



NOISE ASSESSMENT

for

PROPOSED NEW BUILD HOUSING

at

**NAPIER STREET
JARROW
SOUTH TYNESIDE**

for

Mr B Dunner

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NVA Report No: 696.1/1

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1.0 INTRODUCTION

- 1.1 At the request of Mr B Dunner, Noise and Vibration Associates (NVA) have carried out re-assessment of noise affecting a proposed residential development at Napier Street Jarrow (see Figure 1.0).
- 1.2 Significant noise sources affecting the site are road traffic on the nearby flyover (A185) and rail traffic (Metro and occasional freight) on the lines adjacent (see Figure 1.0). There are no other significant noise issues.
- 1.3 This assessment is based upon detailed measurement and observations reported by Applied Acoustic Design (26/07/2005). This detailed report gives sufficient information for assessment of the current application although the planning authority require updates of the situation in relation to potentially increased traffic (road, upon the completion of the 2nd Tyne Tunnel, and rail) and new proposals for development.

Figure 1.0 Proposed Development Site

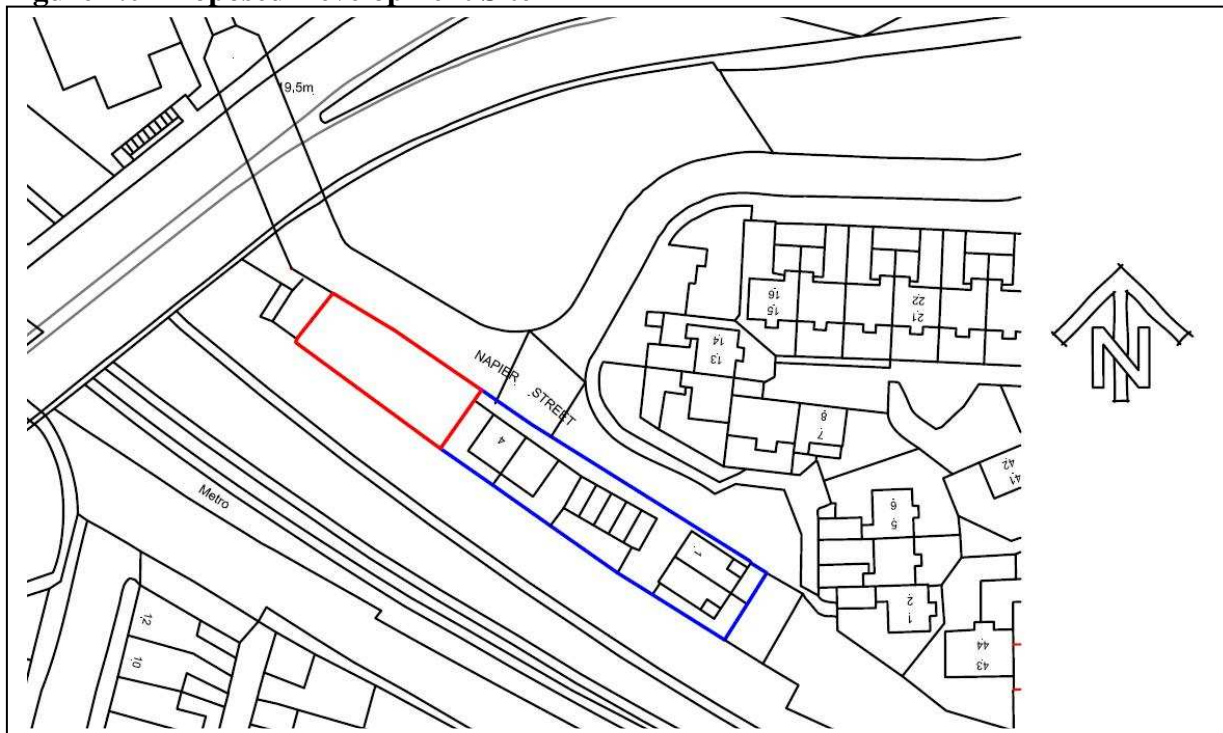


Photo 1.0: Site (Looking East)



2.0 MEASUREMENTS

- 2.1 Noise has been measured and reported in considerable detail by Applied Acoustic Design (July, 2005).
- 2.2 Noise was examined in detail for freight train and Metro train pass-by events and for general road traffic. It is NVA's opinion that the data therein enables assessment for the current development although necessary to take due consideration of potentially increased road and rail traffic. The main issue with rail noise will be Maxima during pass-by events and road traffic may well have increased due to the completion of the second Tyne Tunnel.
- 2.3 Summary of Noise Sources Affecting the Site

