE2241_Report01_Rev3).

One long-term noise monitoring station was set up to measure existing noise levels on the site (location LT3). The microphone was mounted on top a pole approximately 1.2 metres above local ground. The measurement location is shown below.

Period	Measured $L_{Aeq,T}$	10th highest L_{AFmax}^1
11 th May 2022 Daytime (08:15 to 23:00)	53 $L_{Aeq,14.75hr}$	N/A
11 th May 2022 Night-time (23:00 to 07:00)	43 $L_{Aeq,8hr}$	66dB L_{AFmax}
12 th May 2022 Daytime (07:00 to 23:00)	48 $L_{Aeq,16hr}$	N/A
12 th May 2022 Night-time (23:00 to 07:00)	42 $L_{Aeq,8hr}$	68dB L_{AFmax}

¹ L_{AFmax} values were obtained by reviewing the night-time L_{AFmax} noise data in one-minute periods and selecting the 10th highest value.

The main noise sources observed whilst on site were as follows:

- Noise from current commercial activities on site (following discussion with on site personnel the existing business only operated during the daytime).
- Passing trains;
- Public using the footpath; and
- Distant road traffic



Continuous measurements were taken between 08:15 Wednesday 11th May and 10:00 Friday 13th May 2022 with an approximate total duration of over 2 days.

Details of the instrumentation used during the survey are provided in the table below, Calibration certificates of the equipment are available upon request.

Calibration of the equipment was carried out before and after measurements with no significant drift ($< \pm 0.5$ dB) observed.

Measurement Location	Make/Model	Internal Reference / Serial Number	Calibration Ref / Calibration Start / Calibration End	Last Calibration Date
LT1	Rion NL52	#115/ 943366	94.0 / 94.1 / 94.1 dB	18/10/2021
Calibrator	Rion NC74	#33 / 34472822	N/A	30/09/2021

Weather conditions during the survey period were dry with wind speeds below 5 m/s.

4 Noise Measurement Results

The results of the noise surveys are summarised in the table below. Full time history data for the long-term noise monitoring locations can be seen in Appendix A.

A3 Modelling Assumptions

Table A3-1: Noise Model Calculation Parameters and Input Data

Modelling Parameter	Input Parameter
Calculation methodology	ISO 9613-2:2024 Acoustics — Attenuation of sound during propagation outdoors Part 2: Engineering method for the prediction of sound pressure levels outdoors
Topography	Digital Terrain Map (DTM) Obtained from Environment Agency's National LIDAR Programme¹¹ published on the Defra Data Services Platform and available under Open Government Licence v3.0 0.5m vertical intervals Future changes to the Site topography have not been incorporated into the noise model.
Mapping	Geospatial data for the model was informed by publicly available mapping data, as well as the layout plans and drawings provided by the Client. OpenStreetMap data © OpenStreetMap contributors. Google Maps aerial imagery/map data © 2025 Google. OS Open Data © Crown copyright [and Database right] [2026].
Order of reflections	1
Ground absorption, G	0.5
Temperature / Humidity	10 °C / 70%
Adverse weather conditions	Noise model default settings – downwind propagation to all receivers
Heights of existing and proposed buildings	Proposed two storey dwellings – 9.0m Proposed single storey dwellings and garages - 3.0m Other buildings – based on digital building height model calculated from DTM and Digital Surface Model (DSM)¹¹ and on Site observations
Road traffic source	Single carriage way and on/off ramps: line source, 0.5m above carriageway centre Calibrated to the baseline noise measurement data
Rail sources	Line source, each track, along the centreline of the railway, at 1.0m above ground level Calibrated to the baseline noise measurement data

¹¹ Available at <https://environment.data.gov.uk/survey> (Accessed August 2026).

A4 Assessment Guidance

A4.1 British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'

A4.1.1 BS 8233:2014 provides guidance for the control of noise in and around buildings. It is applicable to the design of new buildings, or refurbished buildings undergoing a change of use.

A4.1.2 BS 8233:2014 provides noise guidance for buildings of different uses, however in respect to dwellings and habitable residential spaces, Table 4 of BS 8233:2014 provides guideline values that it is desirable not to exceed during daytime and night-time periods. These guideline values are reproduced in **Table A4-1** and:

- Apply to noise "without character" that excludes features such as "a distinguishable, discrete and continuous tone...irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate";
- Apply to overall noise levels (i.e. the sum of all noise);
- Include normal diurnal fluctuations in external noise (shorter time periods may otherwise be used);
- Do not have to be achieved in all circumstances (such as seasonal / occasional events); and,
- Excludes noise from new mechanical ventilation equipment.

