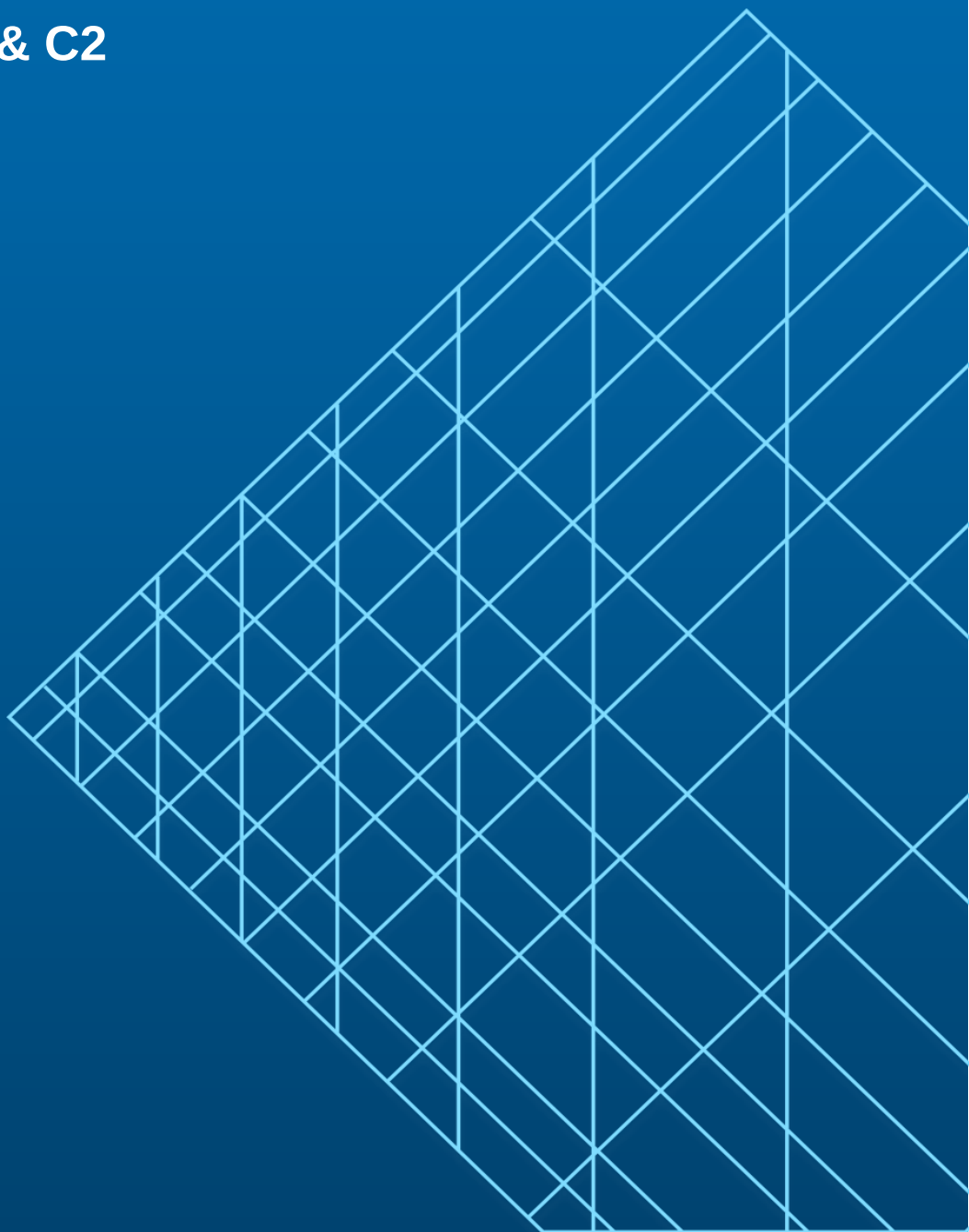
Hunter ACOUSTICS

Independent Acoustic Consultancy Practice

Environmental Noise and Vibration Assessment

Parcels B, C1 & C2
Undy

6000/EBF1



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Environmental Noise and Vibration Assessment

Project: **Parcels B, C1 & C2**

Site Address: Rockfield Farm
Undy
County
NP26

HA Reference: 6000/EBF1

Date: 26/02/2021

Client: Monmouthshire County Council
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1. INTRODUCTION

We understand that a mixed residential and commercial development is proposed at, Rockfield Farm, Undy, NP26. This report assesses Parcels B, C1 & C2.

This report assesses the External Building Fabric sound reduction performance requirements dwelling based on the proposed housing layout.

