Noise Assessment:
Templars Way, Sharnbrook, Bedford

September 2020






Experts in noise and vibration assessment and management

Document Control

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1 Introduction

1.1 Noise Consultants Ltd ('NCL') has been commissioned by Cerda Planning to provide an assessment of railway noise on a site in the village of Sharnbrook in Bedfordshire where residential development is being promoted (the 'site').

1.2 The Sharnbrook Neighbourhood Development Plan (SNDP), which covers the area, is in draft and is currently out for pre-submission consultation prior to being submitted to Bedford Borough Council (BBC). The draft SNDP does not include the site as allocated for residential development, and the supporting information used to inform the SNDP stated that noise at the site may be a constraint.

1.3 This assessment has been produced to provide content that may be used in a representation supporting the site for residential development, including analysis of the current noise levels at the site and assessment of any measures needed to achieve suitable internal and external noise levels.

2 Site details

2.1 The site is located on the east side of Sharnbrook and is currently open fields used for farming. It is adjacent to Templars Way which provides road access, and around 650 m south-west of the A6 at the closest point. The Midland Main Line railway runs along the north-east boundary, with the site between Bedford and Wellingborough stations. Existing dwellings are on the other side of Templars Way to south-east, and a pub, The Fordham Arms, is to the south. A new electrical substation is located around 50 m to the north-east at the closest point, on the other side of the railway.

2.2 The approximate boundary of the site in the context of the immediate surrounding area is shown in **Figure 1** below (image date August 2017 – note this does not include the substation).

Figure 1: Approximate Site Boundary and Surrounding Area

3 Neighbourhood Plan

Policy

3.1 The draft Sharnbrook Neighbourhood Development Plan (SNDP) includes several planning policies. Of relevance to noise when considering residential development is the following:

> ***Policy S1 – Design Principles (Sub-Objectives 1d, 1e, 2c, 3a, 3d and 3f)***
>
> *"New development within Sharnbrook will be supported where it preserves and enhances the local character and appearance of the village. Proposals should: …*
>
> *d. protect residential amenity from direct overlooking, loss of daylight/sunlight, visual bulk and noise pollution."*

3.2 Where residential development is proposed, it is assumed that this policy applies to both existing and proposed dwellings.

Site Options and Assessment

3.3 As part of the neighbourhood plan process, a '*Site Options and Assessment*' report[1] was produced in May 2020 which examined the potential suitability of several sites in the Sharnbrook Parish for residential development.

3.4 The site was considered in the report and was classified as "*potentially suitable for development and allocation*." When considering the site in more detail, the report made several comments regarding the potential impacts of railway noise on any new residential development, as follows:

- *"In addition, the north-eastern boundary of the site adjoins the railway. A Noise Impact Assessment and acoustic screening would potentially be required due to potential noise impacts from the railway."*
- *"The site is potentially suitable for development and allocation subject to provision of a suitable access, infrastructure and noise mitigation from the railway line ..."*

3.5 Whilst the report highlighted the need to consider noise from the railway at the site, it was considered likely that noise impacts from the railway could be appropriately addressed in the design of a proposed development.

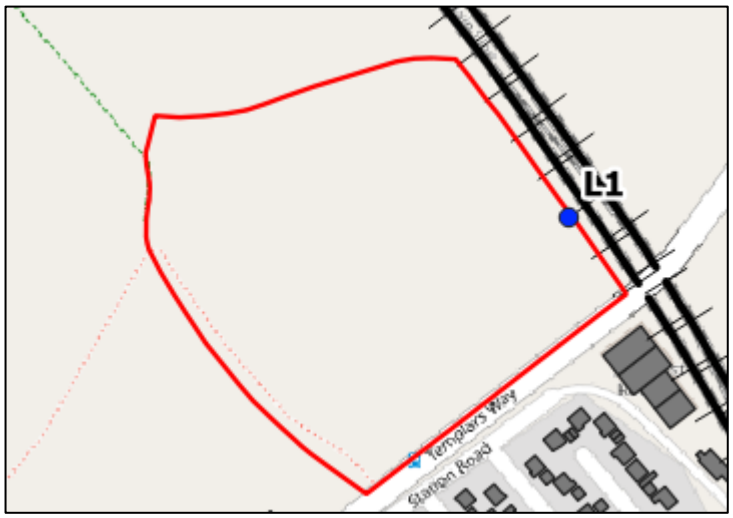
[1] Sharnbrook Neighbourhood Plan: Site Options and Assessment, prepared for Sharnbrook Parish Council by AECOM, revision 6 dated 06/05/2020

