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REPORT AS7603.141121.R1.1

BARTONS ROAD, HAVANT

DETAILED NOISE MITIGATION APPRAISAL

Prepared: 26 November 2014

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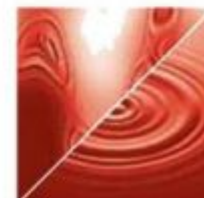
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AS7603/NM1	Noise Map – With Noise Barrier
AS7603/NM2	Noise Map – Without Noise Barrier
Appendix A	Acoustic Terminology
Appendix B	Results from previous report (AS7603.140404.NVIA)

1. INTRODUCTION

This report details a noise mitigation plan specific to the proposed layout of the residential development proposed for this site, to be submitted with the application for detailed planning consent.

Ambient noise survey measurements for the site appraisal carried out by CSA were undertaken between Thursday 20th and Monday 24th March 2014, and are detailed in CSA report reference AS7603.140404.NVIA, the results of which are also appended to this report for reference (Appendix B). This review quantified the train noise exposure of the undeveloped site, and identified outline mitigation measures as:

- Approx. 2m high noise barrier fence along the site boundary with the railway line.
- Enhanced glazing and attenuated means of alternative ventilation for proposed dwellings closest to the railway line
- Suggestions regarding orientation and location of dwellings.

Following initial discussions with East Hampshire District Council based on the site appraisal, more information was requested in relation to the detailed planning application on review by the District's Environmental Health Department in relation to noise impact on the development as proposed, including the application plot plan.

The site actually falls on the boundary between two local planning authorities; East Hampshire District Council (EHDC) and Havant Borough Council (HBC). EHDC volunteered to take a lead on the consideration of this application with regards to noise, and their officers' expertise will be relied upon by both authorities.

David Fitzgerald, Principal Environmental Health Officer for EHDC raised a number of points that he would wish to see addressed in the planning application before feeling he was in a position to recommend approval to the planning departments of the respective authorities. Further liaison between CSA and EHDC assisted in defining these points to establish the following aspects to be addressed in this report, in relation to the previous outline mitigation measures, now that the detailed planning application is under consideration.

Noise barrier fencing to be defined in more detail, to include:

- Demonstration of location and height requirements
- Justification of barrier extent / terminations at either end to maintain protection
- Performance specification and required physical characteristics
- Resultant benefit in reducing noise levels on site

Noise propagation calculations and assumptions to be confirmed, to include:

- Point vs line source characteristics of train noise
- Calculation methodologies employed
- Basis of threshold specification for glazing and ventilation treatments

This report addresses these points to provide EHDC (and HBC) with the clarity requested.

2. NOISE MITIGATION FOR DETAILED SITE LAYOUT - OVERVIEW

The site topography involves a railway line located at a lower level than the site, with levels sloping relatively steeply down to it along the western site boundary. As a result, noise barrier fencing along this boundary is relatively effective in protecting garden areas, but some of the upper storey bedroom windows of the closest dwellings will tend to overlook the fence. Train noise levels then drop off across the site due to distance and screening from the obscured railway line. This effect will be enhanced in the completed development, as the noise barrier fence and other built form (dwellings, garages, garden fences etc.) provide additional effective screening across the site.

Construction of a fence sufficiently high to provide reasonable protection to the windows of the first line of dwellings too, however, would be impractical, and raise other planning concerns. These areas therefore need to be protected by other means, specifically acoustically enhanced glazing, and alternative means of ventilation to ensure that the windows can be kept closed, taking advantage of their sound insulation performance. In a small number of instances, forced mechanical ventilation is considered appropriate, to

ensure that rooms in which train noise would otherwise be especially noisy need never open the windows, even for occasional 'purge' or 'rapid' ventilation requirements.

3. NOISE BARRIER FENCE

In relation to train noise propagation, Calculation of Railway Noise (CRN) as implemented with ISO 9613-2 compliant noise mapping software 'CadnaA' has been used to optimise screening of the site from train noise and to illustrate this via coloured noise map plots.

The calculations are based on cylindrical (line source) noise propagation from the near-side railhead as set out in CRN, and have been cross-checked against CSA's site survey measurements to provide an accurately validated noise emissions model.

Road traffic noise is also included in the model, again validated against the site survey data and calculated using the standard methodology, in this case Calculation of Road Traffic Noise (CRTN).

When using incorporating a barrier into a mitigation scheme ISO 9613-2 states the following;

An object shall be taken into account as a screening obstacle (often called a barrier) if it meets the following requirements:

- The surface density is at least (10kg/m^2);
- The object has a closed surface without any large cracks or gaps;
- The horizontal dimension of the object normal to the source-receiver line is larger than the acoustic wavelength at the nominal midband frequency for the octave band of interest.