This report uses survey data from our environmental noise survey and leads on from our Environmental Noise Report (20.6000_ENS1 dated 07/01/21)

Appendix A references acoustic terminology. Appendix B references drawings used in our assessment

2. CONDITIONS / GUIDANCE

2.1 Local Authority Requirements

The following advice was issued for the adjacent Phase 1 of Rockfield Farm development by Michael Richardson EHO:

I therefore recommend that planning permission should not be granted unless it can be effectively demonstrated that the following internal/external noise levels can be met, which are based on guidance given in BS 8233:2014: Guidance on sound insulation and noise reduction for buildings:

Road Traffic Noise Internal

All habitable rooms exposed to external road traffic noise in excess of 55 dBA Leq 16 hour [free field] during the day [07.00 to 23.00 hours] or 45 dBA Leq 8 hour [free field] at night [23.00 to 07.00 hours] shall be subject to sound insulation measures to ensure that all such rooms achieve an internal noise level of 35 dBA Leq 16 hour during the day and 30 dBA Leq 8 hour at night. The submitted scheme shall ensure that habitable rooms subject to sound insulation measures shall be able to be effectively ventilated without opening windows.

Road Traffic Noise External

The maximum day time noise level in outdoor living areas exposed to external road traffic noise shall not exceed 50 dBA Leq 16 hour [free field]. The upper guideline value of 55 dB LAeq,T may be accepted where it can be satisfactorily justified. I note that the modelling in the noise assessment is based on road traffic data for the design year 2026. To assist with the appraisal of the proposal I would recommend that an explanation was included in the report as to why 2026 data is being used…

…I would also recommend that individual noise events data was included in the noise assessment.

MCC Environmental Health has therefore indicated that positioning of residential areas in NEC C is acceptable in principle, provided appropriate façade noise mitigation is devised at design stage to ensure internal noise levels comply with recommendations in BS 8233:2014 (35dB L_{Aeq} internal daytime and 30dB L_{Aeq} internal at night).

The Planners/EHO add "*It is also noted that the main impact would occur during night hours and mechanical mitigation could be used to achieve acceptable internal noise levels to bedrooms.*"

It is therefore understood that mechanical ventilation would be required for NEC C areas.

2.2 British Standard 8233:2014

British Standard 8233:2014 'Guidance on sound insulation and noise reduction for buildings' includes internal noise criteria of habitable rooms in residential dwellings, as shown below;

Table 2.1 – BS 8233:2014 Internal Ambient Noise Criteria for Habitable Rooms

Location	Desired		Reasonable *	
	07:00 to 23:00	23:00 to 07:00	07:00 to 23:00	23:00 to 07:00
Living room	35 dB $L_{Aeq,16hr}$	-	40 dB $L_{Aeq,16hr}$	-
Dining room/area	40 dB $L_{Aeq,16hr}$	-	45 dB $L_{Aeq,16hr}$	-
Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$	40 dB $L_{Aeq,16hr}$	35 dB $L_{Aeq,8hr}$

* *NOTE 7 states "Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved.*

In addition BS 8233:2014 states: *"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values."*

Reference is therefore made to World Health Organisation (WHO) 'Guidelines for Community Noise, 1999' which states *"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times per night (Vallet & Vernet 1991)".*

Section 7.7.3.2 of BS 8233:2014 entitled 'Design criteria for external noise' states;

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs to be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

The above criteria in BS 8233:2014 apply for sources without specific character, previously termed "anonymous noise". BS 8233:2014 7.7.1 advises:

"NOTE: Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate."

3. NOISE MAP MODELLING

Three dimensional noise map modelling has been undertaken using the proprietary NoiseMap Five environmental noise mapping software package, which in turn uses calculation methods of Calculation of Road Traffic Noise (CRTN).

Models have been set up to predict daytime and night-time noise levels across the site from surrounding sources based on measured noise levels discussed in our 20.6000_ENS_Report.

The model takes into account distance and screening losses from existing and new structures, allowing noise levels at proposed residential facades to be predicted, as well as garden noise levels to be assessed (previously discussed)

The proposed housing layout plans referenced in Appendix B has been used for the developed model (Option E) including for a 4m Site Boundary Bund+Barrier which is shown in **BLUE**. 1.8m garden fences are shown in red, and 3m garden fences where required are shown in **GREEN** Barriers/fences shall have surface density of at least 10kg/m^2.

Noise map model in Figure 3.1 shows predicted daytime road traffic noise levels at 1.5m. Figure 3.2, Figure 3.3 & Figure 3.4 show predicted road traffic noise levels during the critical night-time period (2300-0700hrs) at 1.5m, 4.5m & 7.5m above local ground level on the developed site respectively.