4 Noise Survey

4.1 To quantify the existing noise levels and inform the assessment, a noise survey was undertaken at the site.

4.2 The survey consisted of a Class 1 noise monitor deployed at the north-east boundary of the site at a height of 1.5 m above local ground level, adjacent to the railway and approximately 10 m from the nearest track. Noise was monitored from 11:15 on Wednesday 9th September 2020 to 09:00 on Thursday 10th September 2020. The monitoring location, L1, is shown in **Figure 2** below.

Figure 2: Noise Survey Location (L1)



4.3 The noise monitor was field calibrated using a Class 1 acoustic calibrator before and after the survey, with no significant change in sensitivity noted.

4.4 Using data from a local weather station[2], temperatures were between 9 and 22 °C during the day (07:00 to 23:00) with wind speeds between 1 and 4 m/s, and during the night (23:00 to 07:00) temperatures were between 8 and 10 °C with wind speeds up to 1 m/s. There was no precipitation during the survey. These weather conditions were suitable for undertaking noise measurements.

Observations

4.5 While at the site, it was observed that passing trains were the dominant source of noise. Noise from the new electrical substation to the north-east was only just audible at the closest point on the boundary of site, and therefore was not considered to be a source that may result in any material noise effects on the site. Distant road traffic noise from the A6 was also audible.

4.6 It should be noted that the survey was undertaken during the ongoing impact of the COVID-19 pandemic. In general, this has resulted in a reduction in the use of transport in the UK, including

[2] IBEDFO27: https://www.wunderground.com/dashboard/pws/IBEDFO27

cars and trains, and a corresponding reduction in noise levels from those sources. However, it was noted that during the week of the survey, the operator East Midlands Railway had introduced 97% of the 'normal' or pre-COVID timetable on the Midland Main Line[3], and therefore railway noise was expected to represent typical conditions at the site.

Results

4.7 The results of the survey were processed and are summarised in **Table 1** below for the day and night-time periods. The full results are presented as a time history graph in **Appendix A1**.

Table 1: Summary of Measured Noise Levels at L1

Survey Location	Day (07:00 – 23:00)	Night (23:00 – 07:00)	
	dB $L_{Aeq,16hr}$	dB $L_{Aeq,8hr}$	dB $L_{AFmax,1min}$ (11th highest)
L1	67	58	80

4.8 Following best practice guidance for the consideration of noise at new residential developments (see assessment section below), the noise levels have been presented using the $L_{Aeq,T}$ metric for both the 16 hour daytime period of 07:00 to 23:00 and the 8 hour night-time period of 23:00 to 07:00. This metric can be considered to represent a type of average noise level across the stated periods.

4.9 In addition, the 11th highest $L_{AFmax,1min}$ noise level measured during the night-time period has also been presented, which is typically used to identify the potential of individual noise events, such as passing trains, to affect sleep (the threshold for effects of this type should not be exceeded more than 10 times, hence the 11th highest measured value is used for design purposes). It should be noted that several trains, including freight, passed the site during the night and were the primary source of individual noise events.

5 Modelling

5.1 To facilitate further assessment of the site and potential residential development, a 3D noise model was developed using the software package LimA including the existing topography, ground type and buildings, as well the proposed dwellings where appropriate (see assessment section below).