Table A4-1: Indoor Ambient Noise Levels for Residential Dwellings

Activity	Location	Daytime Guideline (07:00 – 23:00)	Night-time Guideline (23:00 – 07:00)
Resting	Living Room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining Room / Area	40 dB $L_{Aeq,16hr}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

A4.1.3 Internal Noise

A4.1.4 The internal noise requirements are not intended to be met with open windows, although BS 8233:2014 states that the internal noise levels should take account of the proposed ventilation strategy.

A4.1.5 BS 8233:2014 also notes that: "where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved". This sentence refers to the World Health Organization 'Guidelines for Community Noise' (WHO GCN, 1999). This statement is also reiterated in ProPG.

A4.1.6 BS 8233:2014 does not provide specific guidance on noise levels for regular individual noise events, such as passing trains, which can cause sleep disturbance. Guidance on suitable noise levels for individual events is provided in ProPG, which states:

"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 45 dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement

of acceptability will depend not only on the maximum noise levels but also on factors such as source, number, distribution, predictability and regularity of noise events."

- A4.1.7 On this basis, it is considered appropriate to adopt the 10th highest L_{AFmax} noise event occurring in the night time period for the purposes of the assessment.

A4.2 Building Regulations Approved Document F – Ventilation

- A4.2.1 The Building Regulations Approved Document F – Ventilation (ADF) sets out requirements for adequate means of ventilation in buildings to maintain indoor air quality. Ventilation for dwellings (ADF Requirement F1: Means of Ventilation) can be separated into three categories:

- Extract Ventilation – the extraction of water vapour and indoor air pollutants from areas where they are produced in significant quantities (e.g. kitchens, utility rooms and bathrooms)
- Whole Dwelling Ventilation – the provision of a minimum level of outdoor air for occupants' health
- Purge Ventilation – for the rapid dilution of indoor air pollutants and dispersal of water vapour, when necessary, in habitable rooms (bedrooms and living rooms).

A5 Assessment Assumptions

A5.1 Internal Spaces

A5.1.1 For the purposes of the outline noise assessment, internal habitable rooms are assumed to have the following dimensions and glazed areas:

- Living Rooms: floor area 12m², ceiling height 2.4 m, glazed area 3.8 m²
- Bedrooms: floor and ceiling area 9m², ceiling height 2.4 m, glazed area 1.5 m²

A5.2 Standard Building Envelope Sound Insulation Specifications

A5.2.1 Walls, Roofs and Windows

A5.2.2 It is assumed that the external walls are of a standard brick and block cavity wall construction and the roof comprises a pitched roof with tiles on felt, 100 mm mineral wool on a 12.5 mm plasterboard ceiling. Sound reduction indices for example constructions have been obtained from BS 8233:2014.

A5.2.3 Standard thermal double glazing is assumed based on a generic product specification of 6 mm glass / 12 mm air gap / 6 mm glass.

A5.2.4 **Table A5-1** summarises the sound insulation performance specifications for external walls, roofs and windows.

Table A5-1: Standard Building Envelope Sound Insulation Performance – Walls, Roofs and Windows

Element	Sound Reduction Index (SRI) at Octave Centre Band Frequency (Hz)								R _w (C; C _{tr})
	63	125	250	500	1k	2k	4k	8k	
Brick and Block External Wall ¹²	34	40	44	45	51	56	56	59	51 (-1; -4)
Standard Cold Roof ¹³	25	28	34	40	45	49	49	52	43 (-2; -5)
Double Glazing (6/12/6) ¹⁴	18	20	19	29	38	36	44	44	32 (-2; -5)

A5.2.5 Background Ventilation

A5.2.6 For the purposes of an outline noise assessment based on a standard building envelope sound insulation specification, it has been assumed that whole dwelling ventilation provision in habitable rooms (living rooms and bedrooms) would achieve the sound insulation performance specification advised in **Table A5-2** for a background ventilator. This performance is broadly commensurate with an equivalent area of 8,000 mm².