From the Applied Acoustic Design the following may be taken as a "worst case" summary of noise exposure in 2005:

LA _{eq} (16 hour Daytime, Rail)	=	61dB(A)
LA _{eq} (16 hour Daytime, Road)	=	57dB(A)
LA _{eq} (16 hour Daytime, Road and Rail)	=	62dB(A)
LA _{eq} (8 hour Night Time, Road and Rail)	=	45dB(A)
LA _{Max} (Rail)	=	80dB(A)

Road and rail traffic may well have increased but NVA would not expect the changes to be massively significant in terms of overall exposure of the site to noise.

Road and rail traffic needs to double in volume to effect a 3dB(A) increase in Equivalent Continuous Noise Levels. Whilst this may be the case for road traffic (Tyne Tunnel completion) it is unlikely for rail traffic where the Maxima will remain the main issue. A "worst case" estimate of current noise exposure would therefore be:

LA _{eq} (16 hour Daytime, Rail)	=	62dB(A)
LA _{eq} (16 hour Daytime, Road)	=	60dB(A)
LA _{eq} (16 hour Daytime, Road and Rail)	=	64dB(A)
LA _{eq} (8 hour Night Time, Road and Rail)	=	45dB(A)
LA _{Max} (Rail)	=	80dB(A)

3.0 GUIDANCE

3.1 Current Guidance – National Planning Policy Framework

National Planning Policy Framework (NPPF – Reference 1 and the accompanying “Noise Policy Statement for England”) has now replaced the revoked PPG24 (Reference 4). The guidance of BS8223 on internal noise levels within buildings is not replaced and the guidance therein is still current. It should be noted that NPPF generally refers to WHO Guidelines as regards noise limits and these, along with those of BS8233 may be taken as guidance. Externally, amenity garden equivalent continuous noise levels less than 55dB(A) should be sought and, internally, habitable room equivalent continuous noise levels less than 30dB(A) and Maximum Noise Levels in habitable rooms not exceeding 45dB(A) should also be a design target.

3.2 The core strategies of NPPF are:

14. At the heart of the National Planning Policy Framework is a **presumption in favour of sustainable development**, which should be seen as a golden thread running through both plan-making and decision-taking.

For **plan-making** this means that:

- local planning authorities should positively seek opportunities to meet the development needs of their area;
- Local Plans should meet objectively assessed needs, with sufficient flexibility to adapt to rapid change, unless:
 - any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole; or
 - specific policies in this Framework indicate development should be restricted.

For **decision-taking** this means:

- approving development proposals that accord with the development plan without delay; and
- where the development plan is absent, silent or relevant policies are Out of date, granting permission unless:
 - any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole; or
 - specific policies in this Framework indicate development should be restricted.

The following are key recommendations of NPPF:

123. Planning policies and decisions should aim to:
- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
 - mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
 - recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established;

New development schemes should fulfill the requirement of the Noise Policy Statement for England that:

- 2.3 Furthermore, the broad aim of noise management has been to separate noise sources from sensitive noise receivers and to “minimise” noise. Of course, taken in isolation and to a literal extreme, noise minimisation would mean no noise at all. In reality, although it has not always been stated, the aim has tended to be to minimise noise “as far as reasonably practical”. This concept can be found in the Environmental Protection Act 1990, where, in some circumstances, there is a defence of “best practicable means” in summary statutory nuisance proceedings.

4.0 DISCUSSION AND ASSESSMENT

4.1 Noise Affecting the Proposed Development

Current guidance on noise affecting new development is from National Planning Policy Framework (NPPF). Paragraph 123 and Footnote 27 (see Section 4.4) should be key.

Planning policies and decisions should also aim to:

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established*
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

As for guidance on “noise limits”, NPPF defers to WHO Guidelines.

4.2 Noise Amelioration Measures

With reference to BS8233:1999 (Reference 2, Table 5), Internal Equivalent Continuous Noise Levels of 30 dB(A) or less would be classed as “good” for “habitable” rooms (i.e. Living Rooms and Bedrooms), whilst “reasonable” conditions are classified as 35dB(A) for bedrooms and 40dB(A) for Living Rooms. PPG24 and WHO (World Health Organisation) also recommend “a level of 35dB(A) to preserve the restorative process of sleep”. BS8233 also recommends that internal noise levels from repeated night time maxima should not exceed 45dB(A).