5.2 Regarding sources of noise, the results of the survey were used to calibrate a source representing the Midland Main Line so that railway noise could be predicted across the site for both the day and night-time periods. This utilised the UK method for calculating railway noise, the Department of

[3] East Midlands Railway reinstates complete Midland Main Line service: https://www.eastmidlandsrailway.co.uk/help-manage/about-us/news-press/east-midlands-railway-reinstates-complete-midland-main-line-0

Transport technical memorandum '*Calculation of Railway Noise*' (CRN, 1995), as well as the standard ISO 9613-2:1996 for prediction of individual noise events.

6 Assessment

6.1 The primary basis for the assessment of the site is the industry best practice guidance document '*Professional Planning Guidance on Planning and Noise for New Residential Development*' (ProPG, 2017). This builds on existing guidance, including relevant British Standards, to provide a recommended approach for the management of noise within the planning system in England when considering new residential development.

Initial Site Noise Risk Assessment

6.2 The ProPG provides a methodology for an initial assessment of noise risk at a site, classifying risk into four categories: negligible, low, medium, or high. A summary explanation of each category is provided in **Table 2** below.

Table 2: Summary Explanations of ProPG Site Risk Categories

ProPG Site Risk Category	ProPG Based Pre-Planning Application Advice
High	Indicates an increased risk that the development would be refused on noise grounds.
Medium	Indicated site is less suitable from a noise perspective. A subsequent application may be refused unless a good acoustic design process is followed and demonstrated.
Low	Indicates development site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and demonstrated.
Negligible	Indicates development site is likely to be acceptable from a noise perspective.

6.3 It should be noted that the assessment of noise risk at a potential site is not intended to form the basis for a planning stage recommendation on a specific development. Rather, it is intended to give an early indication of the likely initial suitability of a site for new residential development and the extent of the acoustic issues that would need to be considered in the design.

6.4 Average railway noise for the day and night-time periods has been predicted across the current, empty site and plotted graphically according to the risk categories. These are presented in **Figure 3** and **Figure 4** respectively.

Figure 3: Daytime Site Noise Risk for Empty Site (dB $L_{Aeq,16hr}$)