Each object that fulfils these requirements shall be represented by a barrier with vertical edges. The top edge of the barrier is a straight line that may be sloping.

The attached noise maps (Figures AS7603/NM1 and NM2) show the improvements to gardens adjacent to the railway when incorporating a barrier which is nominally 2m to 2.5m in height above local ground level, with some variation in this height along its length to optimise the protection provided to external amenity space in gardens. The figures

illustrate how the acoustic fence protection extends beyond the line of the dwellings to maintain a consistent level of protection to gardens across the site.

Protection to amenity areas from road traffic noise to the south of the site is primarily achieved in the application site layout by orientation and self-screening from the built form on site. The garden of plot 19, however, is provided with an enhanced acoustic fence it being the most exposed private garden area in terms of road traffic noise.

The barrier performance specification above may be achieved using a standard close boarded timber fence construction proposed for demising garden fences throughout the site. The designated 'acoustic fence' elements shown on Figure AS7603.NM1 will need to comprise a suitably robust support structure to accommodate the increased heights (NB relevant approval from Network Rail may be required for line-side structures). In addition the designated acoustic fences will be specified to provide better performance over time, accounting for shrinkage and weathering. This can be achieved using the same standard close boarded design but increasing the feather edge board overlap from 25% to 40%, or by using a proprietary system which slots tightly together.

Demising garden fences are also included in the noise propagation model, which fulfil the above criteria for ISO9613-2 modelling, but are not relied upon for the first line protection against the respective noise sources.

4. ACOUSTICALLY UPDATED GLAZING

4.1 BS8233:2014 Guidance on sound insulation and noise reduction for buildings

The guidance in this document indicates acceptable noise levels for various activities within residential dwellings.

The relevant section of this standard is shown in the following table:

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

- Excerpt from BS8233: 2014

[dB ref. 20µPa]

Facades facing away from the railway and road, and properties located in the centre of the site, will be able to achieve these internal noise levels with open windows and therefore require no further mitigation. All other facades require enhanced glazing and alternative means of ventilation.

The performance specifications for the enhanced glazing required for each dwelling will be determined in line with the 'more rigorous calculation method' described in BS8233 on a plot by plot basis to provide the builder with a reliable means of ensuring compliance with the above levels without over-attenuation. This optimisation process helps to control the cost of mitigation measures, and perhaps more importantly avoids overly quiet conditions in which neighbour noise disturbance can be exacerbated.

The composite sound insulation performance of the building facades will be considered, rather than just the windows themselves, also allowing for the attenuated sound transmission path formed by acoustically attenuated trickle ventilators (see below).

5. ACOUSTICALLY ATTENUATED BACKGROUND VENTILATION

In areas where the design targets tabulated above will be exceeded with windows open, allowance needs to be made for an alternative means of background ventilation, such as acoustic trickle vents, so that windows can remain closed. (N.B. as indicated in BS8233:2014, windows need not be sealed - they "may remain openable for rapid or purge ventilation, or at the occupant's choice") Matched performance specifications will be defined on a plot by plot basis for trickle ventilators in terms of the $D_{ne,w}$ which enables the composite sound insulation of the façade to be determined alongside the open area required for ventilation in compliance with Approved Document F of the Building Regulations.

6. ACOUSTICALLY ATTENUATED FORCED MECHANICAL VENTILATION

In a small number of instances, specifically the flats in the south west corner of the site, single aspect dwellings are found facing the noise source, or exposed to both the railway and road, with no quieter rooms or facades available via which rapid or purge ventilation can be introduced into the dwelling more quietly.

In these instances it is appropriate to provide forced mechanical ventilation in habitable rooms, providing both 'trickle' and 'boost' functions. It is important that the ventilation system itself does not introduce troublesome additional noise when operational, and as such must be specified in parallel with the enhanced glazing performance specification (ref 4.1 above) along with Approved Document F of the Building Regulations (ref paragraph 4.36).