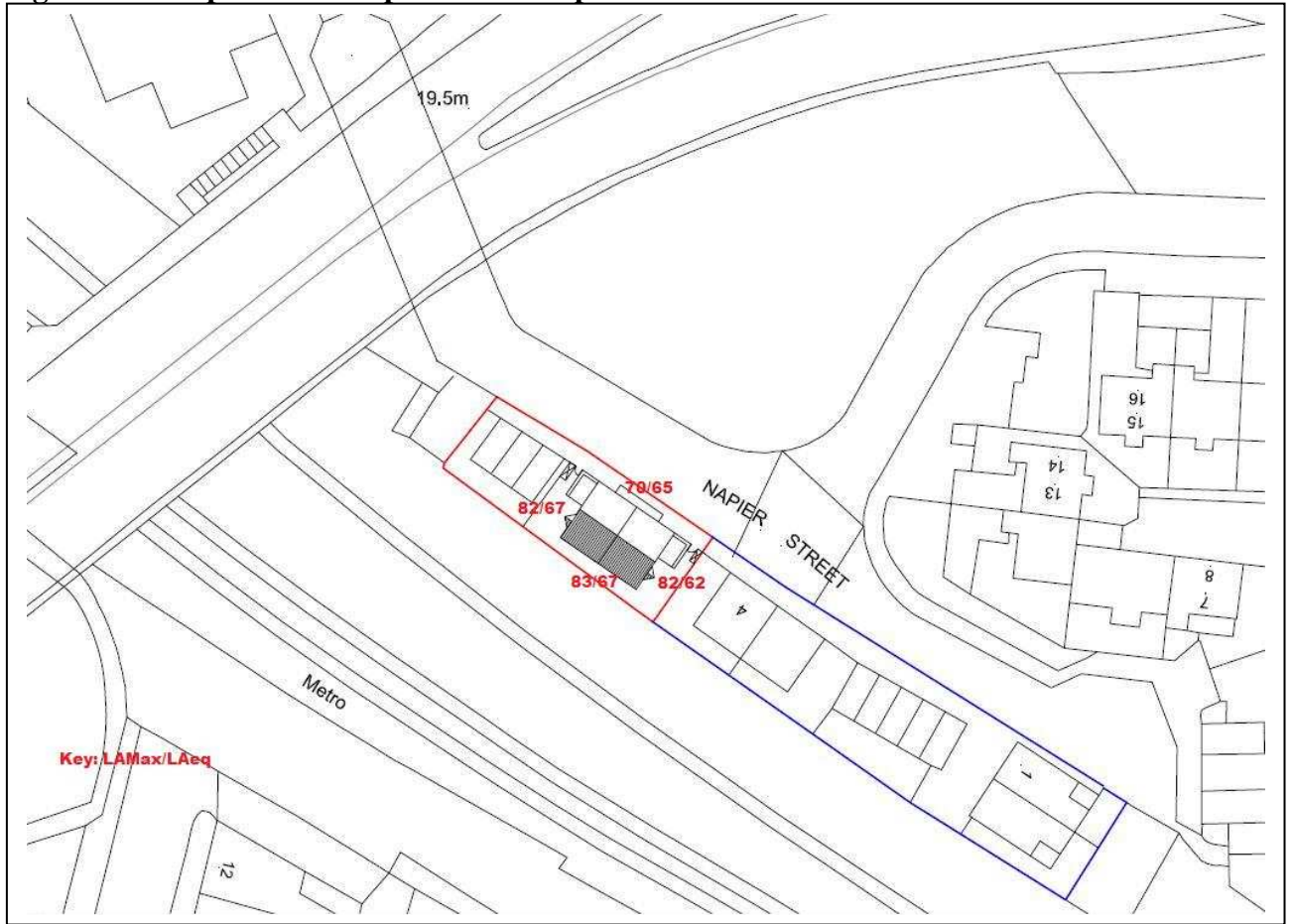
Noting the above, the following criteria are usually applied to proposed developments similar to this:

- 1) Internal noise levels in habitable rooms (bedrooms, living rooms, etc) are limited to 35dB(A) Daytime and 30dB(A) Night time.
- 2) Internal maximum night time noise levels in habitable rooms should not exceed 45dB(A).
- 3) Noise levels in amenity gardens should not exceed 55dB(A).

