Proposed residential development – Greenloaning, Perth & Kinross

Noise Impact Assessment

KSG Acoustics

Prepared for Bobby Halliday Architects

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1. Introduction

KSG Acoustics has been appointed by Bobby Halliday Architects to provide a noise impact assessment (NIA) pertaining to a proposed residential development at Greenloaning, Perth & Kinross.

This report has been prepared in support of an application to Perth & Kinross Council (PKC) for Planning Permission in Principle (PPP). It considers the potential for adverse impacts associated with road traffic noise on the proposed development and, where required, recommends appropriate outline mitigation measures.

2. Site description

The proposed development site is situated south of the settlement of Greenloaning, which lies immediately north of the A9 and south west of Perth. The surrounding area is predominantly greenfield with scattered residential dwellings.

The proposed development site is bounded by Millhill Road to the north and the A9 to the south. There is existing residential development immediately to the west.

The dominant environmental noise source at the proposed development site is road traffic noise from the A9, A822 and associated road network.

3. Proposed development

The Applicant has prepared an indicative layout for the purposes of demonstrating the principle of residential use on the proposed development site. The illustration includes 13 dwellings with associated private gardens, parking provision and landscaping.

The Architect has been reactive to the dominant environmental noise source to the south and has indicated that principal gardens could be accommodated to the north of the associated dwellings to ensure that they receive the acoustic screening benefit of the intervening building.

On the basis of iterative 3D digital modelling of road traffic noise, the indicative design also includes a 1.8m barrier atop the existing bund which runs along the south boundary of the site with the A9. The design benefits of the bund and fence arrangement are discussed later in this report.

A full set of site plans has been submitted with the application and it is recommended that this report should be read in conjunction with these.

4. Assessment methodology and consultation

The following documents have been referred to in this report:

- Planning Advice Note (PAN) 1/2011 *Planning and Noise* and associated *Technical Advice Note* (TAN);
- Calculation of Road Traffic Noise (CRTN);
- *Converting the UK traffic noise index LA10,18h to EU noise indices for noise mapping* Abbott, P. G. and Nelson, P. M., (2002) TRL Limited;
- British Standard (BS) 8233: *Guidance on sound insulation and noise reduction for buildings*; and
- World Health Organisation (WHO) *Guidelines for community noise*.

PAN 1/2011 provides advice on the role of the planning system in helping to prevent and limit the adverse effects of noise. The associated TAN provides information and advice on noise impact assessment methods. PAN 1/2011 is the overarching guidance document in Scotland for the consideration of noise in the context of planning decisions. It highlights the principles of good acoustic design and a sensitive approach to new development. It does not provide any specific methodology that should be applied to the assessment of locations proposed for noise sensitive development however it does recommend the use of other guidance documents which should be used to construct an appropriate assessment. This report seeks to apply the principles underpinning the guidance document to assess the possible impacts of environmental noise on future sensitive development.

CRTN and the TRL publication *Converting the UK traffic noise index LA10,18h to EU noise indices for noise mapping* provide methodology for converting measured or predicted values of LA10,18h to equivalent LAeq,T values for day time (0700 to 2300h) and night time (2300 to

0700h). These values have been used to determine the requirements for mitigation to protect internal and external habitable areas.

BS8233 and the WHO document *Guidelines for Community Noise* both contain guidance with respect to suitable internal noise levels for internal and external habitable spaces with windows open for ventilation. BS8233 also provides guidance with respect to the acoustic performance of façade elements and composites. Specific guidance from these documents is detailed throughout this report, where appropriate.

SoundPLAN 3D electronic noise modelling

Road traffic flow data have been used to generate a 3D model in the proprietary digital noise modelling software SoundPLAN. This model has been used to predict the propagation of road traffic noise across the site and to define the requirements for physical mitigation measures on the basis of the indicative layout provided.

The software applies the algorithms set out in the Calculation of Road Traffic Noise (CRTN) to model the propagation from line source inputs to the receptor points defined. Topographical data has been included to increase the accuracy of modelled road traffic noise propagation.

Daytime (LAeq,16h) colour contour plots are presented in Appendix A, as follows. Plots have been prepared at 1.5m (garden / ground floor) and 4m (first floor) above local ground height and include all requisite acoustic barriers. Night time plots are not included, as the use of gardens is considered relevant to daytime hours only, and the glazing and mitigation strategy for habitable rooms is determined by daytime values, where the differential between the incident road traffic noise levels and the internal standards to be achieved is greatest.