Figure 3.1 – Daytime Model (Developed Site With 4m Site Boundary Barrier) $L_{Aeq,16hr}$ Contours at 1.5m Height

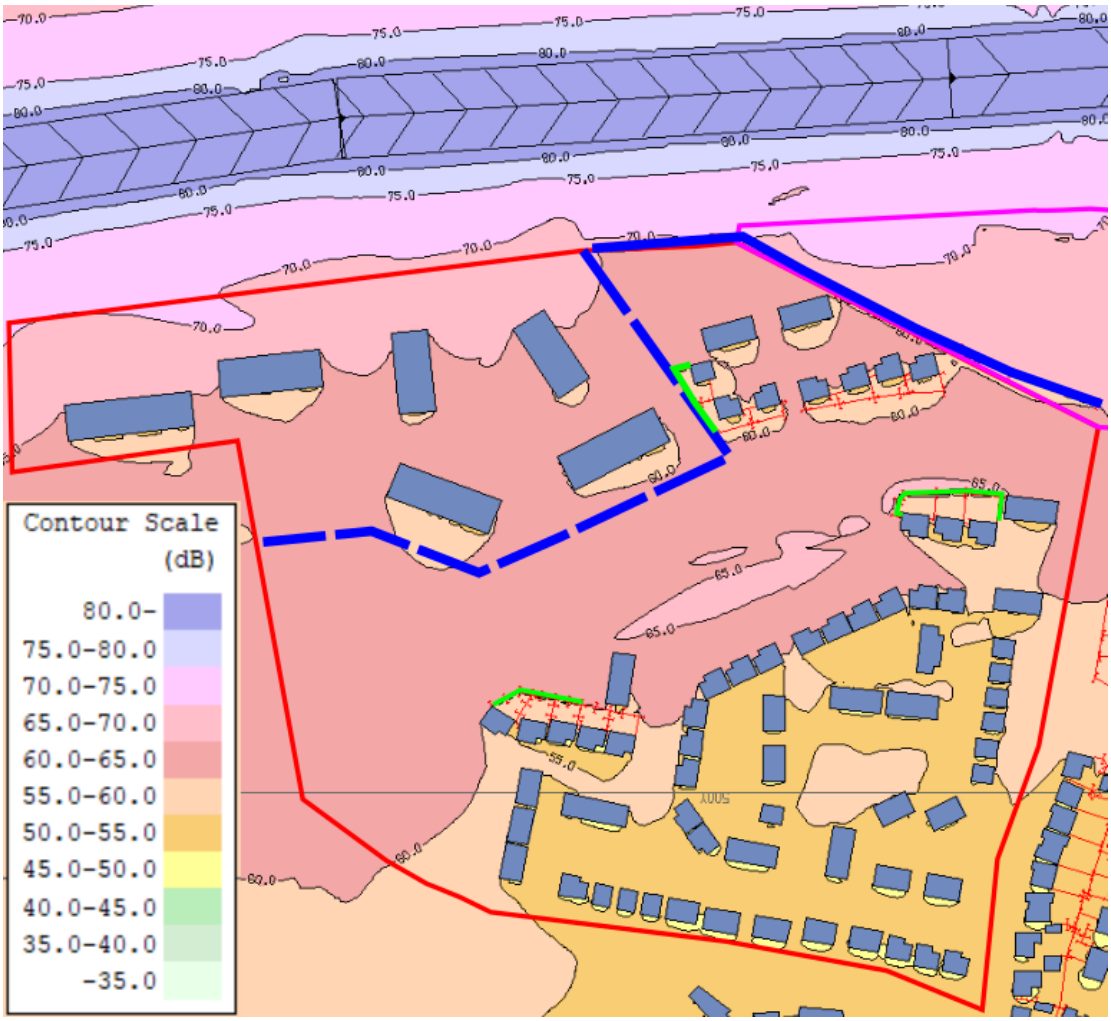


Figure 3.2 – Night-time Model (Developed Site) $L_{Aeq,8hr}$ Contours at 1.5m Height