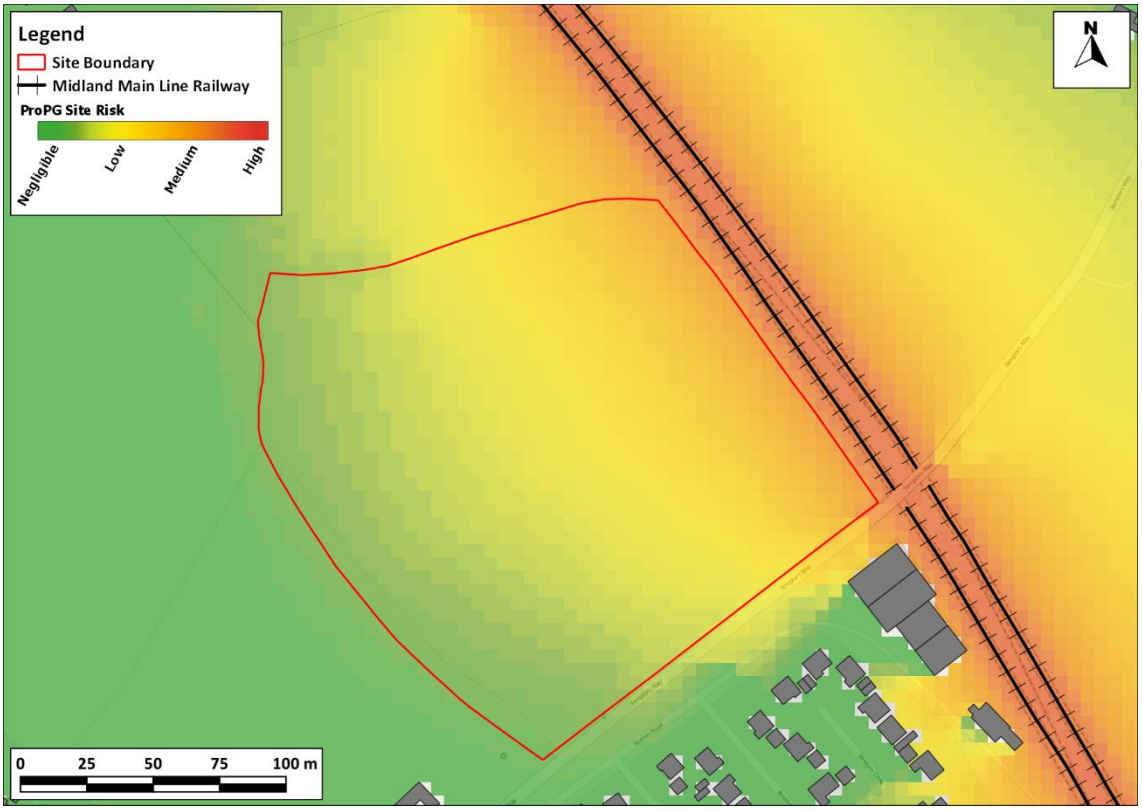
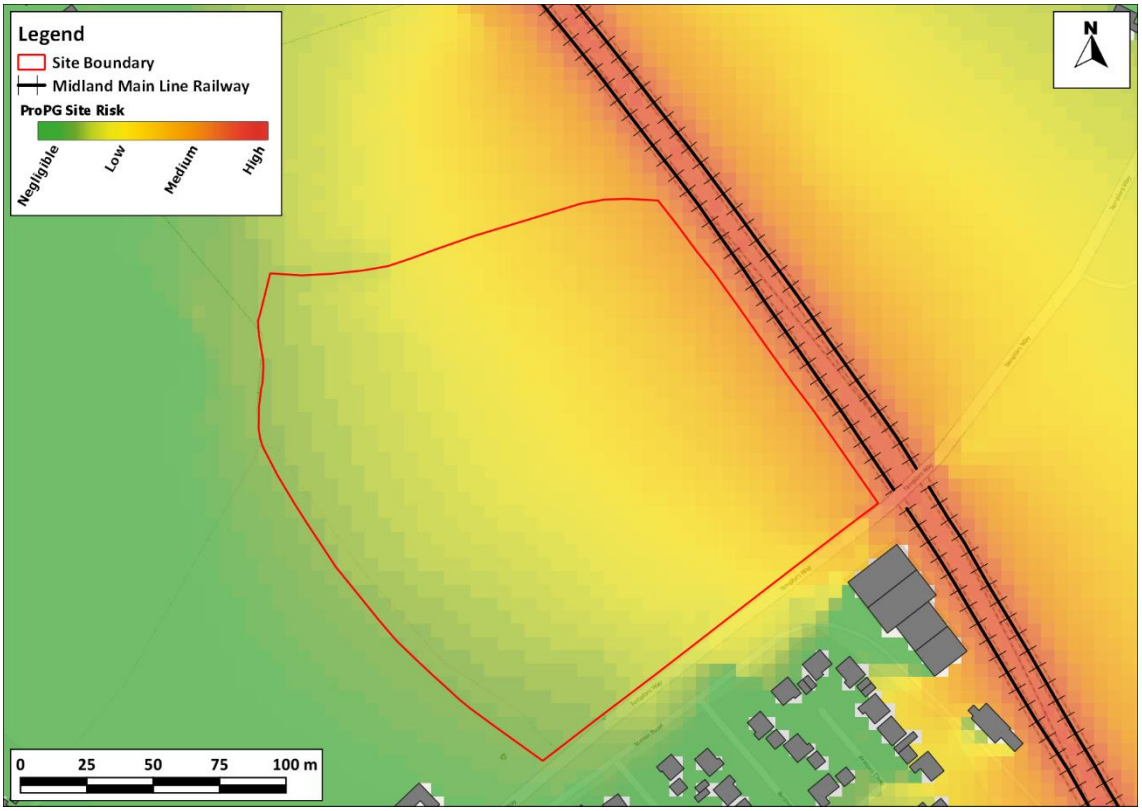


Figure 4: Night-time Site Noise Risk for Empty Site (dB $L_{Aeq,8hr}$)



6.5 It can be seen from **Figure 3** and **Figure 4** that the site noise risk from average railway noise is similar during the day and night-time periods. Most of the site is considered low risk, with the area closest to the railway line indicated as medium risk, and the section furthest from the railway as negligible risk.