7. CONCLUSION

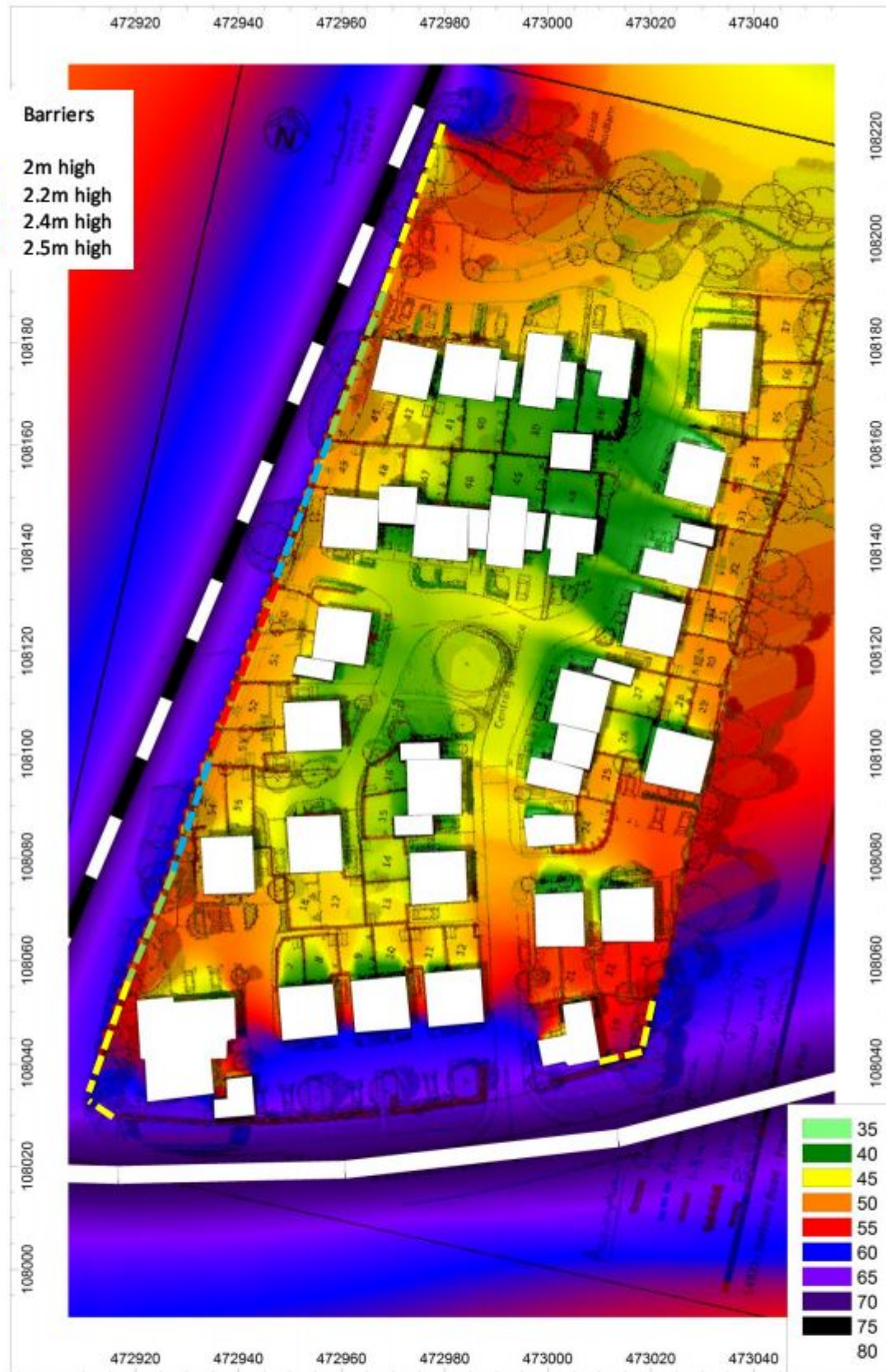
A more detailed analysis of the Bartons Road site has been undertaken, based on the initial site appraisal provided by CSA, and addressing specific points raised by East Hampshire District Council on behalf of themselves and Havant Borough Council.

This report addresses those points, and sets out the means by which the developer will provide mitigation against road and train noise intrusion to the proposed dwellings.