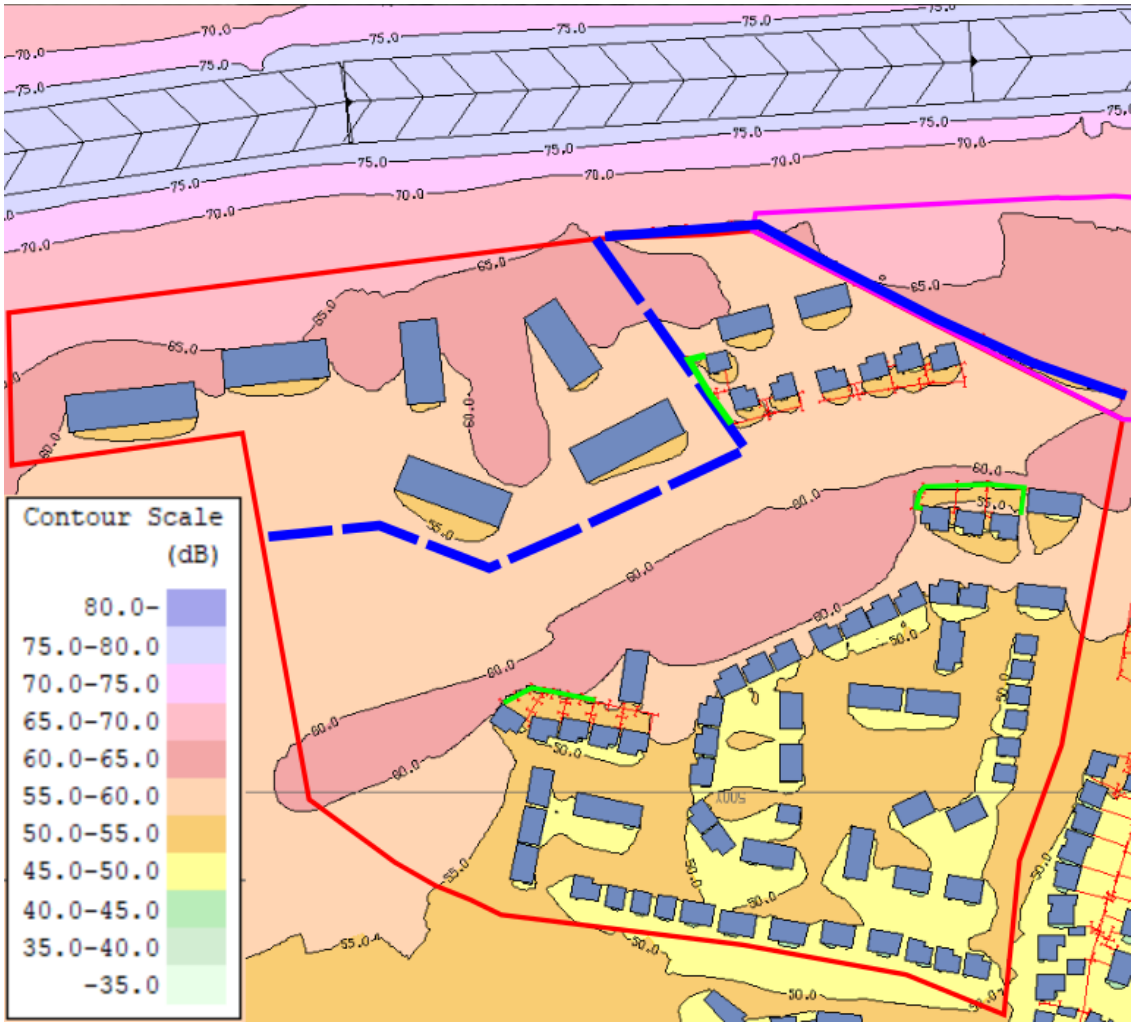


Figure 3.3 – Night-time Model (Developed Site) $L_{Aeq,8hr}$ Contours at 4.5m Height

