Land at Springville, East Sleekburn

Noise impact assessment

Amethyst Homes Limited

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Executive Summary

An environmental noise assessment has been undertaken for the proposed residential development on land adjacent to Brock Lane, East Sleekburn, Northumberland.

The results of Cundall's 2020 noise survey have been compared with those measured in 2013 by Wardell Armstrong for a previous planning application on the site. The noise levels measured during the previous noise survey by Wardell Armstrong are higher and have been selected for use in the noise assessment.

Based on the results of the survey, a noise assessment in light of guidance from the ProPG has been carried out and has concluded that significant adverse effects are unlikely to occur if appropriate mitigation measures are implemented.

It has been concluded that standard thermal double glazing and non-acoustic window head trickle ventilators will be suitable for most residential building façades in the development. However, acoustic trickle vents and an enhanced glazing specification (e.g. 6 mm pane, 6-16 mm cavity, 10.6 mm laminated pane) will be required for the most exposed façades facing the A168 and Brock Lane.

In addition, solid walls/fences will be required to gardens directly facing the A168 and Brock Lane to reduce external noise to an acceptable level.

Therefore, in terms of noise, it is considered that the site is suitable for a residential development, assuming appropriate design measures are implemented.

Contents

1.0 Introduction

Cundall has been commissioned by Amethyst Homes Limited to undertake environmental noise surveys and noise modelling to produce a detailed assessment for a proposed residential development on land adjacent to Brock Lane, East Sleekburn, Northumberland. This report is intended to be submitted as part of a planning application for the proposed development.

The purpose of the report is to:

- review appropriate national and local planning policy and legislation;
- assess noise levels incident on the site;
- compare current noise levels with those measured for the previous planning application; and
- carry out an acoustic assessment of the external building fabric requirements and where appropriate provide outline mitigation advice.

2.0 Proposed development

2.1 Existing site

The site is located to the north-west of the village East Sleekburn, adjacent to Brock Lane. Figure 1 shows the site location in relation to East Sleekburn and nearby Bedlington.

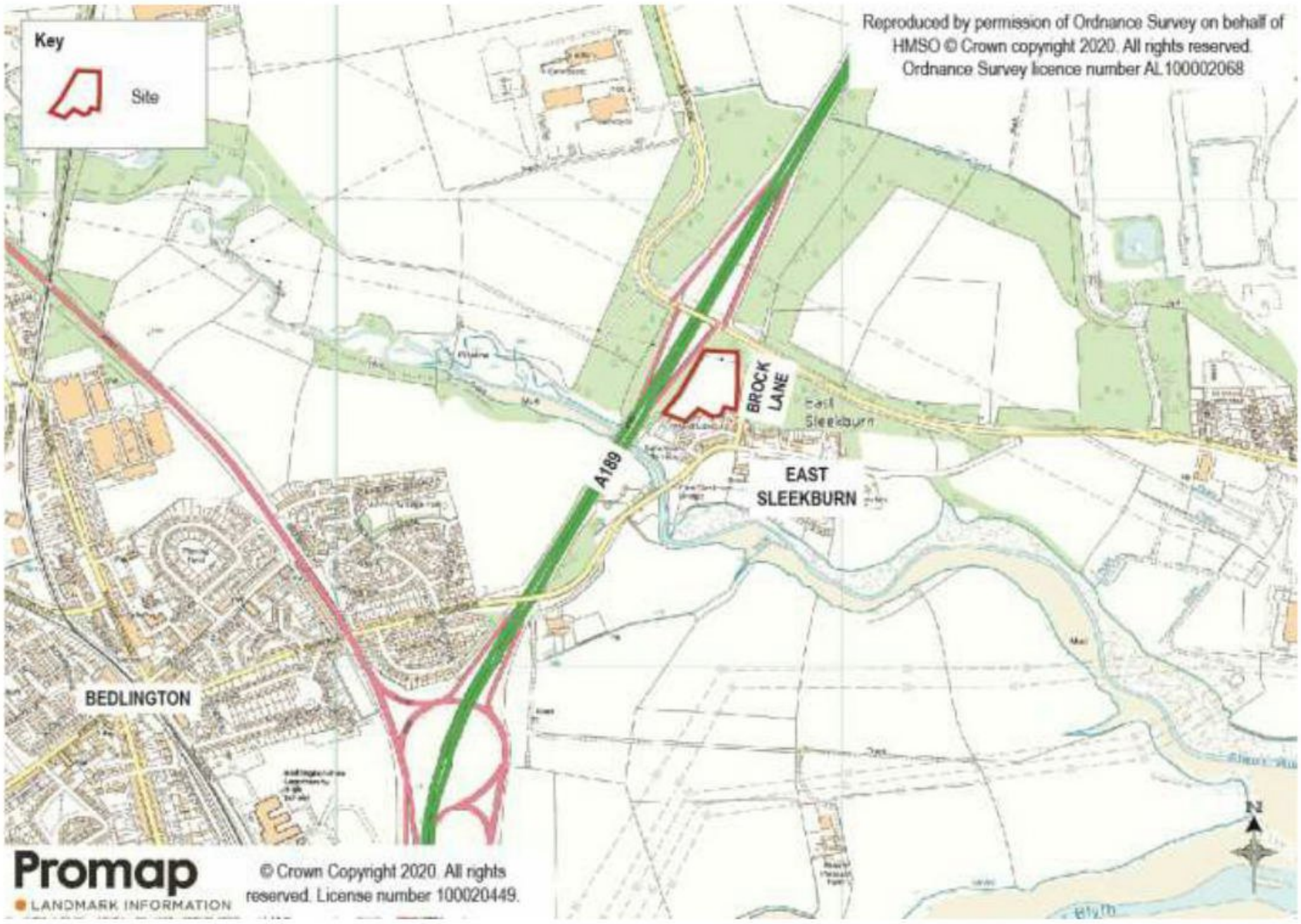

Figure 1 - Site location

The site is located to the north west of East Sleekburn and is bound by Brock Lane to the north and east, existing residential dwellings and allotments to the south and the A189 to the west.

2.2 Development proposals

It is proposed to develop the site to accommodate a maximum of 48 residential units. The proposed Location Plan is provided in Appendix A.

2.3 Noise sources

The primary source of noise impacting the site is traffic on surrounding roads; in particular, the A189 to the northwest which was identified as the dominant noise source at the site.

The Location Plan in Appendix A provides an indication of the extent of the site and the surrounding noise sources.