E H Clarke

CLARKE SAUNDERS ASSOCIATES



Title: Daytime With Noise Barrier

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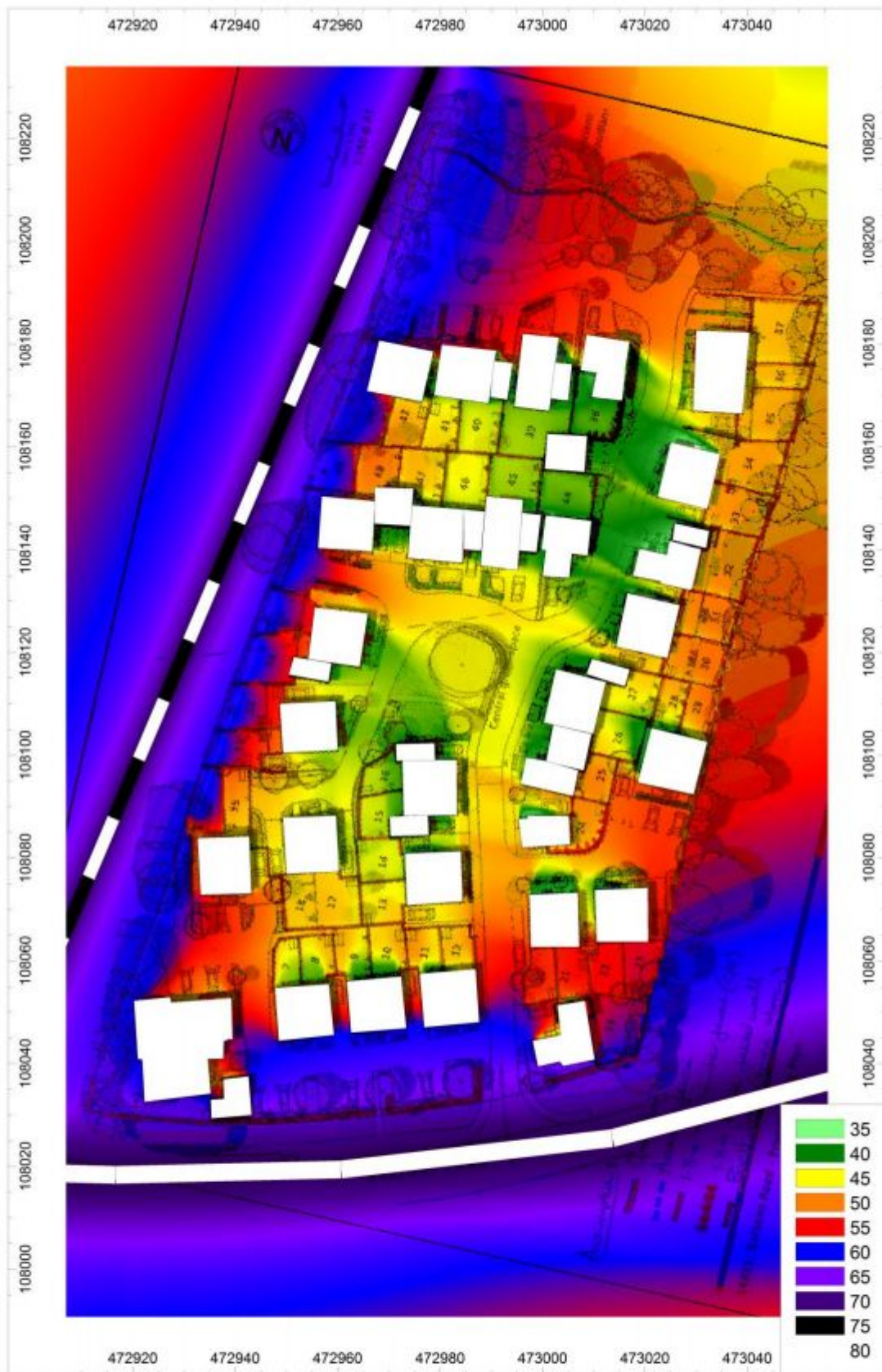
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Figure No: 7603/NM1



Title: Daytime Without Noise Barrier

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APPENDIX B

REPORT 7603.140404.NVIA - RESULTS

RESULTS

Environmental Noise Survey

The site is affected by train pass-bys and road traffic using Bartons Road.

Figures AS7603/TH1-TH4 and figures AS7603/TH5-8 show the L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} sound pressure levels as time histories at measurement positions 1 and 2 respectively.

Two periods of unusually high noise levels occurred at monitoring position 2 between 03:00 and 04:30 and between 12:30 and 13:30 on Sunday 23rd March, as shown on AS7603/TH7. After discussing this with the land owner, John Tiller, who currently lives on site, he was unaware of any noisy events at this time. However, liaison with National Rail has revealed that trains were cancelled on this day on this section of railway due to emergency works taking place. The data collected during these two periods has been omitted from the assessment.

The average $L_{Aeq, T}$ noise levels for the daytime and night-time periods and the typical L_{AFmax} noise levels for night-time periods are shown in Table 4.1.

Monitoring Position	Daytime $L_{Aeq, 16 \text{ hour}}$	Night-time, $L_{Aeq, 8 \text{ hour}}$	Night-time, L_{AFmax}
Position 1	64 dB	56 dB	74 dB
Position 2	62 dB	58 dB	84 dB

Table 4.1 - Daytime and night-time average noise level at position [dB ref. 20µPa]

Vibration Survey

The maximum results of the vibration measurements during the survey period are shown in Table 4.2 in terms of vibration dose values (VDV) for day and night periods.

Daytime $VDV_{day} (m/s^{-1.75})$	Night-time $VDV_{night} (m/s^{-1.75})$
0.173	0.164

Table 1.1 - Daytime and night-time VDV