- Figure 1: Daytime 1.5m above local ground height
- Figure 2: Daytime 4m above local ground height

Consideration of traffic noise ingress to the closest habitable rooms has also been considered. The results of these specific predictions are discussed later in this report.

Planning background and consultation

This site is included in the Local Plan for residential development and previously benefitted from a consent in principle (10/01363/IPM).

A further application (12/00736/AMM) was approved for the acoustic barrier as part of the reserved matters conditions on the original consent.

The bund has already been constructed adjacent to the A9, however the acoustic fence has yet to be implemented.

The consent has since lapsed, however the current Application is intended to revive the proposals. A pre-application inquiry relating to the current Application was prepared and submitted by Bobby Halliday Architects in October 2019.

On the basis of the previous consent and other recent decisions make by PKC in respect of planning and noise, it is considered appropriate to ensure that internal and external habitable spaces are protected using a combination of bund and fence along the boundary with the A9, closed windows with appropriately specified glazing and alternative means of background ventilation (appropriately specified trickle vents), and sensitive layout to protect principal gardens from excessive road traffic noise.

Criteria for assessment

With respect to principal gardens, the WHO publication Guidelines for Community Noise recommends that *To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level from steady, continuous noise … should not exceed 55 dB LAeq. To protect the majority of people from being moderately annoyed during the daytime, the sound pressure level should not exceed 50 dB LAeq*.

For the purpose of this assessment, and in keeping with the approach described in PAN 1/2011 and the associated TAN, as well as British Standard (BS) 8233, a target level of 55dB LAeq,16h has been adopted. The rationale for adopting 55dB LAeq,16h as the design target for principal gardens is set out in Appendix B.

For habitable rooms, BS8233 recommends that daytime environmental noise ingress should not exceed 35dB LAeq,16h inside bedrooms and livingrooms. At night, environmental noise ingress should not exceed 30dB LAeq,8h. This is a standard and reasonable approach for anonymous noise sources, such as road traffic noise. Due to proximity to the A9, habitable room windows facing the source of rad traffic noise will require to remain closed with

alternative background ventilation provided to achieve these design standards. Windows will remain openable for rapid ventilation.

5. Baseline noise modelling

As previously described, a 3D digital model of road traffic noise has been prepared to inform this assessment. Measurements have not been undertaken at this time, due to the ongoing Covid-19 pandemic, which continues to suppress ambient levels of background sound as a result of reduced road traffic flows etc.

To inform the model, flow data from the Department for Transport (DfT) count points ID724 (A9) and 10927 (A822) has been extracted and integrated into the line sources.

The following data is incorporated into the SoundPLAN model.

Table 1: Road traffic flow data

Road link	18 hour 2-way flow (0600-0000h)	**Percentage (%) HGV**	**Average speed (kph)**
A9	29348	10	120
A822	3691	4.5	96

6. Noise impact assessment

Road traffic noise affecting future habitable rooms

To ensure that the adopted design standards set out in BS8233 are met, the minimum composite acoustic performance of glazing and ventilation elements has been considered for habitable rooms with a direct line of sight on to the A9.

With respect to the acoustic attenuation afforded by a partially open window in a façade, BS8233 Annex G suggests that 15dB may be achieved, although it should be noted that the acoustic performance may vary with the frequency content of the noise and window type. These internal noise targets are therefore approximately equivalent to external free field levels of 50dB LAeq,16h (daytime) and 45dB LAeq,8h (night time).

The predicted propagation of road traffic noise across the indicative layout can be seen in Appendix A Figure 1 (1.5m above local ground height - ground floor) and Figure 2 (4m above local ground height - first floor). The colour contour plots presented in Appendix A both show free field external levels of road traffic noise.

Including the combined effect of the bund (already in situ) and 1.8m acoustic fence, the external daytime levels of road traffic noise are predicted to be a maximum of 59dB LAeq,16h (free field) at ground floor and up to 63dB LAeq,16h (free field) at first floor on south facing facades. Therefore, to achieve 35dB LAeq,16h inside, the combined glazing and ventilation elements will require to meet a minimum of 24dB Rw,Ctr at ground floor and 28dB Rw,Ctr at first floor respectively.