6.6 This suggests that the site is likely to be acceptable for residential development from a noise perspective provided that a good acoustic design process is followed for any proposed development, particularly in the areas closest to the railway indicated as medium risk.

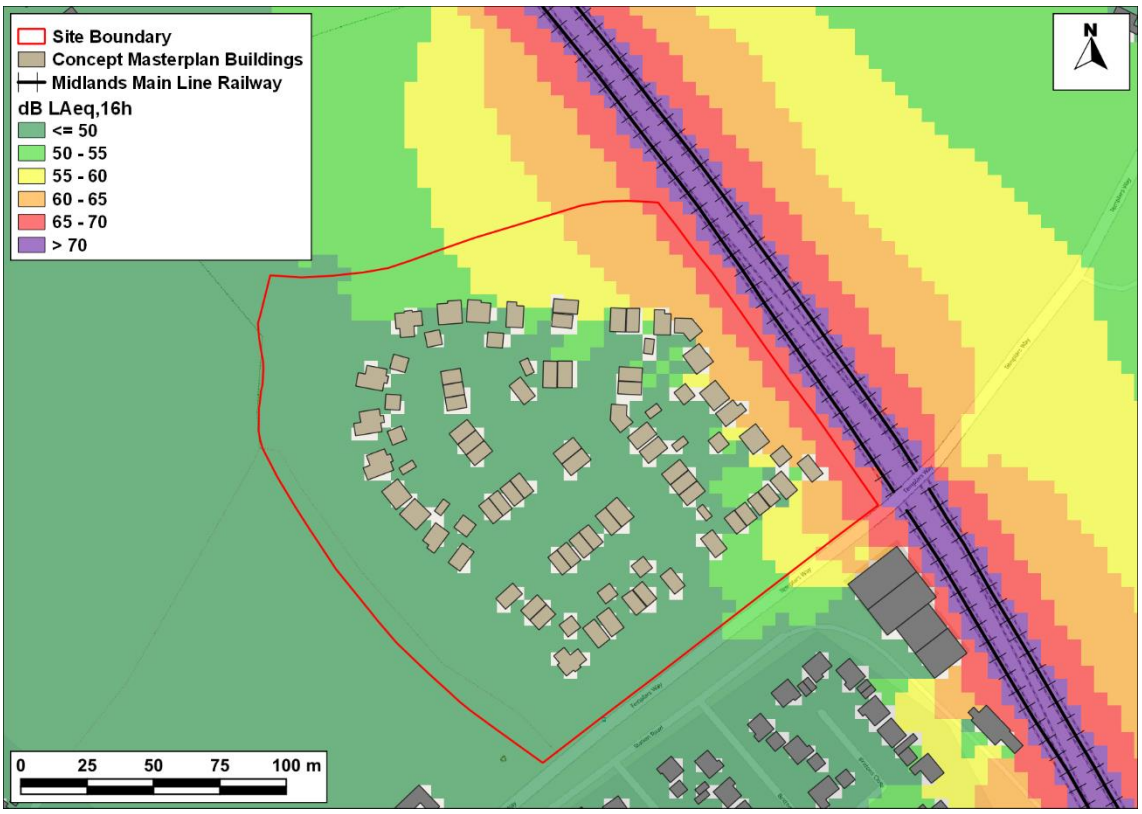
Assessment of Potential Development

6.7 To consider further the potential effects of noise on residential development at the site, it is necessary to incorporate a proposed design. NCL have been provided with a concept masterplan layout of dwellings which has been utilised for this purpose.