3.0 Assessment criteria

This section of the report outlines key legislation and guidance relevant to the assessment of noise for development of this type.

3.1 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published by Defra in March 2010. The NPSE sets out the long-term vision of Government noise policy:

Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

The NPSE long term vision is supported by the following aims:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life.*

3.2 National Planning Policy Framework

The revised National Planning Policy Framework was updated on 19 February 2019 and sets out the government's planning policies for England and how these are expected to be applied.

The NPPF states:

130. Permission should be refused for development of poor design that fails to take the opportunities available for improving the character and quality of an area and the way it functions, taking into account any local design standards or style guides in plans or supplementary planning documents. Conversely, where the design of a development accords with clear expectations in plan policies, design should not be used by the decision-maker as a valid reason to object to development. Local planning authorities should also seek to ensure that the quality of approved development is not materially diminished between permission and completion, as a result of changes being made to the permitted scheme (for example through changes to approved details such as the materials used).

170. Planning policies and decisions should contribute to and enhance the natural and local environment by;

[…]

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;

180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; […]

182. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

3.3 BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'

Table 4 of British Standard 8233:2014 provides guidance on internal ambient noise levels in residential spaces. This table is reproduced below:

Location	Daytime (07:00 to 23:00 hours)	Night-time (23:00 to 07:00 hours)
Living room	≤ 35 dBA $L_{eq,16hour}$	N/A
Dining room	≤ 40 dBA $L_{eq,16hour}$	N/A
Bedroom	≤ 35 dBA $L_{eq,16hour}$	≤ 30 dBA $L_{eq,\ 8hour}$

Table 1 - BS 8233:2014 'indoor ambient noise levels for dwellings'

The following notes should be considered when following the guidance above:

"If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level;"

In relation to the noise guidelines in Table 1 above, BS 8233 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 5 dB and reasonable internal conditions still achieved'

BS 8233: 2014 provides the following consideration for façade attenuation when partially open windows are used for ventilation:

"If partially open windows were relied upon for background ventilation, the insulation [of the building façade] *would be reduced to approximately 15 dB".*

The 2014 version of BS 8233 does not include any specific requirement for maximum instantaneous noise levels within dwellings. However, BS 8233:1999 (superseded) stated that "*For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB L_{AFMax}.*"

3.4 ProPG – Professional Practice Guidance on Planning and Noise

The 'Professional Practice Guidance on Planning & Noise – New Residential Development' (ProPG) was produced to provide practitioners with guidance and a recommended approach for the assessment of noise impact on residential developments during the planning stage.

The primary goal of the ProPG is to:

"Assist the delivery of sustainable development by promoting good health and wellbeing through the effective management of noise."

The document seeks to do this by:

"Encouraging a good acoustic design in and around proposed new residential development having regard to national policy on planning and noise"

The ProPG advocates a 2-stage approach to facilitate *"…straightforward accelerated decision making for lower risk sites and assists proper consideration of noise issues where the acoustic environment is challenging".*

The recommended approach is summarised below:

- Stage 1 – an initial noise risk assessment of the proposed development site; and
- Stage 2 – a systematic consideration of four key elements.
  - Element 1 – Demonstrating a "Good Acoustic Design Process";
  - Element 2 – Observing internal "Noise Level Guidelines";
  - Element 3 – Undertaking an "External Amenity Area Noise Assessment"; and
  - Element 4 – consideration of "Other relevant Issues".

In addition to the above, the ProPG states:

"The approach is underpinned by the preparation and delivery of an 'Acoustic Design Statement' (ADS). An ADS for a site assessed as high risk should be more detailed than for a site assessed as low risk. An ADS should not be necessary for a site assessed as low risk."

Having followed the recommended approach, the ProPG suggests that the noise practitioner should be able to make one of four recommendations to the relevant planning decision maker:

A) Planning consent may be granted without any need for noise conditions;
B) Planning consent may be granted subject to the inclusion of suitable noise conditions;
C) Planning consent should be refused on noise grounds in order to avoid significant adverse effects ("avoid"); or

Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects ("prevent").

4.0 Environmental noise survey

This section of the report gives details of the environmental noise surveys undertaken at the site. The surveys were carried out to determine the existing noise levels at the site which will be incident upon the proposed development.

4.1 Limitations due to COVID-19

At the time of reporting, COVID-19 guidance has resulted in lower prevailing noise levels in areas adjacent to road networks due to more people working from home and fewer people using public transport. Ambient noise levels at the proposed Development are therefore expected to be currently lower than would be expected during 'normal' conditions.

In line with current guidance[1] published jointly by the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA), the results of Cundall's August 2020 noise survey have therefore been compared with the noise levels measured during a previous noise survey, which was undertaken in October/November 2013 for a prior planning application[2] for the site. The previous noise impact assessment report is included in Appendix B.

Both surveys measured noise levels in similar positions at the site and, as a worst-case assumption, the highest noise levels measured during either survey were used in the assessment. Cundall assumes no responsibility for the accuracy or validity of third-party data.

4.2 Measurement times and location

The Cundall noise survey consisted of attended noise monitoring on Thursday 6 and Friday 7 August 2020. The sound level meter was positioned on a tripod with the microphone at a height of 1.5 m above ground in all locations. The approximate measurement locations are shown in Figure 2 below.

[1] 'Joint Guidance On The Impact Of COVID-19 On The Practicality And Reliability Of Baseline Sound Level Surveying And The Provision Of Sound & Noise Impact Assessments' accessed on 23/09/2020 at: https://www.association-of-noise-consultants.co.uk/wp-content/uploads/2020/03/Joint-Statement-On-the-Impact-of-Covid.IOA-ANC.v1.230320.pdf?dm_i=142S,6SSFC,60HB0Z,R7UUM,1

[2] Planning Ref 13/3937/FUL allowed under appeal reference APP/P2935/W/14/3001679.

Figure 2 - Measurement locations

4.3 Existing noise climate

The dominant noise source affecting the site and the surrounding area is road traffic on surrounding roads.

4.4 Survey equipment

Table 2 provides relevant details of the equipment used for the baseline noise surveys.

Equipment	Manufacturer and model	Serial number
Sound level meter	Casella CEL 633	1211404
Calibrator	Casella Calibrator 120/1	4921893

Table 2 - Survey equipment

4.5 Weather conditions

Weather conditions during the entirety of the survey were dry with windspeeds below 5 m/s.