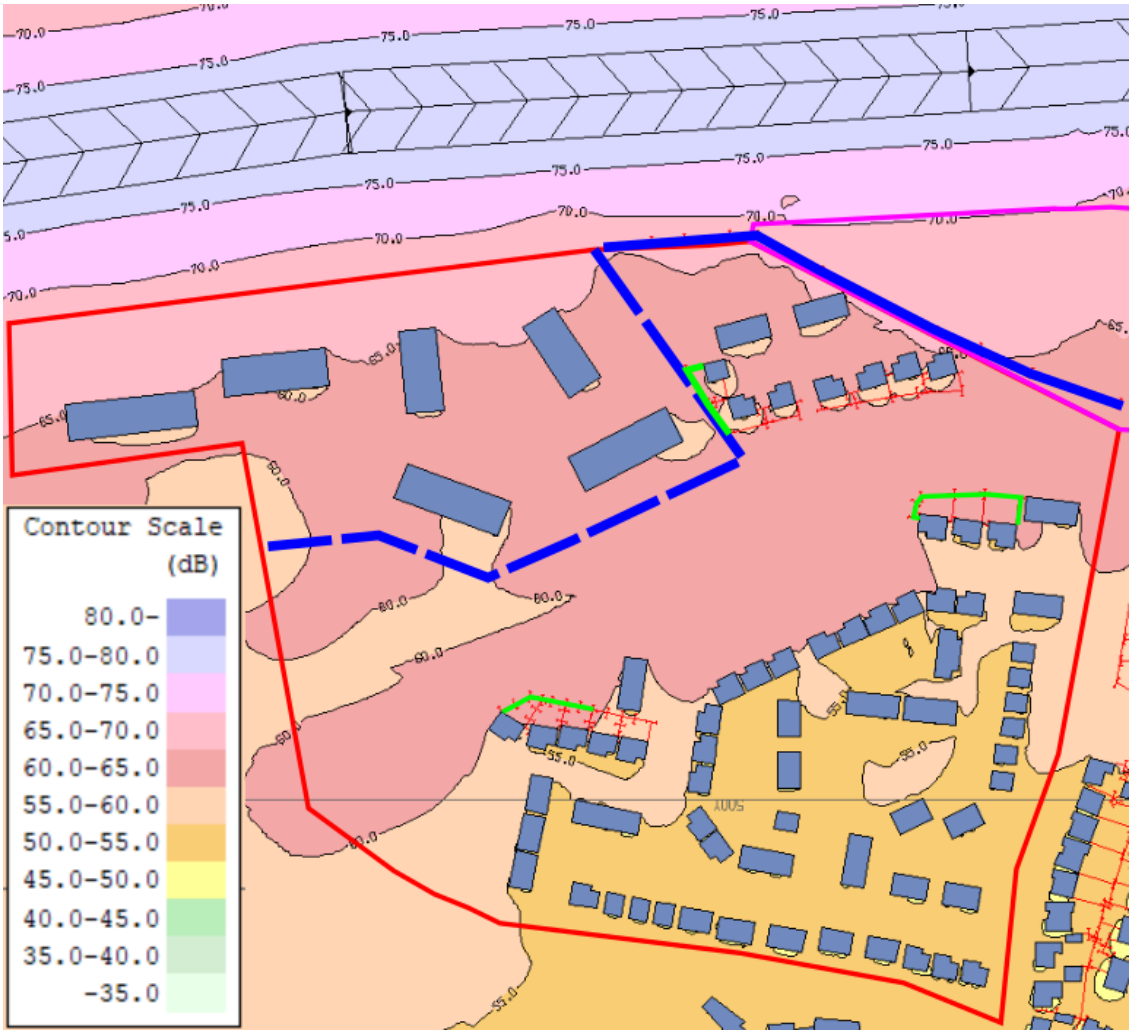
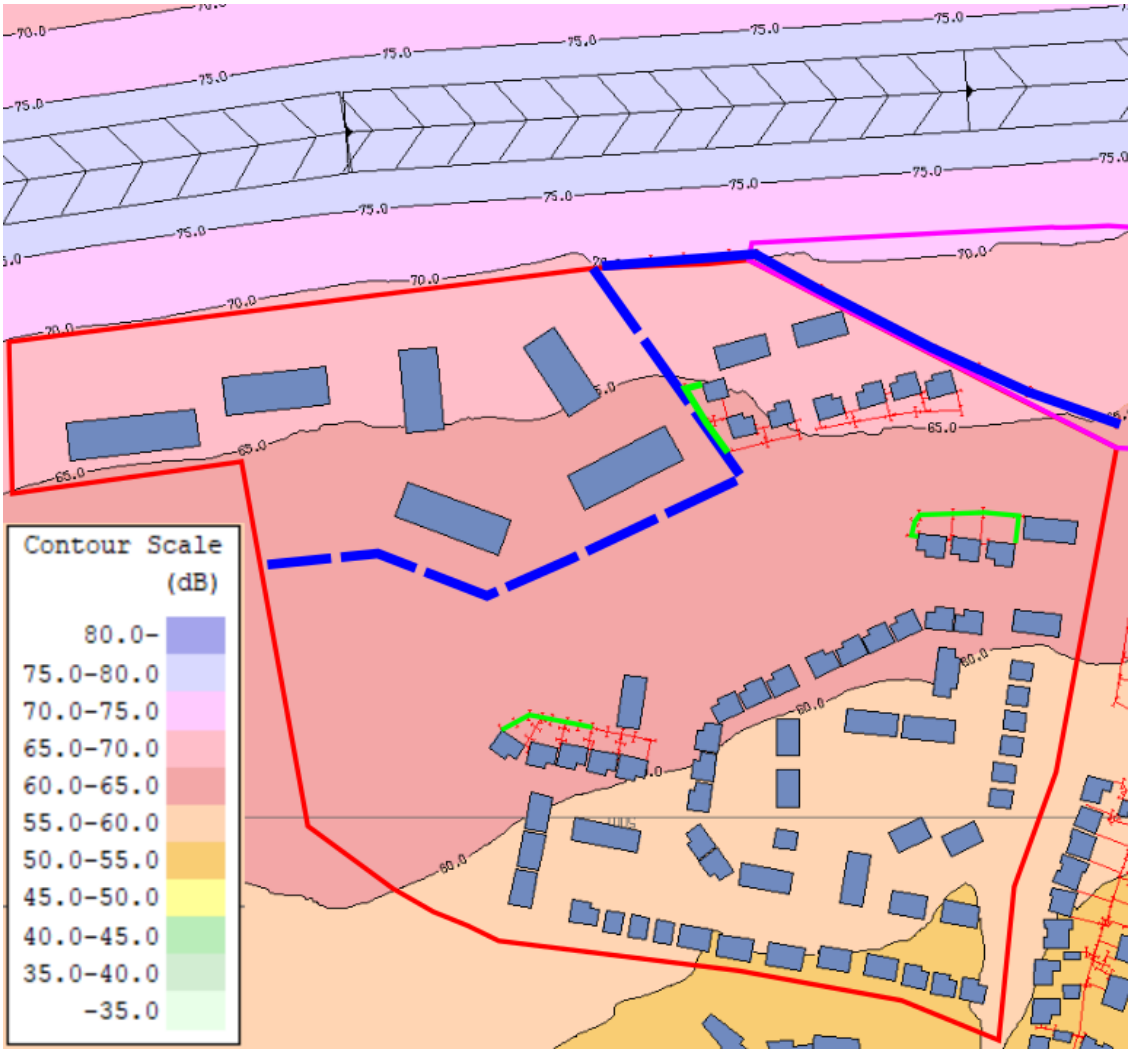