External Amenity Areas (Gardens)

6.8 During the daytime, the ProPG recommends that average noise levels in external amenity areas should ideally not be above the range of 50 to 55 dB $L_{Aeq,16hr}$. **Figure 5** below presents the predicted daytime average railway noise levels across the site in 5 dB bands and incorporates the concept masterplan dwellings.

Figure 5: Daytime Railway Noise Predictions for Concept Masterplan (dB $L_{Aeq,16hr}$)



6.9 From **Figure 5**, it can be seen that noise levels across the site are reduced with the addition of the dwellings, due to the buildings themselves providing screening of the railway. The vast majority of the site (lighter and darker green areas) is below 55 dB $L_{Aeq,16hr}$ and therefore would provide suitable conditions for external amenity areas with no further consideration.

6.10 While the boundaries of the gardens are not shown, the concept masterplan has been designed so that gardens are behind dwellings with respect to the railway line possible, to take advantage of the screening provided by the buildings.

6.11 A small number of gardens closest and most exposed to the railway (circa 4) fall into the 55-60 and 60-65 dB $L_{Aeq,16hr}$ bands. However, the predictions have not incorporated any fencing that would likely be installed around each garden. Where the direct line of sight to the railway, solid fencing can be expected to reduce noise levels in the gardens by up to 10 dB. On this basis, it is expected that suitable noise levels could be achieved in all external amenity areas with the use of solid fencing around the perimeter.

Indicative Façade Specification

6.12 When considering noise inside the habitable rooms of proposed dwellings (e.g. living rooms and bedrooms), it is usually necessary to consider whether suitable noise levels can be achieved with open windows, as well as the required acoustic specification of glazing and ventilation units.

6.13 It has been assumed, as is normal, that the acoustic performance of the rest of the façade, e.g. the walls, is great enough that it can be ignored, i.e. that the acoustic performance of the façade will be dictated by the glazing and ventilation units as they are typically the weak points.