4.6 Noise survey results

The following table summarises the results of the noise survey, all results are free-field levels. Noise data was logged in 15 min increments throughout the day/night period, rotating through the measurement positions (see Appendix C for full set of 15-min period data, data was also simultaneously recorded in 1 min periods).

Measurement Location	Period	Measurement duration	Ambient noise level $L_{Aeq,T}$ (dB)	Typical maximum noise level L_{AFMax} (dB)
1	Daytime (07:00 - 23:00 hrs)	1 hour	62	-
	Night-time (23:00 – 07:00 hrs)	30 mins	55	69
2	Daytime (07:00 - 23:00 hrs)	1 hour	57	-
	Night-time (23:00 – 07:00 hrs)	30 mins	49	64
3	Daytime (07:00 - 23:00 hrs)	1 hour	54	-
	Night-time (23:00 – 07:00 hrs)	30 mins	49	64
4	Daytime (07:00 - 23:00 hrs)	1 hour	56	-
	Night-time (23:00 – 07:00 hrs)	30 mins	47	62

* This is the highest $L_{AFmax,1min}$ value estimated to not be exceeded more than 15 times in the night-time period measured i.e. twice in the 30 min measurement period.

Table 3 - Summary of noise measurement results

4.7 Comparison of noise survey results

The table below compares the results of Cundall's 2020 noise survey with those measured in 2013 by Wardell Armstrong. The values used in the assessment are those highlighted in yellow.

Measurement Location	Period	Cundall 2020 noise survey		Wardell Armstrong 2013 noise survey	
		Ambient noise level $L_{Aeq,T}$ (dB)	Typical maximum noise level L_{AFMax} (dB)	Ambient noise level $L_{Aeq,T}$ (dB)	Range of maximum noise levels L_{AFMax} (dB)
1	Daytime	62	-	68	-
	Night-time	55	68	55	63-66
2	Daytime	57	-	64	-
	Night-time	49	61	55	62-82
3	Daytime	54	-	62	-
	Night-time	49	63	52	64-68
4	Daytime	56	-	65	-
	Night-time	47	62	53	60-82

Table 4 - Comparison of 2020 and 2013 noise measurement results

In most cases, the noise levels measured during the previous noise survey by Wardell Armstrong are higher and have been selected for use in the noise assessment.

It should be noted that Wardell Armstrong's measurement periods were significantly shorter than Cundall's (typically half the duration or less).

5.0 Initial noise risk assessment

This assessment has been carried out in light of the guidance in the ProPG document. Therefore, an initial site risk assessment has been undertaken and is followed by an 'Acoustic Design Statement'. However, this assessment does not constitute a full assessment in accordance with the ProPG.

This section presents a "Stage 1" initial noise risk assessment for the site based on the guidance in the ProPG.

The Stage 1 assessment of the ProPG process aims to provide an indication of the likely risk of adverse effects on future residential development as a result of the existing noise climate around the proposed development site. The ProPG states that this risk assessment should not include any subsequent mitigation to be included as part of the development proposal.

5.1 Analysis of measured noise levels

The results of the 2013 noise survey show that measured noise levels across the site range from 62 – 68 dB $L_{Aeq,T}$ during the daytime and 52 - 55 dB $L_{Aeq,T}$ during the night-time.

The range of noise levels across the site means that the areas closest to the roads are likely to be classed as being at 'medium' risk from noise when assessed in accordance with the ProPG Stage 1 assessment (see Figure 4).

For sites in the 'medium' category, the ProPG provides the following guidance:

'As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is follow and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrates that a significant adverse noise impact will be avoided in the finished development.'

It should be noted that this initial assessment of the risk from noise does not consider the design of the buildings themselves or any landscaping associated with the development which will provide additional attenuation.

It is therefore likely that the site is suitable for residential type development assuming appropriate noise mitigation measures are incorporated into the design. This is discussed in more detail in the next section of the report.

NOISE RISK ASSESSMENT		POTENTIAL EFFECT WITHOUT NOISE MITIGATION	PRE-PLANNING APPLICATION ADVICE
Indicative Daytime Noise Levels $L_{Aeq,16hr}$	Indicative Night-time Noise Levels $L_{Aeq,8hr}$		
High		Increasing risk of adverse effect	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice. As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.
70 dB	60 dB		
Medium			
65 dB	55 dB		
60 dB	50 dB		At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
Low			
55 dB	45 dB		
50 dB	40 dB	No adverse effect	These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.
Negligible			

Figure 3 - ProPG Stage 1 risk assessment table (Fig.1 ref. ProPG)

6.0 Acoustic Design Statement

The initial noise risk assessment undertaken in line with the ProPG, has found that the site is likely to be above the 'negligible' risk from a noise perspective. Therefore, as recommended by the ProPG, an Acoustic Design Statement (ADS) has been produced.

This section of the report provides an ADS based on the recommended approach outlined in the ProPG to assess the level of noise impact on the proposed development.

6.1 Stage 2 Assessment – Acoustic Design Statement

The ProPG suggests that an ADS should consider four key elements. Each of these four elements are discussed in the following sections.

6.1.1 Element 1 – Good acoustic design process

The potential effects of noise have been considered throughout the design of the proposed development. The layout is provided in Figure 4 below and Appendix A:

Figure 4 - Proposed site layout

The proposed site layout provides a number of benefits from an acoustics perspective. It is likely that the proposed design of the development will reduce noise levels incident on proposed dwellings, and therefore the risk of adverse effects, due to the following:

- The dwellings are set-back from the noisiest road (the A189).
- The design of the development means that the majority of gardens closest to Brock Lane will face away from the road.
- Fences and walls have been included in the design to reduce external noise levels in gardens.

6.1.2 Element 2 – Internal Noise Level Guidelines

This element of the assessment seeks to identify if and how the 'internal noise level guidelines' (INLGs) defined in the ProPG can be achieved in noise sensitive rooms within the proposed development.

In relation to the INLG the ProPG states the following:

'Most residents value the ability to open windows at will, for a variety of reasons, and LPAs [Local Planning Authorities] *should therefore normally request that designers principally aim, through the use of good acoustic design, to achieve the internal noise level guidelines in noise-sensitive rooms with windows open. Where internal noise levels are assessed with windows closed the justification for this should be included in the ADS.*

Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment. In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide "whole dwelling ventilation" in accordance with Building Regulations Approved Document F (e.g. trickle ventilators) in the open position (see Supplementary Document 2). Furthermore, in this scenario the internal LAeq target noise levels should not generally be exceeded.'