Figure 3.4 – Night-time Model (Developed Site) $L_{Aeq,8hr}$ Contours at 7.5m Height



4. EXTERNAL BUILDING FABRIC ASSESSMENT

Based on the noise map models, we have carried out an external building fabric assessment with the aim of controlling noise intrusion to habitable rooms to meet:

- 35dB $L_{Aeq,16hr}$ daytime
- 30dB $L_{Aeq,8hr}$ night-time
- 45dB $L_{Amax,F}$ in bedrooms during the night

These are in line with the desirable internal ambient noise values quoted in BS 8233:2014 and quoted limits from the Local Planning authority in section 2.

We have not allowed for any room in roof scenarios. These should be avoided. (none are indicated on house / apartment drawings)

Critical façades are shown on site plans in Figure 4.1, Figure 4.2 & Figure 4.3 below, marked up with **MAGENTA**, **BLUE** and **YELLOW** lines.

Figure 4.1 – Façades Requiring Additional Sound Insulation Measures (At Ground Floor)

Figure 4.2 – Façades Requiring Additional Sound Insulation Measures (At First Floor)

Figure 4.3 – Façades Requiring Additional Sound Insulation Measures (At Second Floor)

Note: Habitable rooms include bedrooms, lounges, dining rooms and kitchen/diners but not kitchens or bathrooms.

All habitable rooms on façades highlighted above require up-rated acoustic glazing, walls, roof and ventilation as specified below. Standard thermal double glazing and trickle ventilation should be sufficient on remaining façades (not highlighted).

4.1 External Walls

The following external wall constructions have been used in our analysis;

- Brick / 50mm cavity / Timber Frame
- Brick / 50mm cavity / Metsec Stud System with 2no layers of plasterboard

The following SRI performance figures are taken from BS 8233:2014 for 'Brick and block external wall'. The proposed constructions should be capable of achieving these figures as a minimum;

Table 4.1 – External Wall Sound Reduction Index Figures

Element	Description	Sound Reduction Index, *R* (SRI: BS EN ISO 140) at Octave Band Centre Frequency (Hz)				
		125	250	500	1k	2k
External Wall 1	Brick / Cavity / Timber Frame	40	44	45	51	56
External Wall 2	Brick / 50mm cavity / Metsec Stud System	40	44	45	51	56

The successful tenderer must provide independent laboratory test data showing their wall systems meet the above performance requirements.

4.2 Roof

The following roof constructions have been used in our analysis;

• Pitched tiles on felt roof, 9mm plasterboard ceiling + 400mm insulation

The following minimum SRI performance figures are taken from BS 8233:2014: “tiles on felt roof with 100mm mineral wool on plasterboard ceiling”;

Table 4.2 – Roof Sound Reduction Index Figures

Element	Description	Sound Reduction Index, *R* (SRI: BS EN ISO 140) at Octave Band Centre Frequency (Hz)				
		125	250	500	1k	2k
Pitched Roof	Tiles on felt, 9mm plasterboard ceiling, 100mm mineral wool insulation	28	34	40	45	49

There should be no rooms in roof/mansard sections included on critical plots.