North facing facades will benefit from the acoustic screening effects of the intervening building, however first floor bedrooms will also require minimum specifications for the acoustic performance of glazing and ventilation elements to meet BS8233 daytime recommendations. This is because external free field road traffic noise levels are predicted to exceed 50dB LAeq,16h. The maximum predicted road traffic noise level at first floor is 55dB LAeq,16h, therefore the composite acoustic performance of glazing and ventilation elements will require to be at least 20dB Rw,Ctr.

Various glazing and ventilation elements will be capable of achieving these requirements and it should be the decision of the Developer to select the products that best suit their needs. The combination of elements should be considered in the context of the preferred ventilation strategy, which may be entirely passive or an alternative system, for example dMEV or MVHR.

Additional calculations should be undertaken at the detailed design stage to ensure that the selection of double glazing and ventilation elements is sufficient such as to ensure that the recommended standards for resting and sleeping conditions are met.

Road traffic noise affecting outdoor amenity areas (gardens)

As previously described, the indicative layout has undergone iterative design to maximise the principal garden areas able to meet the adopted design standard of 55dB LAeq,16h.

Figure 1 in Appendix A illustrates the predicted propagation of road traffic noise across the proposed development site, in relation to the indicative layout. As previously noted, principal

gardens are indicated to lie north of the associated dwellings, thereby affording them the additional screening benefits of the intervening dwelling.

The predicted road traffic noise levels indicate that this arrangement is effective, and Figure 1 clearly indicates that principal gardens can meet the adopted design target.

7. Conclusions

KSG Acoustics has carried out a noise impact assessment in relation to a proposed residential development at Greenloaning, Perth & Kinross. This report is prepared in support of an application to PKC for PPP.

Consideration has been given to the potential adverse impacts on future dwellings of road traffic noise from the A9 and A822.

Iterative design of the indicative layout confirms that a 1.8m close boarded fence on top of the existing bund provides adequate attenuation of road traffic noise to ensure that the adopted design target for gardens can be met.

Habitable room windows facing towards the A9 and first floor windows to the north will require to be closed, although they will remain openable for rapid ventilation. The acoustic performance of the glazing and ventilation elements selected should be sufficient to meet the recommendations set out in BS8233. Additional calculations should be undertaken at the detailed design stage to ensure that the requisite standards can be met.

Providing that the mitigation measures set out in the report are incorporated into the design, then acceptable levels of road traffic noise ingress can be met throughout the proposed development.

Appendix A: SoundPLAN contour plots – Road traffic noise

Figure 1: Daytime road traffic noise levels (LAeq,16h) (dB) at 1.5m above local ground height (garden areas)