The proposed site is located near a major road. This means that in some areas of the site it will not be possible to meet the ProPG internal noise level guidelines (INLGs) whilst windows are open. Therefore, for this site, internal noise levels will be assessed with windows closed. The assessment will take account of measures required to provide 'whole dwelling ventilation', as recommended by the ProPG.

The proposed ProPG INLGs are based on BS 8233, which contains guidance on suitable internal noise levels (Section 3.3). It is important to note that ProPG states that it is generally accepted that the internal noise criteria outlined in BS 8233 (and the 45 dB L_{AFmax} maximum noise criteria from ProPG) represent the lowest observable adverse effect level. Therefore, if these internal noise levels are met, it is unlikely that adverse noise effects on future residents will occur. If noise levels exceed these values, adverse effects may occur, but they will not necessarily be significant and are therefore likely to be acceptable in some situations.

ProPG also references BS 8233 regarding the internal noise levels:

'Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form.'

The following sub-sections describe the proposed measures included as part of the design to control internal noise levels and help achieve the ProPG INLGs.

6.1.3 Façade noise break-in

Calculations have been undertaken to determine a suitable façade sound insulation strategy for the development. Based on the results of the 2013 noise survey, predicted levels of noise incident on the proposed dwellings have been established.

Sound insulation performance requirements for the external building façade have been predicted based on the following assumptions:

- Calculations have been undertaken based on the 'more rigorous' calculation method proposed in Annex G of BS 8233:2014;
- Calculations have been undertaken in terms of octave band noise data;
- The noise spectrum used in the calculations was taken from the 2020 survey and adjusted to the overall dBA value measured in 2013;
- Façade dimensions for the noise-sensitive room were assumed to be 4 m wide by 3 m high;
- The room's internal dimensions were assumed to be 4 m x 5 m x 2.7 m;
- It has been assumed that all spaces will have a reverberation time of 0.5 seconds;
- In the absence of design details for the building facades, it has been assumed that glazing to noise sensitive rooms would comprise no more than 25% of the facade area (or 3 m^2);
- It has been assumed that non-glazed areas of the façade will be of masonry construction; and
- Internal noise levels to meet ProPG / BS 8233 criteria.

Table 5 summarises the results of these calculations and also identifies glazing configurations that are likely to be capable of providing the required sound insulation. More information about the calculations is included in Appendix B.

Calculated noise level incident upon the façade (dB)	Internal ambient noise level criteria	Example glazing and ventilators	Highest calculated internal noise level (dB)
Daytime: 68 $L_{Aeq,16hr}$ Night-time: 55 $L_{Aeq,8hr}$ Night-time: 82 $L_{AFmax,5min}$	Daytime: 35 $L_{Aeq,16hr}$ Night-time: 30 $L_{Aeq,8hr}$ Night-time: 45 $L_{AFmax,5min}$	Double glazing to provide a minimum of 29 dB $R_w + C_{tr}$ e.g. ▪ 6 mm glazing ▪ 6-16 mm cavity ▪ 10.6 mm laminated pvb glazing Up to two trickle vents per habitable room each to provide a minimum of 42 dB $D_{n,e,w}$[3]	Daytime: 32 $L_{Aeq,16hr}$ Night-time: 18 $L_{Aeq,8hr}$ Night-time: 45 $L_{AFmax,5min}$
Daytime: 62 $L_{Aeq,16hr}$ Night-time: 52 $L_{Aeq,8hr}$ Night-time: 68 $L_{AFmax,5min}$	Daytime: 35 $L_{Aeq,16hr}$ Night-time: 30 $L_{Aeq,8hr}$ Night-time: 45 $L_{AFmax,5min}$	Double glazing (to provide a minimum of 28 dB $R_w + C_{tr}$ ▪ 4 mm glazing ▪ 6-16 mm cavity ▪ 4 mm glazing Up to two trickle vents per habitable room each to provide a minimum of 35 dB $D_{n,e,w}$	Daytime: 33 $L_{Aeq,16hr}$ Night-time: 22 $L_{Aeq,8hr}$ Night-time: 37 $L_{AFmax,}$

Table 5 - Glazing and trickle vent requirements

[3] E.g. PASSIVENT Fresh 90dB

It can be seen from the assessment above that INLGs can be met on even the most exposed facades with appropriately specified double-glazing systems. Acoustic trickle ventilators providing an increased level of sound reduction will be required on the most affected façades.

The most onerous glazing and ventilator specification is applicable to residential building façades directly facing the roads (those highlighted in red in Figure 5 below). Façades facing away from the roads, or set further back from them, will benefit from additional screening and sound attenuation with distance and so the reduced specification will be suitable.

Figure 5 – façades with most onerous glazing and trickle ventilator requirements (in red)

6.1.4 Ventilation systems

It is a requirement of the Building Regulations that 'whole dwelling ventilation' (previously known as background ventilation) is provided continuously in dwellings. The ProPG also recommends that the INLGs are not exceeded whilst this ventilation is provided. There are three main methods of providing whole dwelling ventilation:

- Natural / passive ventilation openings (e.g. trickle vents, ventilation stacks);
- Continuous mechanical extract (e.g. continuous extract by bathroom and kitchen fans and make-up air provided by trickle vents); and
- Mechanical ventilation (e.g. mechanical ventilation and heat recovery [MVHR]).

The final ventilation solution for the project is yet to be finalised. However, if spaces are ventilated using a mechanical system (i.e. MVHR), no façade openings (e.g. trickle vents) would be required.

MVHR systems inherently provide a good level of noise attenuation but this should be reviewed and, where necessary, attenuation should be included in the design of any ventilation inlets / outlets to meet the INLGs.

Any mechanical ventilation system used will need to be appropriately designed so that noise generated by the system itself does not result in significant adverse effects. This should be examined in more detail during the design stage of the project, but the following initial internal mechanical services noise level limits are proposed in dwellings:

- Living rooms (daytime and night-time): .. NR30

- Bedrooms (daytime): NR30
- Bedrooms (night-time): NR25

For the purposed of the acoustic assessment a passive ventilation strategy is assumed with a maximum of two trickle vents (or other ventilation openings in the façade) per habitable room.

Once the final ventilation strategy of the residential units is known, it is recommended that this is reviewed in detail during the design of the project.