4.3 Glazing

The housing layout plan in Figure 4.1 shows façades where windows require up-rating. The following sound reduction index figures shall be met for glazing on these critical façades:

Table 4.3 - Glazing Sound Reduction Index Figures

Element	Description	Sound Reduction Index, *R* (SRI: BS EN ISO 140) at Octave Band Centre Frequency (Hz)				
		125	250	500	1k	2k
BLUE	For budgetary guidance: based on Pilkington 6mm / 6 – 16mm / 4mm	21	20	25	38	37
MAGENTA and YELLOW	For budgetary guidance: based on Pilkington 10mm / 6 – 16mm / 6mm	24	24	32	37	37

A typical glazing system that should be capable of achieving the quoted SRI figures (based on Pilkington test data) is included in the table for initial budgetary guidance, however;

The successful glazing suppliers shall provide independent laboratory test data confirming their proposed systems (including frames/seals) meet the quoted octave band sound reduction performance figures above.

For all other façades standard thermal double-glazing and trickle ventilation is indicated to be sufficient.

4.4 Ventilation

All habitable rooms on critical façades highlighted require a ventilation strategy that does not rely on opening windows to achieve 'whole building' and 'extract' ventilation rates as required by Building Regulations Part F;

System 3: ***Continuous mechanical extract.*** *Guidance on minimum provisions for extract and whole building ventilation is set out in table 1.2c of Building Regulations Part F.*

System 4: ***Continuous mechanical supply and extract with heat recovery.*** *Guidance on minimum provisions for extract and whole building ventilation is set out in Table 1.2d of Building Regulations Part F..*

Note: Positive Input Ventilation systems (PIV) may also be considered, as depending on the air tightness of the dwelling, these may not require trickle ventilators.

All ventilation systems shall meet the requirements of the Domestic Ventilation Compliance Guide 2010.

The final proposed ventilation strategy should be confirmed acceptable with planners/ EHO and Building Control.

Facades highlighted YELLOW require System 4 ventilation (MVHR).

Facades highlighted in **MAGENTA** & **BLUE** may utilise System 3 or System 4 ventilation.

4.4.1 Building Regulations Part F - System 3

If System 3 (MEV) is used to provide fresh air through (background) trickle ventilators, the trickle ventilators shall be acoustically treated to achieve the following performance;

Table 4.4 – Acoustic Trickle Ventilator Specifications

Element	Description	$D_{n,e}$ at Octave Band Centre Frequency (Hz)				
		125	250	500	1k	2k
Ventilator	For budgetary guidance: based on Renson AK80/3 (open)	37	32	34	46	52

The calculation has allowed for a maximum of 2no acoustic trickle ventilators per room.

For budgetary guidance the above ventilator figures are based on Renson AK80 ventilators. The successful tenderer shall provide independent laboratory test data showing their vent meets the above performance requirements.

4.4.2 Building Regulations Part F - System 4

System 4 (mechanical ventilation with heat recovery, MVHR) could be utilised which does not require any trickle vents in the external façade.

4.4.3 Mechanical Ventilation Systems

All mechanical ventilation systems should be designed to meet the following internal noise levels (based on CIBSE guidance):

Table 4.5 - Internal Noise Criteria (Mechanical Ventilation)

Space	Noise Rating Criteria (NR)
Bedroom	25
Living Room	30
Kitchen	35
Bathroom	35
Hallway	35

4.4.4 General

Do not include standard trickle ventilation within window frames on critical facades highlighted.

Final proposals should be confirmed with Building Control and Environmental Health prior to orders being placed.

4.5 Overheating

Our assessment recommends acoustic glazing and mechanical ventilation on critical facades, to control noise intrusion. This is based on windows normally being closed (excluding purge ventilation).

If there is a risk of overheating on any of the facades, requiring windows to be opened more frequently, a more detailed assessment would be required – please advise.

5. EXTERNAL NOISE ASSESSMENT (GARDENS)

Private garden areas are generally located behind the dwellings, maximising screening to the road.

We would advise that noise levels of up to 60dB$L_{Aeq,16hr}$ were accepted by the planners/EHO for Phase 1 of the Rockfield Farm development.

Furthering this criteria British Standard 8233:2014 advises the following:

"However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs to be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

Element 3 of ProPG provides the further following guidance for wider acoustic and planning considerations of external amenity spaces.

3 iv) *Whether or not external amenity spaces are an intrinsic part of the overall design, consideration of the need to provide access to a quiet or relatively quiet external amenity space forms part of a good acoustic design process.*

3(v) *Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:*

- *a relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or*
- *a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different, protected, location); and/or*
- *a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- *a relatively quiet, protected, publically accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance).*

The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations.

The noise map model in Figure 3.1 indicates the following;

Gardens to plots in the northern portion of parcel C2 meet the 55dB $L_{Aeq,16hr}$ in 50% of the garden area when located south of the dwelling.