6.14 The recommended internal noise thresholds for habitable rooms from the ProPG are summarised in **Table 3** below.

Table 3: Summary of Recommended Internal Noise Thresholds for Habitable Rooms

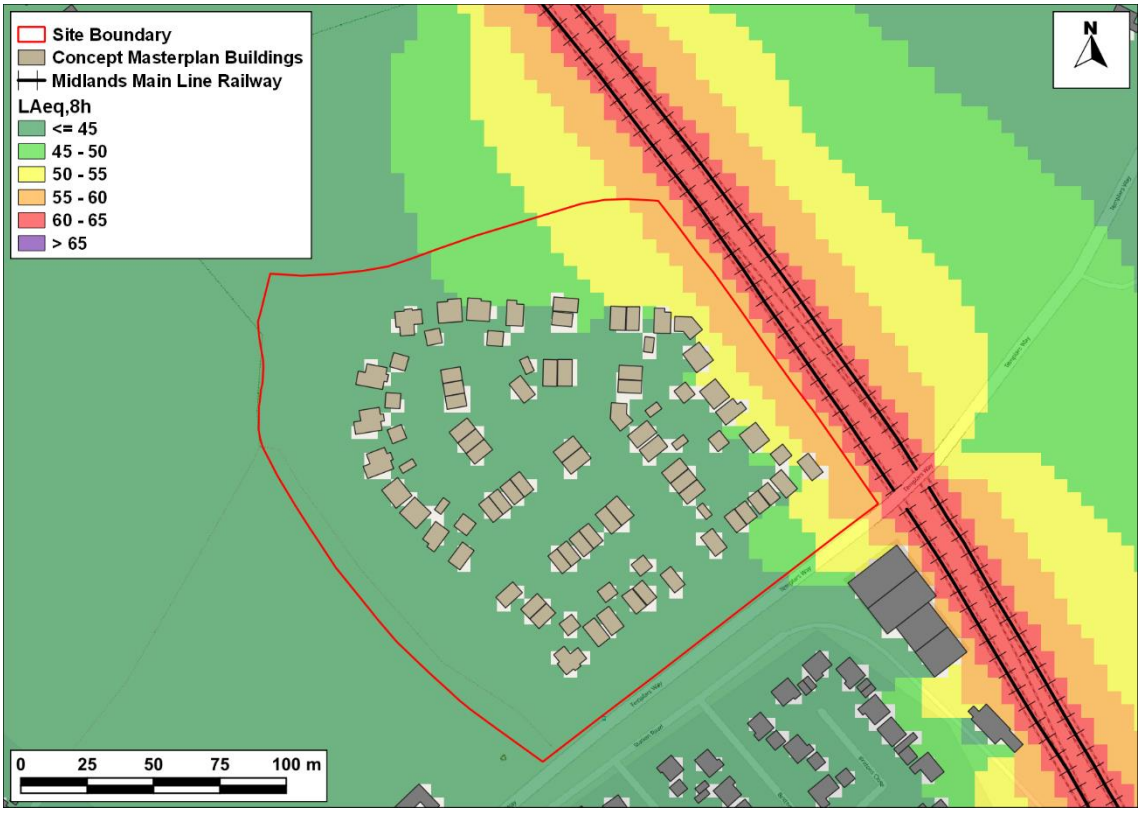
Room Type	Day (07:00 – 23:00)	Night (23:00 – 07:00)	
	dB $L_{Aeq,16hr}$	dB $L_{Aeq,8hr}$	dB $L_{AFmax,1min}$ (11th highest)
Bedroom	35	30	45
Living Room	35	-	-

6.15 When the windows of a habitable room are open, they are expected to attenuate external noise by up to 15 dB. When considering both the day and night-time, referring to **Figure 5** above and **Figure 6** on the next page, the vast majority of the dwelling façades are exposed to average railway noise levels of no more than 50 dB $L_{Aeq,16hr}$ during the day and 45 dB $L_{Aeq,8hr}$ during the night (the darker green areas). Therefore, the recommended thresholds should be achieved with open windows.

6.16 For the other areas, where the dwelling façades are closer and/or more exposed to the railway line, the recommended internal noise thresholds are unlikely to be achieved with open windows, which is typical of any site relatively close to a reasonably busy road or railway line. However, the predictions do indicate that natural ventilation can be employed in all instances (see below).

6.17 During the night, noise from individual noise events must also be considered. Predictions of individual noise events are difficult to present in graphical form. However, the predictions indicate broadly the same pattern as when considering the average railway noise during the night, i.e. that the majority of the site will be exposed to levels of up to 60 dB $L_{Aeqmax,1min}$ and therefore able to achieve the recommended internal noise thresholds with open windows, with the façades more exposed to the railway able to utilise natural ventilation.

Figure 6: Night-time Railway Noise Predictions for Concept Masterplan (dB $L_{Aeq,8hr}$)



6.18 Indicative acoustic performance requirements for glazing and ventilation units at the dwellings have been calculated and compared for the predicted average railway noise during both the day and night, and the individual noise event levels during the night. The comparison indicates that the required performance is greatest during the day.

6.19 Therefore, based on the noise contours for daytime average railway noise shown in **Figure 5**, a summary of the indicative acoustic performance requirements for glazing and ventilation units at the dwellings is presented in **Table 4** below. This is based on typical room characteristics and façade

element sizes and assumes that each habitable room requires two trickle vents with a combined equivalent area of 5,000 mm^2 to comply with Building Regulations requirements.