6.1.4.1 Purge ventilation

The only time windows will be required to be open for the purpose of ventilation will be for occasional 'purge' ventilation. With respect to noise levels during purge ventilation, the ProPG states the following:

'*It should also be noted that the internal noise level guidelines are generally not applicable under 'purge ventilation' conditions as defined by Building Control Approved Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).'*

It is therefore not considered necessary to further consider noise levels during purge ventilation conditions and using windows for this purpose is unlikely to result in any significant adverse effects.

Based on the above statement, it is considered that any increase in noise level when windows are open to provide purge ventilation are unlikely to result in significant adverse effects.

6.1.4.2 Thermal comfort (overheating)

Unless the design includes alternative measures, it is likely that windows will need to be opened on occasion to provide relief from overheating in some spaces. When windows are open, internal noise levels will be increased. Any impact on future residents will partly depend upon how often this is likely to be required.

6.1.5 Element 3 - External amenity areas

This element of the assessment seeks to assess noise levels in external amenity areas (private gardens) as part of the proposed development.

Based on the results of the noise survey, a boundary treatment strategy will need to be developed to reduce noise levels in plots which are predicted experience the highest noise levels i.e. along the A168. A wall or close-boarded timber fence (>10 kg/m^2) can typically provide up to 15 dB sound reduction and will be required to all gardens facing roads. Solid walls/fences at a height of 1.8m, as proposed in other areas of the site, should be adequate to provide screening to these gardens.

Other gardens facing away from roads should be adequately screened from road traffic noise by the proposed dwellings themselves.

Figure 6 below shows the daytime noise levels (measured in 2013) in each portion of the site and indicates the likely extent of the required 1.8 m tall close-boarded fence treatments in red:

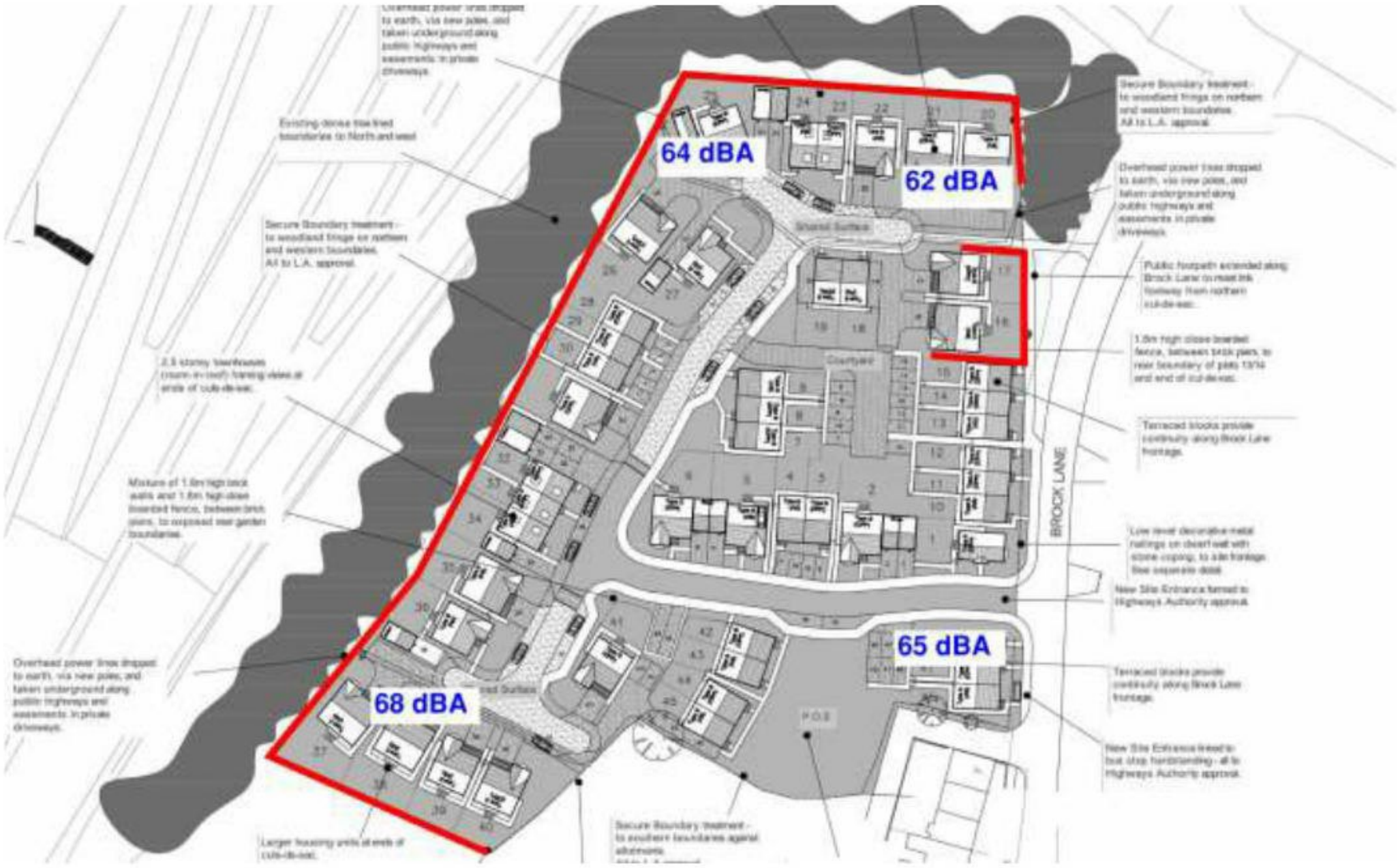

Figure 6 - Daytime noise levels (blue) and garden boundary treatments (red)

6.1.6 Element 4 – Other relevant issues

No other significant acoustic issues have been identified.

6.2 Acoustic design statement conclusions (recommendations to the decision maker)

An assessment has been undertaken in line with the guidance in the new ProPG document.

The Stage 1 risk assessment found that the noise risk associated with the site is between 'low' and 'medium' risk.

A ProPG Stage 2 assessment has been undertaken and an ADS has been produced for the site. It is believed that the ADS demonstrates that a good acoustic design process has been followed and appropriate design and mitigation measures are included in the form of appropriate garden perimeter fences / walls to avoid significant adverse effects in external amenity spaces and, where possible, mitigate adverse effects.

Therefore, it is recommended that from an acoustics perspective, planning consent be granted subject to the inclusion of suitable noise conditions.

7.0 Conclusion

An environmental noise assessment has been undertaken for the proposed residential development on land adjacent to Brock Lane, East Sleekburn, Northumberland.