Plots with western facing gardens exceed this criteria with levels between 60-61dB $L_{Aeq,16hr}$. The inclusion of a 3m close boarded fence to these gardens highlighted in **GREEN** brings garden levels in line with 58-59dB.

Gardens of dwellings to the north east of parcel B are seeing noise levels in gardens of 57-58dB$L_{Aeq,16hr}$ with the inclusion of a 3m close boarded garden fence highlighted in **GREEN**.

Gardens to plots located in the north east corner of the site parcel B are seeing noise levels of 57-58 dB $L_{Aeq,16hr}$ with the inclusion of a 3m close boarded garden fence highlighted in **GREEN**.

6. CONCLUSION

An environmental noise assessment has been carried out for the proposed residential development at Parcels B, C1 & C2, Rockfield Farm, Undy, NP26.

This report assesses garden noise levels and the external building fabric to critical plots.

Road traffic is indicated to control the ambient noise climate day and night.

Noise surveys have been carried out across the site. Additional sample measurements were undertaken to aid calibration of a noise map model.

The noise survey indicates that night-time is the critical period (day/night difference > 5dB).

Noise map models have been generated to show noise propagation across both the undeveloped and developed sites.

The developed site includes a 4m high (highlighted **BLUE**) barrier/bund combination.

An external building fabric assessment has been carried out. Critical facades requiring additional sound insulation measures have been highlighted and specifications for external wall, roof, ventilation and glazing are included.

Facades not highlighted are indicated to meet internal criteria with standard thermal 6mm / 6 – 16mm / 4mm

An assessment of external noise in gardens has also been undertaken. Where garden noise levels exceed the 60dB(A) $L_{eq,16hr}$ requirement the height of the garden fences have been increased to 3m above local ground height. These are highlighted green on the noisemaps in Section **Error! Reference source not found.**.

This is not assessed significant bearing in mind that the adjacent site had a relaxed criteria imposed of 60dB(A) $L_{eq,\ 16hr}$ and guidance included in BS 8233:2014, discussed in this report.

APPENDIX A - ACOUSTIC TERMINOLOGY

Human response to noise depends on a number of factors including loudness, frequency content and variations in level with time. Various frequency weightings and statistical indices have been developed in order to objectively quantify 'annoyance'.

The following units have been used in this report:

dB(A)	The sound pressure level A-weighted to correspond with the frequency response of the human ear and therefore a persons' subjective response to frequency content.
L_{eq}	The equivalent continuous sound level is a notional steady state level which over a quoted time period would have the same acoustic energy content as the actual fluctuating noise measured over that period.
L_{max}	The highest instantaneous sound level recorded during the measurement period.
L_{10}	The sound level which is exceeded for 10% of the measurement period. i.e. The level exceeded for 6 minutes of a 1 hour measurement - used as a measure of background noise.
L_{90}	The sound level which is exceeded for 90% of the measurement period. i.e. The level exceeded for 54 minutes of a 1 hour measurement - used as a measure of background noise.
$L_{Ar,Tr}$	The 'rating' level, as described in BS 4142:2014 – the specific noise plus any adjustment for the characteristic features of the noise.
SSR	Sound sensitive receiver

APPENDIX B - DRAWING LISTS

The following Childs Sulzmann Architects drawings and documents have been used in our assessment;

Table B.1 – Drawing List

Drawing Title	Drawing Number	Rev	Date
Proposed Noise Mitigation	21/571/050	/	Feb 21
3B5P Detached House Type A	21/571/010	/	Feb 21
3B5P Detached House Type B	21/571/011	/	Feb 21
4B7P Detached House Type C	21/571/012	/	Feb 21
2B4P Semi-Detached House Type D	21/571/013	/	Feb 21
2B4P Semi-Detached House Type D	21/571/014	/	Feb 21
3B5P Semi-Detached House Type E	21/571/015	/	Feb 21
3B5P Semi-Detached House Type E	21/571/015	/	Feb 21
3B5P Semi-Detached With Garage House Type F	21/571/017	/	Feb 21
3B5P Semi-Detached With Garage House Type F	21/571/018	/	Feb 21
2B4P Terrace House Type G	21/571/019	/	Feb 21
2B4P Terrace House Type G	21/571/020	/	Feb 21
2B4P-3B5P Terrace House Type H	21/571/021	/	Feb 21
2B4P-3B5P Terrace House Type H	21/571/022	/	Feb 21
2B4P-3B5P Terrace House Type I	21/571/023	/	Feb 21
2B4P-3B5P Terrace House Type I	21/571/025	/	Feb 21
2B4P-3B5P Terrace House Type I	21/571/025	/	Feb 21
1B2P-2B3P Flats House Type J	21/571/026	/	Feb 21
1B2P-2B3P Flats House Type J	21/571/027	/	Feb 21