In this case, the above criteria for internal noise levels will require the building envelope (walls, glazing, ventilation) to habitable rooms with windows within the facades with a view of road or rail to provide the appropriate insulation against external noise.

Expected daytime façade noise levels due to road traffic, based on the measured noise levels (but increased by 3dB(A) in respect of façade reflections) are shown in Figure 2.0 (overleaf). Relevant noise amelioration measures to the building envelope are then suggested in Sections 4.2.1 to 4.2.3, below.

Figure 2.0 Proposed Development and Expected Noise Levels



5.2.1 Glazing

The weakest part of a building façade in terms of sound insulation is often the glazed areas. NVA would suggest, therefore, that the insulation of various glazing configurations may be assessed by reference to the Traffic Noise Insulation Index (R_{Tra}) (which takes account of an increased low frequency content usually associated with road traffic) enabling estimation of the A-weighted reduction according to the following formula (based on that given in Ref 2, Sect 6,7):

$$LAeq(Inside) = LAeq(Outside, Façade) - R_{Tra} + 10 \text{ Log}\{S_w/A\} \quad (1)$$

Where S_w is the glazed area and A is the total acoustic absorption within the room

With an assumption of $2.5M^2$ glazed area and a room volume of $40M^3$ and “reverberation time” around 0.7 seconds, (1) becomes (approximately):

$$LAeq(Inside) \sim LAeq(Outside, Façade) - (R_{Tra} + 3) \quad (2)$$

Noting the above and also considering that Night Time Noise Levels would be expected to be reduced by 5dB(A) or more, a reasonable design target would be to limit Daytime Noise Levels to 35dB(A) and Night Time Levels to 30dB(A). This would generally be considered to be representative of a “good” internal noise environment. Glazing configurations (or equivalent) from within the following range (Table 2.0) would normally be recommended as appropriate to habitable rooms with windows in the rear, front and side facades with view of road and rail traffic.

Table 2.0: Glazing Options For Habitable Rooms To All Facades

Expected Façade Noise Level Max/LAeq dB(A)	Glazing Configuration (Glass/Cavity/Glass)	Noise Reduction Range dB(A)	Resultant Internal Noise Level Max/LAeq - dB(A)
83/67 Max/LAeq Rear and sides	10mm/200mm/6mm (Secondary)	~48	~35/19 Good Internal Noise
	6mm/150mm/4mm (Secondary)	~42	~41/25 Good Internal Noise
	10mm/12mm/6.4mm (PVB)*	~37	~46/30 Good Internal Noise*
	10mm/12mm/6mm	~35	~48/32 Good Internal Noise*
78/65 Max/LAeq Front	10mm/12mm/6.4mm (PVB)	~37	~41/28 Good Internal Noise
	10mm/12mm/6mm	~35	~43/30 Good Internal Noise

(PVB) - Pilkington Standard Laminated Glass (or equivalent)

(+) These options would be secondary glazed in separate frames with sound absorbently lined reveals within the cavity.

Night time noise levels are fully expected to be reduced by at least 5dB(A) such that the above glazing configuration will provide for equally acceptable night time conditions.

In general, for small cavity glazing (~12mm) reduction to 10mm cavity, to accommodate frame rebate sizes, would not be significant in terms of noise reduction.

Other glazing configurations giving equivalent performance would be acceptable.