A5.2.7 The acoustic performance of most background ventilation products will be specified in terms of a single ventilator. Where a room requires more than one ventilator, this will need to be compensated for by adopting a commensurately higher performance for individual units. For example, if a room

¹² BS 8233:2014 Annex G More Rigorous Calculation.

¹³ Pitched, tiled roof with 100 mm mineral wool above 12.5 mm plasterboard ceiling.

¹⁴ Based on Pilkington Insulight 6/12/6.

required two or three ventilators, this would require an improvement in performance of 3 or 5dB respectively per unit.

Table A5-2: Standard Building Envelope Sound Insulation Performance – Small Elements

Element	Level Difference ($D_{n,e}$) at Octave Band Centre Frequency (Hz)								$D_{n,e,w}$ (C ; C_{tr})
	63	125	250	500	1k	2k	4k	8k	
Standard 8,000 mm ² non-acoustic background ventilator	31	31	31	31	31	31	31	31	32 (-1; -1)

A6 Acoustics and Overheating

A6.1 Building Regulations Approved Document O – Overheating

- A6.1.1 The Building Regulations Approved Document O – Overheating (ADO) came into force in June 2022 and sets out requirements for the control of overheating. ADO sets out two assessment methodologies: the Simplified Method and Dynamic Thermal Modelling. The Simplified Method identifies minimum window opening requirements and maximum glazed area requirements based on floor area. Dynamic thermal modelling (DTM) offers an alternative method of demonstrating compliance and provides more flexibility in addressing constraints to the overheating mitigation strategy from, for example, noise, air quality, safety and security.
- A6.1.2 ADO intimates that windows are assumed to be closed where the internal noise levels in bedrooms at night-time will exceed:
- 40 dB $L_{Aeq,8hr}$ (2300 hrs to 0700 hrs); and
 - 55 dB L_{AFmax} more than 10 times a night (between 2300 hrs and 0700 hrs).
- A6.1.3 These constraints are also assumed to apply equally to alternative methods of ventilation (i.e. acoustic louvres).
- A6.1.4 The Association of Noise Consultants Approved Document O Noise Guide (ADO Noise Guide) provides a method to demonstrate compliance to the Building Control Body of the noise constraints in ADO. It provides clarity for both practitioners and regulators so that assessments can be carried out consistently and the outcome is repeatable and reliable.

A6.2 Simplified Method

- A6.2.1 Assuming the use of the Simplified Method, ADO defines the minimum equivalent areas for high¹⁵ and moderate¹⁶ risk locations as 13% and 4% of the floor area of the bedrooms, respectively. The ADO Noise Guide estimates the resultant level differences from outside to inside as 5 dB for high risk locations and 10 dB for moderate risk locations.
- A6.2.2 Notably, these equivalent areas are based on large openings. For comparison, the equivalent area for a partially open window is typically assumed to provide approximately 13 dB sound level difference from outside to inside¹⁷. This equates to an equivalent area of 2% of the floor area of the associated bedroom.
- A6.2.3 Consequently, the external noise levels above which the ADO Simplified Method cannot be used are summarised in **Table A6-1**.

¹⁵ Urban and some suburban parts of London and some parts of central Manchester. Detailed in Appendix C of ADO.

¹⁶ All other parts of England.

¹⁷ Waters-Fuller, T., Lurcock, D., Mackenzie, R. & MacKenzie, R. (2007). NANR 116: 'Open/Closed Window Research' Sound Insulation Through Ventilated Domestic Windows.

Table A6-1: External Noise Level Above Which the Simplified Method Cannot be Used

Parameter	Moderate Risk Areas
L _{Aeq,8hr}	50 dB
L _{AFmax} (more than ten times a night-time)	65 dB

A6.3 Dynamic Thermal Modelling

- A6.3.1 Importantly, a DTM approach could show that ADO overheating criteria can be met with significantly smaller equivalent areas than the Simplified Method resulting in a commensurate reduction in terms of noise constraints. The DTM approach also enables consideration of alternatives to open windows such as ventilation louvres with any required acoustic properties.
- A6.3.2 The ADO Noise Guide sets out a methodology for calculating the required equivalent area based on the level difference needed to reduce the internal noise levels to meet the ADO noise criteria, once room dimensions are known. These equivalent areas can be provided to the Overheating Consultant to feed into the DTM exercise.
- A6.3.3 As noted in **Section A6.2**, a partially open window is typically assumed to provide approximately 13 dB sound level difference from outside to inside.



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