Table 4: Summary of Indicative Glazing & Ventilator Acoustic Performance Requirements

Façade Noise Band Exposure (Figure 5)		Indicative Glazing Specification		Indicative Ventilator Specification	
Colour	**dB $L_{Aeq,16hr}$**	**Acoustic Rating, R_w (C_{tr})**	**Example Type**	**Acoustic Rating, $D_{n,e,w}$ (C_{tr})**	**Example Type**
Orange	60-65	39 (-6) dB	6/16/6.8 mm with acoustic laminate	44 (-3)	Acoustic trickle vent
Yellow	55-60	33 (-5) dB	8/(6-16)/4 mm	38 (-2)	Acoustic trickle vent
Light Green	50-55	29 (-4) dB	4/(6-16)/4 mm (standard double glazing)	33 (-1)	Typical slot vent
Dark Green	≤ 50	29 (-4) dB	4/(6-16)/4 mm (standard double glazing)	33 (-1)	Typical slot vent

6.20 The assessment has shown that recommended noise levels in both external amenity areas and inside habitable rooms are likely to be achieved with appropriate garden fencing and façade element acoustic performance specifications. Most habitable rooms should achieve the recommended thresholds with open windows, and all habitable rooms should be able to utilise natural ventilation methods and achieve the thresholds. It is therefore considered that residential development at the site can readily comply with the relevant policy in the draft SNDP.

6.21 It should be noted that it may be possible to reduce the acoustic performance requirements of the façade elements, as well as noise levels in external amenity areas, by utilising a barrier along the north-east boundary of the site, adjacent to the railway. This would typically be earth bunding or fencing and would provide screening of the railway across the rest of the site. However, use of any such measure would be subject to landscape and visual impact constraints, and as previously discussed, it is expected that recommended internal and external noise levels can be achieved with suitable fencing and façade element specification alone.

7 Conclusions

7.1 Noise Consultants Ltd has been commissioned by Cerda Planning to provide an assessment of railway noise on a site in the village of Sharnbrook in Bedfordshire where residential development is being promoted.

7.2 The assessment has been produced to provide content that may be used in a representation supporting allocation of the site for residential development in the Sharnbrook Neighbourhood Development Plan, which is currently out for pre-submission consultation, and includes analysis of the current noise levels at the site and assessment of any measures needed to achieve suitable internal and external noise levels.

7.3 The dominant source of noise at the site is the Midland Main Line railway line which runs adjacent to the north-east boundary of the site. A noise survey has been carried out and, based on the results, a 3D model has been created to predict railway noise across the site.

7.4 Based on the modelled results, an initial site noise risk assessment of the empty site indicates a mainly low risk, with areas of medium risk closer to the railway line and negligible risk further away from it, suggesting the site is likely to be acceptable for residential development provided that a good acoustic design process is followed.

7.5 Utilising a concept masterplan layout, the noise levels in external amenity areas have been assessed, and indicative glazing and ventilator acoustic performance requirements for dwellings have been identified.

7.6 The assessment has shown that recommended noise levels in both external amenity areas and inside habitable rooms are likely to be achieved with appropriate garden fencing and façade element acoustic performance specifications. Most habitable rooms should achieve the recommended thresholds with open windows, and all habitable rooms should be able to utilise natural ventilation methods and the thresholds. It is therefore considered that residential development at the site can readily comply with the relevant policy in the draft SNDP.

8 Glossary

dB Decibel. The logarithmically scaled measurement unit of sound.

A-weighting Frequency weighting applied to measured sound to account for the relative loudness perceived by the human ear at different frequencies (pitches).

$L_{Aeq,T}$ 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.

L_{Amax} The A-weighted maximum recorded noise level during a measurement period, typically used to represent individual noise events.

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.

$D_{n,e,w}$ The weighted normalised Level Difference which characterises the airborne sound insulation of a small building element over a range of frequencies with a single number quantity. Typical used when specifying ventilation units.

C and C_{tr} Spectrum adaption terms that use standard reference curves to determine the weighted value of airborne sound insulation. C and C_{tr} consider different source spectra, where C considers the A-weighted pink noise spectrum and C_{tr} considers the A-weighted urban traffic noise spectrum.

A1 Noise Survey Results: Time History Graph