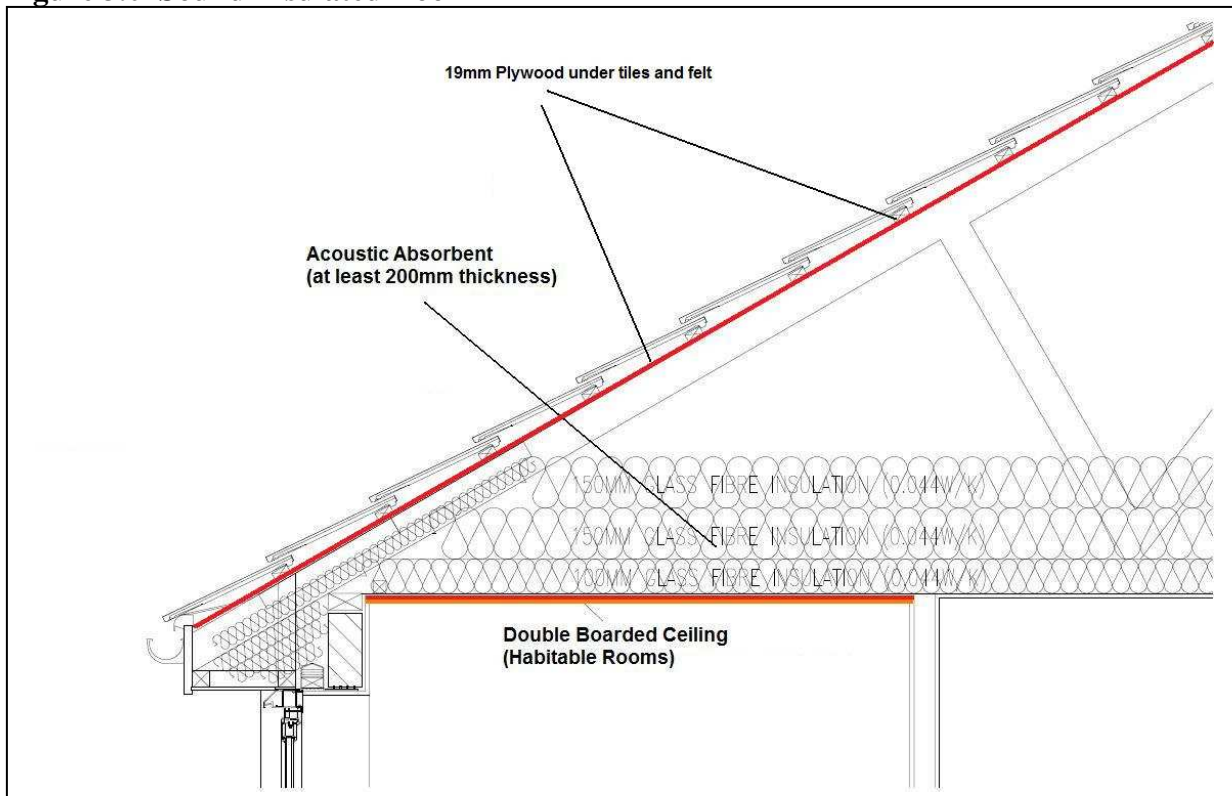
In all cases windows may be openable (for purge ventilation) but should be well sealed when closed.

(* **NVA would note that if the screening fence or wall is incorporated (see 5.3, below) the rear French windows at ground floor will be screened from train noise and the lesser specifications (i.e. not secondary glazed) will be acceptable.**

5.2.2 Roof/Ceiling

For those habitable rooms directly beneath roof/ceilings (Bedrooms, Living Rooms, Dining Rooms), and noting Pitch Roof construction, NVA would recommend 19mm Sheet Plywood under tiles on felt and a thence a double boarded ceiling of overlapped GYPROC SOUNDBLOC (15mm thickness and 12.5 kg/m² superficial density – or equivalent) taped, skimmed and sealed. The felt layer should be well sealed at all edges such that there are no air paths to noisy external areas. The loft cavity should contain at a 200mm layer of sound absorbent material such as mineral wool or fibre glass.

Figure 3.0 Sound Insulated Roof



It will also be necessary to design for adequate ventilation of the roof and incorporation of thermal building regulations without significantly compromising sound insulation.

5.2.3 Ventilation

In the case of those habitable rooms with a view of the railway or the A185 ventilation systems enabling appropriate ventilation without recourse to open windows to noisy facades should be incorporated. Suppliers should be informed that an overall sound reduction of the order of 45dB(A) between external and internal is required (See Appendix 4.0 for supplier list). This will typically require ventilation systems to provide a sound reduction of 50dB($D_{ne,w}$) or better whilst still providing appropriate ventilation.

NVA are not qualified to make recommendations for the specification of ventilators in relation to The Building Regulations (Ventilation – Approved Document F). It is our understanding that whatever ventilators are used they should provide the above level of acoustic insulation whilst still providing the basic ventilation requirements (i.e non-purge situations) for each habitable room for which they are required. Should a purge ventilation requirement arise then windows may be opened in the normal manner. Reputable suppliers will usually provide a free design service to satisfy both acoustic and ventilation requirements. The noise levels detailed in this report should enable them to configure and recommend appropriate ventilation solutions.