Based on the results of the noise survey, a noise assessment considering guidance from the ProPG has been carried out and has concluded that significant adverse effects are unlikely to occur if appropriate mitigation measures are implemented.

Therefore, in terms of noise, it is considered that the site is suitable for a residential development, assuming appropriate design measures are implemented.

Appendix A - Location Plan

Appendix B - Noise break-in calculation details

Glazing sound reduction performance used in the calculations is taken from EN 12758 and detailed as follows:

Glass	Sound reduction index (dB)						
	Octave band Centre Frequency (Hz)						$R_w + C_{tr}$
	125	250	500	1000	2000	4000	
4 mm / (6 - 16 mm) / 4 mm	21	17	25	35	37	31	25
6 mm / (6 - 16 mm) / 10.6 mm Laminated	24	25	33	39	40	49	32

Trickle ventilator sound reduction performance used in the calculations is detailed as follows:

Ventilator	Sound reduction index (dB)						
	Octave band Centre Frequency (Hz)						$D_{n,e,w}$
	125	250	500	1000	2000	4000	
Trickle vent with direct air path	35	35	34	36	34	-	35
Acoustic trickle vent	42.5	32	39.8	42.3	50	55.3	42

Calculation Sheet

Worst case Day LAeq

		Octave Band Centre Frequency (Hz)							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Location 1 Day LAeq									
Location 1 Day LAeq - Location 1 - Day Leq **Noise Levels**		**65.0**	**59.0**	**53.0**	**55.0**	**61.0**	**52.0**	**42.0**	**32.0**
Adjust overall level									
		5.7	*5.7*	*5.7*	*5.7*	*5.7*	*5.7*	*5.7*	*5.7*
Location 1 Day LAeq									
Facade Width (m)	4.0								
Facade Height (m)	3.0								
Main Element - 225mm brickwork									
Glazed Element - 6/16/10lam									
Window Width (m)	1.5								
Window Height (m)	2.0								
No. of Windows (no)	1.0								
Vent - PASSIVENT Fresh 90dB									
No. of Vents (no)	2.0								
Receiver - Location 1 Day LAeq									
Lp (ff) at facade (dB)		**70.7**	**64.7**	**58.7**	**60.7**	**66.7**	**57.7**	**47.7**	**37.7**
BS 8233 Break-In Calc									
-SRI									
Main Element - 225mm brickwork									
Glazed Element - 6/16/10lam									
Window Width (m)	1.5								
Window Height (m)	2.0								
No. of Windows (no)	1.0								
Vent - PASSIVENT Fresh 90dB									
No. of Vents (no)	2.0								
		-	*-29.4*	*-27.3*	*-35.1*	*-38.8*	*-43.7*	*-50.7*	-
10 log (S/A)									
Receiver - Location 1 Day LAeq									
		-	*-1.6*	*-1.6*	*-1.6*	*-1.6*	*-1.6*	*-1.6*	-

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	Octave Band Centre Frequency (Hz)							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
+3								
	-	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*	-
BS 8233 Break-In Calc								
Internal Receiver Noise								
Internal Receiver Noise - Location 1 Day LAeq **Reverberant Field, LPrev**	-	**36.7**	**32.8**	**27.0**	**29.3**	**15.3**	**-1.6**	-
Internal Receiver Noise								
Internal Receiver Noise - Location 1 Day LAeq **Total Sound Pressure Level (dB)**	-	**36.7**	**32.8**	**27.0**	**29.3**	**15.3**	**-1.6**	-
dBA								
dBA	31.8							
Input:	-	**36.7**	**32.8**	**27.0**	**29.3**	**15.3**	**-1.6**	-

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Calculation Sheet

Worst case Night LAeq

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Location 1 Night LAeq									
Location 1 Night LAeq - Location 1 - Night Leq **Noise Levels**		**53.0**	**49.0**	**42.0**	**47.0**	**54.0**	**44.0**	**30.0**	**18.0**
Arithmetic Sum									
		0.0	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Location 1 Night LAeq									
Facade Width (m)	4.0								
Facade Height (m)	3.0								
Main Element - 225mm brickwork									
Glazed Element - 6/16/10lam									
Window Width (m)	1.5								
Window Height (m)	2.0								
No. of Windows (no)	1.0								
Vent - PASSIVENT Fresh 90dB									
No. of Vents (no)	2.0								
Receiver - Location 1 Day LAeq									
Lp (ff) at facade (dB)		**53.0**	**49.0**	**42.0**	**47.0**	**54.0**	**44.0**	**30.0**	**18.0**
Location 1 Night LAeq									
Facade Width (m)	4.0								
Facade Height (m)	3.0								
Main Element - 225mm brickwork									
Glazed Element - 6/16/10lam									
Window Width (m)	1.5								
Window Height (m)	2.0								
No. of Windows (no)	1.0								
Vent - PASSIVENT Fresh 90dB									
No. of Vents (no)	2.0								
Receiver - Location 1 Day LAeq									
		-	*-28.0*	*-25.9*	*-33.7*	*-37.4*	*-42.4*	*-49.3*	*-*

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		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Internal Receiver Noise									
Internal Receiver Noise - Location 1 Night LAeq **Reverberant Field, LPrev**		-	21.0	16.1	13.3	16.6	1.6	-19.3	-
Internal Receiver Noise									
Internal Receiver Noise - Location 1 Night LAeq **Total Sound Pressure Level (dB)**		-	21.0	16.1	13.3	16.6	1.6	-19.3	-
dBA									
dBA	18.2								
Input:		-	21.0	16.1	13.3	16.6	1.6	-19.3	-

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Calculation Sheet

Worst case Night LAF,max

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Location 2 Night LAF,max									
Location 2 Night LAF,max - Location 1 - Night Leq **Noise Levels**		**53.0**	**49.0**	**42.0**	**47.0**	**54.0**	**44.0**	**30.0**	**18.0**
Arithmetic Sum									
		27.0	*27.0*	*27.0*	*27.0*	*27.0*	*27.0*	*27.0*	*27.0*
Location 2 Night LAF,max									
Facade Width (m)	4.0								
Facade Height (m)	3.0								
Main Element - 225mm brickwork									
Glazed Element - 6/16/10lam									
Window Width (m)	1.5								
Window Height (m)	2.0								
No. of Windows (no)	1.0								
Vent - PASSIVENT Fresh 90dB									
No. of Vents (no)	2.0								
Receiver - Location 1 Day LAeq									
Lp (ff) at facade (dB)		**80.0**	**76.0**	**69.0**	**74.0**	**81.0**	**71.0**	**57.0**	**45.0**
Location 2 Night LAF,max									
Facade Width (m)	4.0								
Facade Height (m)	3.0								
Main Element - 225mm brickwork									
Glazed Element - 6/16/10lam									
Window Width (m)	1.5								
Window Height (m)	2.0								
No. of Windows (no)	1.0								
Vent - PASSIVENT Fresh 90dB									
No. of Vents (no)	2.0								
Receiver - Location 1 Day LAeq									
		-	*-28.0*	*-25.9*	*-33.7*	*-37.4*	*-42.4*	*-49.3*	-