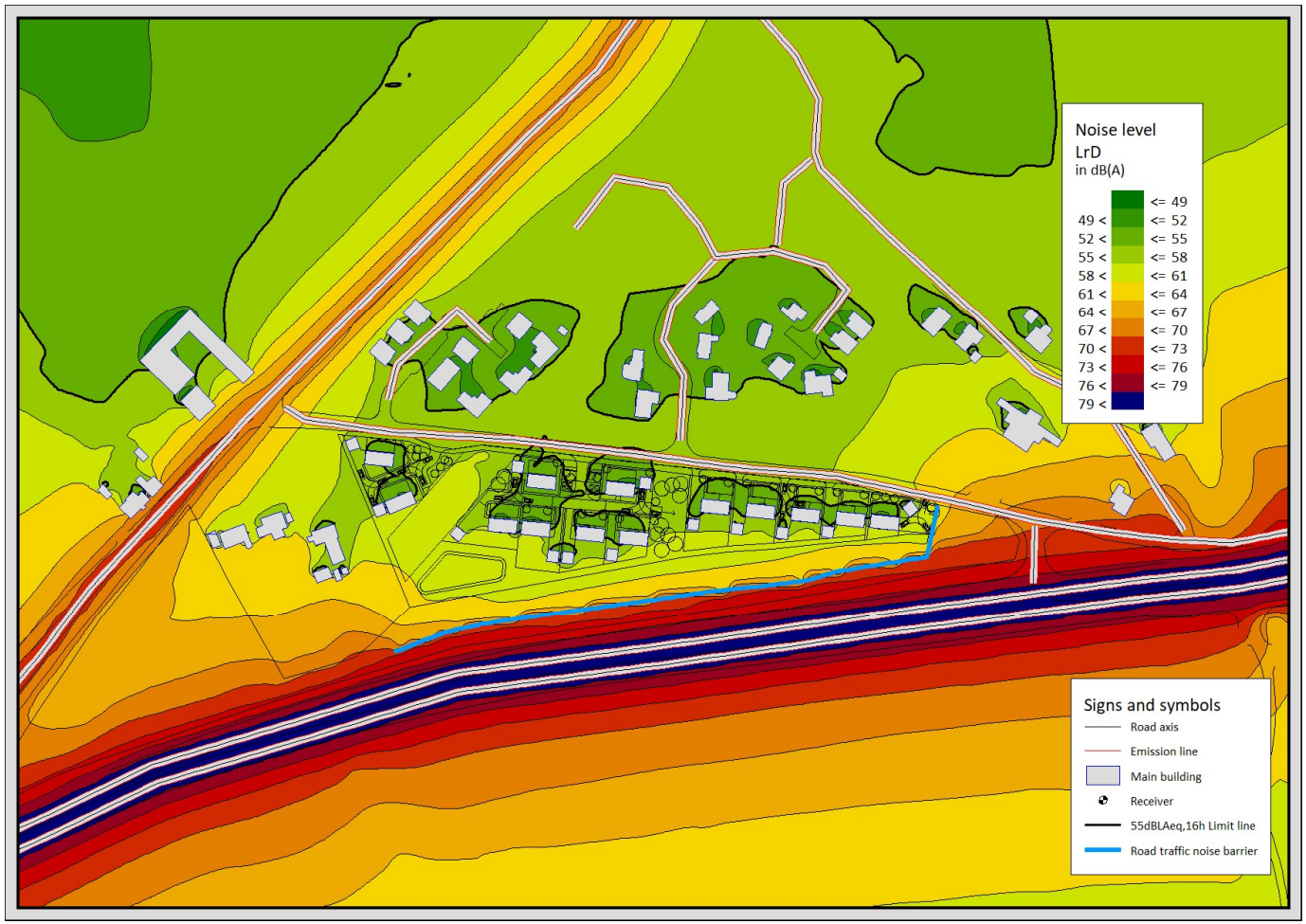
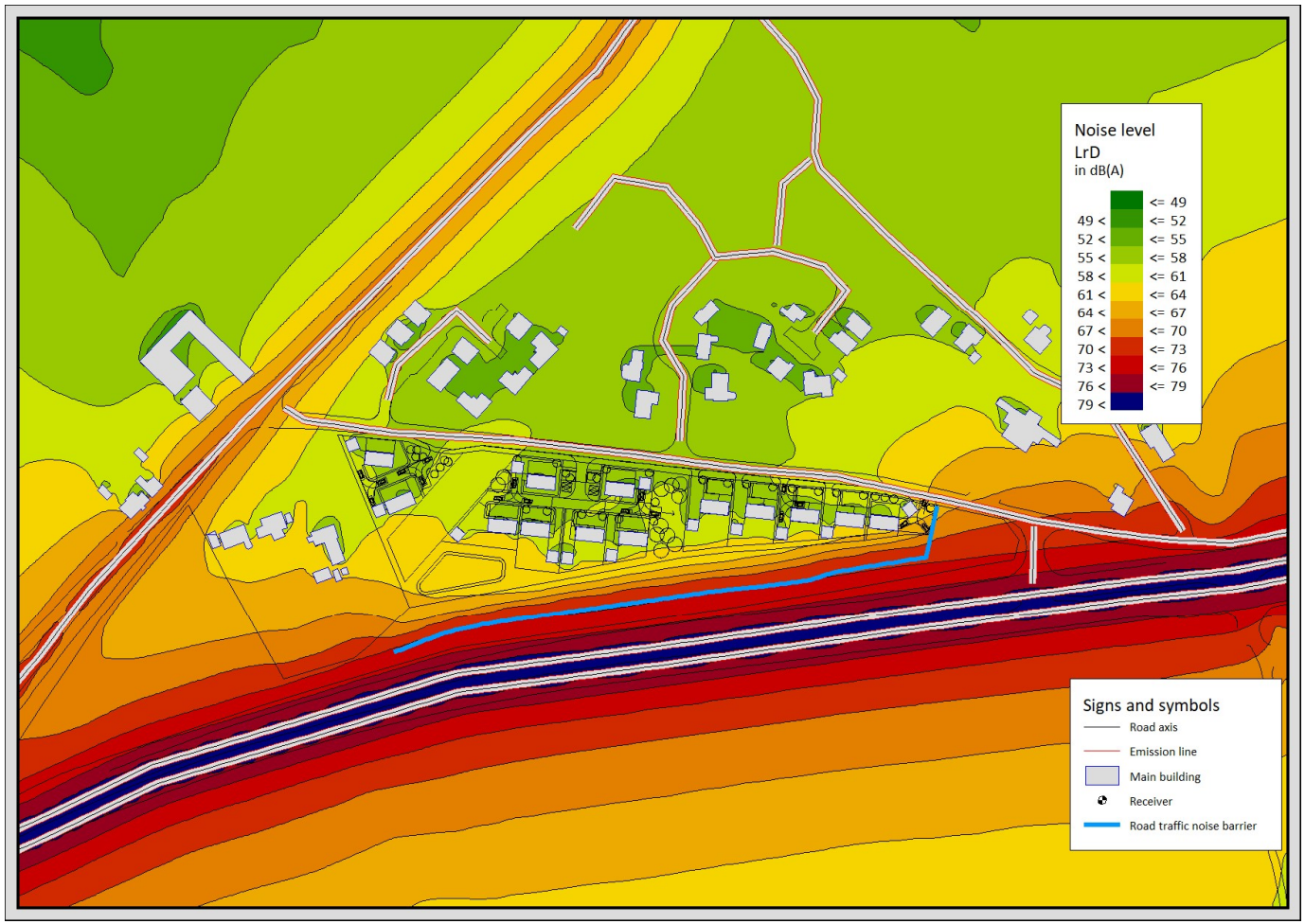