5.3 Other Considerations

Night Time Noise Levels

Night Time noise measurements are not considered necessary as, when dominated by road traffic noise, they are usually some 7dB(A) less than the Daytime results (unless very special circumstances prevail) and recommended amelioration measures for Daytime noise are therefore totally sufficient for Night Time.

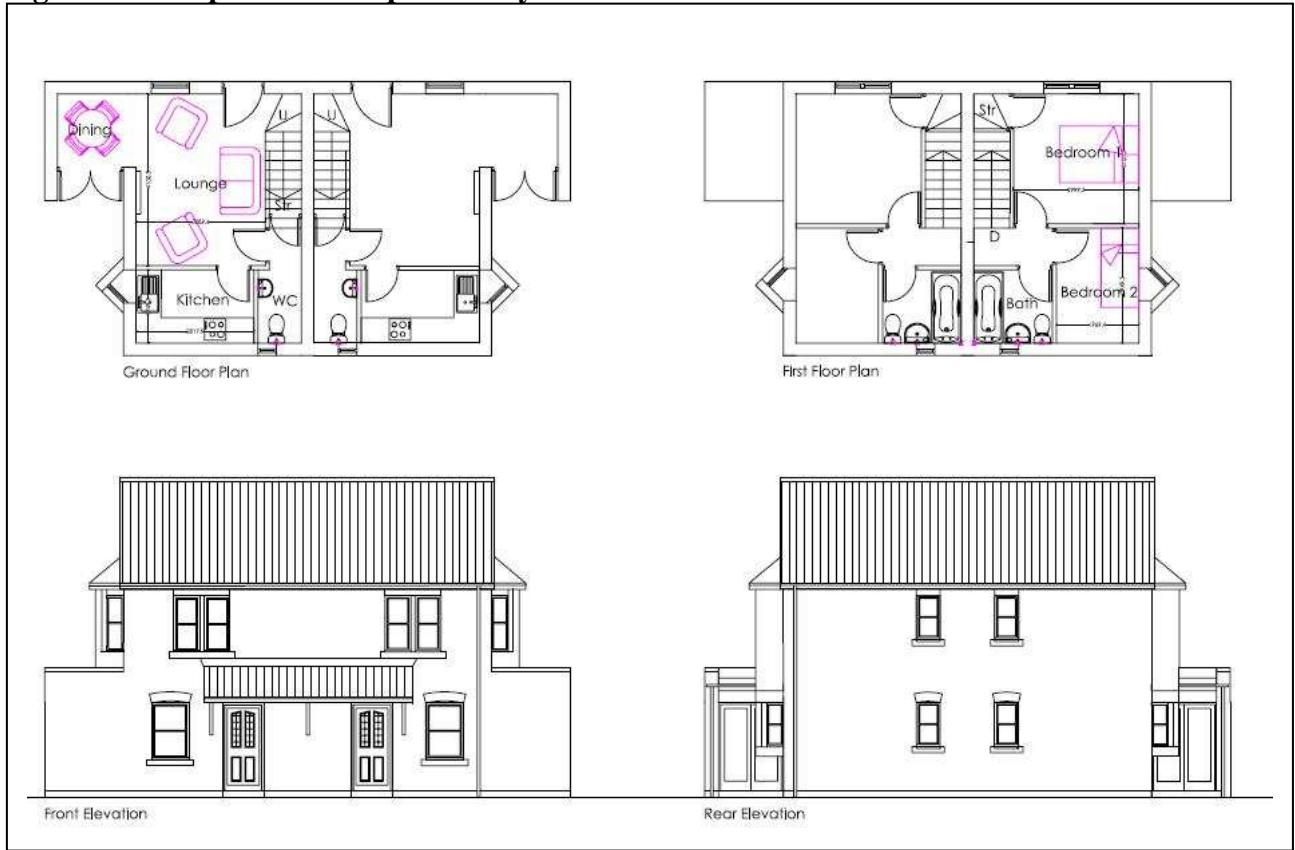
Amenity Garden Noise Levels

NVA are unsure if the rear space is to be formally classified as an “amenity garden” but the French windows to rear are noted; a screening wall or close boarded fence is therefore recommended. This should be of at least 2 metres height so as to remove line of sight to passing trains from people in the external yard area. If a close boarded fence is utilised it should be of superficial density (mass per unit area) 8kg/m^2 or more without gaps.