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		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Internal Receiver Noise									
Internal Receiver Noise - Location 2 Night LAF,max **Reverberant Field, LPrev**		-	48.0	43.1	40.3	43.6	28.6	7.7	-
Internal Receiver Noise									
Internal Receiver Noise - Location 2 Night LAF,max **Total Sound Pressure Level (dB)**		-	48.0	43.1	40.3	43.6	28.6	7.7	-
dBA									
dBA	45.2								
Input:		-	48.0	43.1	40.3	43.6	28.6	7.7	-

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Calculation Sheet

Quietest Day LAeq

		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Location 3 Day LAeq									
Location 3 Day LAeq - Location 3 - Day Leq **Noise Levels**		**63.0**	**58.0**	**47.0**	**47.0**	**53.0**	**44.0**	**34.0**	**28.0**
Arithmetic Sum									
		7.4	*7.4*	*7.4*	*7.4*	*7.4*	*7.4*	*7.4*	*7.4*
Location 3 Day LAeq									
Facade Width (m)	4.0								
Facade Height (m)	3.0								
Main Element - 225mm brickwork									
Glazed Element - 4/16/4									
Window Width (m)	1.5								
Window Height (m)	2.0								
No. of Windows (no)	1.0								
Vent - Trickle vent with direct air path									
No. of Vents (no)	2.0								
Receiver - Location 1 Day LAeq									
Lp (ff) at facade (dB)		**70.4**	**65.4**	**54.4**	**54.4**	**60.4**	**51.4**	**41.4**	**35.4**
Location 3 Day LAeq									
Facade Width (m)	4.0								
Facade Height (m)	3.0								
Main Element - 225mm brickwork									
Glazed Element - 4/16/4									
Window Width (m)	1.5								
Window Height (m)	2.0								
No. of Windows (no)	1.0								
Vent - Trickle vent with direct air path									
No. of Vents (no)	2.0								
Receiver - Location 1 Day LAeq									
		-	*-24.5*	*-21.2*	*-27.0*	*-31.6*	*-30.1*	-	-

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		Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k	8k
Internal Receiver Noise								
Internal Receiver Noise - Location 3 Day LAeq **Reverberant Field, LPrev**	-	40.9	33.2	27.4	28.8	21.3	-	-
Internal Receiver Noise								
Internal Receiver Noise - Location 3 Day LAeq **Total Sound Pressure Level (dB)**	-	40.9	33.2	27.4	28.8	21.3	-	-
dBA								
dBA 32.5 **Input:**	-	40.9	33.2	27.4	28.8	21.3	-	-

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Calculation Sheet

Quietest Night LAeq

		Octave Band Centre Frequency (Hz)							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Location 3 Night LAeq									
Location 3 Night LAeq - Location 3 - Night Leq **Noise Levels**		**48.0**	**43.0**	**35.0**	**42.0**	**48.0**	**38.0**	**23.0**	**16.0**
Arithmetic Sum									
		2.9	*2.9*	*2.9*	*2.9*	*2.9*	*2.9*	*2.9*	*2.9*
Location 3 Night LAeq									
Facade Width (m)	4.0								
Facade Height (m)	3.0								
Main Element - 225mm brickwork									
Glazed Element - 4/16/4									
Window Width (m)	1.5								
Window Height (m)	2.0								
No. of Windows (no)	1.0								
Vent - Trickle vent with direct air path									
No. of Vents (no)	2.0								
Receiver - Location 1 Day LAeq									
Lp (ff) at facade (dB)		**50.9**	**45.9**	**37.9**	**44.9**	**50.9**	**40.9**	**25.9**	**18.9**
Location 3 Night LAeq									
Facade Width (m)	4.0								
Facade Height (m)	3.0								
Main Element - 225mm brickwork									
Glazed Element - 4/16/4									
Window Width (m)	1.5								
Window Height (m)	2.0								
No. of Windows (no)	1.0								
Vent - Trickle vent with direct air path									
No. of Vents (no)	2.0								
Receiver - Location 1 Day LAeq									
		-	*-24.5*	*-21.2*	*-27.0*	*-31.6*	*-30.1*	-	-

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		Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Internal Receiver Noise									
Internal Receiver Noise - Location 3 Night LAeq **Reverberant Field, LPrev**		-	21.4	16.7	17.9	19.3	10.8	-	-
Internal Receiver Noise									
Internal Receiver Noise - Location 3 Night LAeq **Total Sound Pressure Level (dB)**		-	21.4	16.7	17.9	19.3	10.8	-	-
dBA									
dBA	21.5								
Input:		-	21.4	16.7	17.9	19.3	10.8	-	-

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Calculation Sheet

Quietest Night LAF,max

		Octave Band Centre Frequency (Hz)							
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Location 3 Night LAF,max									
Location 3 Night LAF,max - Location 1 - Night Leq **Noise Levels**		**53.0**	**49.0**	**42.0**	**47.0**	**54.0**	**44.0**	**30.0**	**18.0**
Arithmetic Sum									
		13.0	*13.0*	*13.0*	*13.0*	*13.0*	*13.0*	*13.0*	*13.0*
Location 3 Night LAF,max									
Facade Width (m)	4.0								
Facade Height (m)	3.0								
Main Element - 225mm brickwork									
Glazed Element - 4/16/4									
Window Width (m)	1.5								
Window Height (m)	2.0								
No. of Windows (no)	1.0								
Vent - Trickle vent with direct air path									
No. of Vents (no)	2.0								
Receiver - Location 1 Day LAeq									
Lp (ff) at facade (dB)		**66.0**	**62.0**	**55.0**	**60.0**	**67.0**	**57.0**	**43.0**	**31.0**
Location 3 Night LAF,max									
Facade Width (m)	4.0								
Facade Height (m)	3.0								
Main Element - 225mm brickwork									
Glazed Element - 4/16/4									
Window Width (m)	1.5								
Window Height (m)	2.0								
No. of Windows (no)	1.0								
Vent - Trickle vent with direct air path									
No. of Vents (no)	2.0								
Receiver - Location 1 Day LAeq									
		-	*-24.5*	*-21.2*	*-27.0*	*-31.6*	*-30.1*	-	-