Figure 2: Daytime road traffic noise levels (LAeq,16h) (dB) at 4m above local ground height



Appendix B: Justification for external 55dB LAeq,16h free-field criterion for outdoor habitable areas

The selection of 55dB LAeq,16h (free field) as an appropriate design standard for outdoor habitable areas is reflected in various key resources as detailed below.

The most common reference to free-field outdoor levels is in the World Health Organisation (WHO) publication Guidelines for Community Noise. It recommends that: "To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level from steady continuous noise… should not exceed 55dB LAeq. To protect the majority of people from being moderately annoyed during the daytime, the sound pressure level should not exceed 50dB LAeq". This advice is based on the precautionary principle.

Planning Advice Note (PAN) 1/2011 Planning and Noise and the associated Technical Advice Note (TAN) advocate a balanced approach to noise impact assessment, including "applying noise impact criteria reasonably". There is also mention of: "a pragmatic approach… to ensure that quality of life is not unreasonably affected, and that new development continues to support sustainable economic growth".

Although it does not seek to offer prescriptive guidance, the TAN contains advice on Noise Impact Assessment methodologies. In Example 1, which considers the effects of new residential development close to an existing transport noise source, it refers to the WHO 55dB LAeq,16h for illustrative purposes as the criterion for daytime outdoor levels at Noise Sensitive Receptors. The supporting text advocates consideration of: "Guidance noise levels issued by authoritative organisations such as WHO…" also stating that "context is important…". It goes on: "The choice of appropriate criteria noise levels and relevant time periods are the responsibility of the local authority… it…provide[s] flexibility, allowing particular circumstances to be taken into account…". In addition, Example 4 which uses the effects of a new road on Quiet Areas in an agglomeration as an example, notes: "Generally, few people are annoyed by noise levels below 55dB LAeq,12h[1]".

British Standard (BS) 8233 also makes mention of outdoor amenity areas, reflecting the recommendations in the WHO publication, suggesting: "…it is desirable that the external

[1] Daytime 0700 to 1900h

noise level does not exceed 50dB LAeq,T, with an upper guideline value of 55dB LAeq,T" but also reflecting the need for pragmatism, referencing: "making efficient use of land resources to ensure development needs can be met".

Similarly, the Royal Environmental Health Institute of Scotland Briefing Note 017, Table 1 quotes the WHO publication to set external daytime target levels of 50-55dB LAeq,16h.

Appendix C: Limitations of the report

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