Care should be taken that the French windows provide the required sound insulation (as a safeguard measure) even though they would be screened by the wall or fence.

NVA note that there are no windows to habitable rooms at the rear façade in any case. This is good design under the circumstances and reduces emphasis on secondary glazing. However, NVA recommend secondary glazing at the side façade (triangular) windows to Bedroom 2 of each unit.

Figure 4.0 Proposed Development Layouts and Facades



5.0 CONCLUSIONS

- 5.1 The required noise assessment has been carried out to update representative noise levels associated with road and rail traffic noise affecting the proposed development. This has been on the basis of the previous detailed measurements (2005) but updated to a representative “worst case” situation.
- 5.2 Under current guidance of National Planning Policy Framework, NVA would recommend significant mitigation measures (enhanced glazing, screening, sound attenuated ventilation and enhanced roof/ceiling sound insulation). Subject to the provision of the noise amelioration measures, as identified in this report, the occupants of the proposed development would not be subject to any significant adverse impacts on health and quality of life from noise. The proposals are compliant with the requirements of the NPPF and the Noise Policy Statement for England (Department for the Environment, Food and Rural Affairs).
- 5.3 Typical recommendations for noise amelioration measures to ensure good/acceptable internal noise environments (daytime and night time) within habitable rooms with windows to all facades are given in 5.2.1 to 5.2.3 above.

REFERENCES

- 1) Department of the Environment Planning Policy Guidance: PPG24: 1994
“Planning and Noise”.
- 2) Sound Insulation and Noise Reduction for Buildings: BS8233:1999
- 3) Department of Transport “Calculation of Road Traffic Noise” HMSO

APPENDIX 2.0 GUIDANCE

A2.1 General guidance with regard to absolute noise levels in relation to proposed residential development is given by PPG 24 (Reference 1). This guidance considers absolute noise levels and is applicable to those sites affected by any combination of road, rail, air and industrial noise. Assessment of noise affecting the proposed development may therefore be formally assessed by the methods of PPG24.

A2.2 **Department of the Environment Planning Policy Guidance PPG24 (Reference 1): Planning and Noise, 1994 (superseding Planning Circular 10/73, 1973).**

This planning guidance document outlines considerations to be taken into account in determining planning applications for noise sensitive developments in areas where noise levels are significant. The guidance predominantly relates to transportation noise (road, rail and air).

This document defines 4 “Noise Exposure Categories (NEC)” to assist local planning authorities in relation to the assessment of proposed residential developments. Categories are defined according to Daytime and Night Time Equivalent Continuous Noise Levels:

Category A:

Road Noise: < 55 dB(A) $L_{eq(16 \text{ hour})}$ **Daytime** and < 45 dB(A) $L_{eq(8 \text{ hour})}$ **Night Time**

Rail Noise: < 55 dB(A) $L_{eq(16 \text{ hour})}$ **Daytime** and < 45 dB(A) $L_{eq(8 \text{ hour})}$ **Night Time**

“Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be considered as a desirable level”.

Category B:

Road Noise: < 63 dB(A) $L_{eq(16 \text{ hour})}$ **Daytime** and < 57 dB(A) $L_{eq(8 \text{ hour})}$ **Night Time**

Rail Noise: < 66 dB(A) $L_{eq(16 \text{ hour})}$ **Daytime** and < 59 dB(A) $L_{eq(8 \text{ hour})}$ **Night Time**

“Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise”.

Category C:

Road Noise: < 72 dB(A) $L_{eq(16 \text{ hour})}$ **Daytime** and < 66 dB(A) $L_{eq(8 \text{ hour})}$ **Night Time**

Rail Noise: < 74 dB(A) $L_{eq(16 \text{ hour})}$ **Daytime** and < 66 dB(A) $L_{eq(8 \text{ hour})}$ **Night Time**

“Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quiet sites available, conditions should be imposed to ensure a commensurate level of protection against noise”.

Category D:

Road Noise: > 72 dB(A) $L_{eq(16 \text{ hour})}$ **Daytime** and > 66 dB(A) $L_{eq(8 \text{ hour})}$ **Night Time**

Rail Noise: > 74 dB(A) $L_{eq(16 \text{ hour})}$ **Daytime** and > 66 dB(A) $L_{eq(8 \text{ hour})}$ **Night Time**

“Planning permission should normally be refused”.

APPENDIX 3.0: ACOUSTIC UNITS

Noise in these situations is generally measured and assessed in terms of the following parameters:

"A" weighted Sound Pressure Level (SPL) - dB(A).

This represents an "average" sound level measured over selected time periods of either 1 second ("slow response") or 0.125 seconds ("fast response"), taking account of the entire audible frequency range (with an applied "weighting" according to human auditory response). The "A" weighted decibel is the commonly accepted measure of noise level in relation to regulations and the effects of noise on man. With many noise sources (e.g. traffic noise) there is a general variation of level from second to second; it is not possible to directly read off a representative noise level and statistical averaging of a suitable form has to be utilised. The various statistical measures that may be considered are described below:

Sound Exposure Level (SEL) - dB or dB(A).

For isolated "noise events", such as the passage of various types of train, it is useful to determine the "total noise energy" associated with a "pass-by" event. If the number of such events, over an assessment time period, are known it is possible to accurately calculate noise data, such as "Equivalent Continuous Noise Level" (see below) that may be compared to relevant guidance for planning and insulation purposes.

Equivalent Continuous Noise Levels (L_{eq}) - dB or dB(A).

When noise levels generally vary with time, as is the case with passing traffic noise, it is convenient to relate measurements to the average noise energy per second received during the measurement period. The unit utilised for this purpose is the Equivalent Continuous Noise Level (L_{eq}) which is defined as:

"That level of continuous steady noise that contains the same amount of noise energy as the variable noise under consideration".

The usual "A" weighting may be applied (resultant units of dB(A)), to give an overall assessment of the "noise energy" corrected for the sensitivity of the human hearing mechanism. Note that, if noise was completely steady, then the Equivalent Continuous Noise Level (L_{eq}) would exactly equal the Sound Pressure Level; in cases where noise is non-steady, L_{eq} may be thought of as an average noise level.

Percentile Noise Levels - dB or dB(A).

Where noise levels vary with time, as may be the case with traffic noise, it is often convenient to determine levels of noise that are exceeded for a certain percentage of the measurement period. These levels are signified as L_n , where L is the noise level exceeded for $n\%$ of the measurement period (for instance, L_{10} would signify that level of noise that has been exceeded for 10% of the whole measurement period). Traffic noise and environmental impact noise surveys may be meaningfully assessed with this type of unit; an L_{90} would typically represent a "Background Noise Level" and L_{10} will relate to subjective annoyance by intermittent noise.

The "A" weighting may again be applied (resultant units of dB(A)), to give an overall assessment of the noise corrected for the sensitivity of the human hearing mechanism.

Traffic noise is assessed in terms of the "L₁₀(18 hour)", defined as that level of A-weighted noise exceeded for 10% of the 18 hours between 0600hrs and 2400hrs. This may be approximated by a 3 hour shortened measurement, as defined in Reference 3.

Decibel Scale.

The decibel is a logarithmic measure defined in the form of a ratio to a specified "reference level"; in the case of noise levels the decibel scale is based upon a reference level of 0.00002 Newtons/square metre as follows:

$$SPL = 10 \log_{10} \left[\frac{\overline{p^2}}{(0.00002)^2} \right]$$

"A-weighting".

As mentioned above, the "A-weighting" associates different importance to the noise in relation to the frequency content; work has shown that the human hearing mechanism is more sensitive (and susceptible to damage) to noise in certain frequency ranges. Modern measuring equipment enables the different sensitivity to be assessed electronically, the resultant unit being the A-weighted decibel defined as:

$$SPL(A) = 10 \log_{10} \left[\frac{\overline{p_A^2}}{(2 \times 10^{-5})^2} \right]$$

APPENDIX 4.0 SUPPLIERS OF SOUND ATTENUATED VENTILATORS

Rytons Building Products Ltd
Design House
Kettering Business Park
Kettering
Northants
NN15 6NL

Tel: 01536 511874

Passivent
Brooklands Road
Sale
Cheshire
M33 3SS

Tel: 0161 962 7113

Air Domestique Installations Ltd
31, Berkely Road
London
N15 6HH

Tel: 0181-880-2426

Greenwood Air Management
Brookside Industrial Estate
Rustington
West Sussex
BN16 3LH

Tel: 01903-771021