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		Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k	8k
Internal Receiver Noise								
Internal Receiver Noise - Location 3 Night LAF,max **Reverberant Field, LPrev**	-	37.5	33.8	33.0	35.4	26.9	-	-
Internal Receiver Noise								
Internal Receiver Noise - Location 3 Night LAF,max **Total Sound Pressure Level (dB)**	-	37.5	33.8	33.0	35.4	26.9	-	-
dBA								
dBA 37.4 **Input:**	-	37.5	33.8	33.0	35.4	26.9	-	-

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Appendix C – Cundall 2020 Noise Survey Data

Measurement Location	Start Date Time	End Date Time	Duration Sec	$L_{AF,MAX}$	$L_{Aeq,15min}$	L_{A90}
1	06/08/2020 11:22	06/08/2020 11:37	900	68	63	59
2	06/08/2020 11:43	06/08/2020 11:58	900	69	57	55
3	06/08/2020 12:02	06/08/2020 12:17	900	65	54	50
4	06/08/2020 12:23	06/08/2020 12:38	900	72	55	45
1	06/08/2020 12:42	06/08/2020 12:57	900	69	61	57
2	06/08/2020 13:02	06/08/2020 13:17	900	64	56	54
3	06/08/2020 13:20	06/08/2020 13:35	900	66	54	50
4	06/08/2020 13:39	06/08/2020 13:54	900	83	56	46
1	06/08/2020 13:58	06/08/2020 14:13	900	71	61	57
2	06/08/2020 14:17	06/08/2020 14:32	900	66	57	54
3	06/08/2020 14:35	06/08/2020 14:50	900	69	55	51
4	06/08/2020 14:54	06/08/2020 15:09	900	71	56	47
1	06/08/2020 15:13	06/08/2020 15:28	900	79	62	59
2	06/08/2020 15:32	06/08/2020 15:47	900	62	57	55
3	06/08/2020 15:50	06/08/2020 16:05	900	65	55	52
4	06/08/2020 16:09	06/08/2020 16:24	900	70	56	48
1	06/08/2020 23:23	06/08/2020 23:38	900	69	55	44
2	06/08/2020 23:42	06/08/2020 23:57	900	61	50	41
3	07/08/2020 00:01	07/08/2020 00:16	900	64	51	37
4	07/08/2020 00:19	07/08/2020 00:34	900	64	49	32
1	07/08/2020 00:42	07/08/2020 00:57	900	68	54	34
2	07/08/2020 01:01	07/08/2020 01:16	900	65	48	30
3	07/08/2020 01:19	07/08/2020 01:34	900	63	46	31
4	07/08/2020 01:37	07/08/2020 01:52	900	62	41	28

Appendix D - Previous noise impact report

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ENERGY AND CLIMATE CHANGE
ENVIRONMENT AND SUSTAINABILITY
INFRASTRUCTURE AND UTILITIES
LAND AND PROPERTY
MINING, QUARRYING AND MINERAL ESTATES
WASTE RESOURCE MANAGEMENT

DYSART DEVELOPMENTS

East Sleekburn, Northumberland

Noise Assessment

November 2013

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Wardell Armstrong
City Quadrant, 11 Waterloo Square, Newcastle upon Tyne, NE1 4DP, United Kingdom
Telephone: +44 (0)191 232 0943 Facsimile: +44 (0)191 261 1572 www.wardell-armstrong.com

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DYSART DEVELOPMENTS

East Sleekburn, Northumberland

Noise Assessment

November 2013

PREPARED BY:

Nick Dennon — Environmental Scientist

CHECKED BY:

Nichola Dixon — Principal Environmental Scientist

APPROVED BY:

Mark Dawson — Technical Director

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ENERGY AND CLIMATE CHANGE
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LAND AND PROPERTY
MINING AND MINERAL PROCESSING
MINERAL ESTATES AND QUARRYING
WASTE RESOURCE MANAGEMENT

CONTENTS

TABLES

APPENDICES

FIGURES

1 INTRODUCTION

1.1.1 Wardell Armstrong LLP was commissioned by Dysart Developments to undertake a noise assessment for a proposed residential development at land in East Sleekburn, Northumberland.

1.1.2 The site currently comprises open grassland and is bound to the north, west and east by dense strips of trees and bushes which lie adjacent to the A189 and Brock Lane. To the south there is a residential development, with Sleek Burn flowing approximately 100m from the southern boundary of the site.

1.1.3 The noise assessment report has been prepared in support of the planning application for the proposed residential development. The report assesses the results of a noise survey carried out in accordance with current guidance and includes recommendations for noise mitigation as appropriate.

2 ASSESSMENT METHODOLODGY

2.1 Consultation and Scope of Works

2.1.1 The assessment considers the potential impact of existing sources of noise across the proposed noise sensitive areas of the site including noise from vehicles travelling along the A189 road to the west and Brock Lane to the north and east. The scope of works included in this assessment is as follows:

2.2 Noise Survey

2.2.1 As part of this assessment, Wardell Armstrong LLP has carried out an attended noise survey to assess the current ambient and background noise levels at proposed receptor locations. The noise survey is discussed in greater detail in Chapter 3 of this report.

2.3 Assessment Methodology Adopted

2.3.1 An assessment is required to consider any potentially noise sensitive areas of the site. The potential impacts of the existing and future sources of noise, on the proposed residential area of the development, have been assessed with reference to the 'National Planning Policy Framework' (NPPF), British Standard 8233:1999 "Sound Insulation and Noise Reduction for Buildings – Code of Practice" (BS8233) and the World Health Organisation Guidelines for Community Noise 1999 (WHO, 1999).

National Planning Policy Framework

2.3.2 In March 2012 the 'National Planning Policy Framework' (NPPF) was introduced as the current planning policy guidance within England. Paragraph 123 of the NPPF states:

'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; and*
- *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.'*

2.3.3 In terms of 'adverse effects' the NPPF refers to the 'National Policy Statement for England' (NPSE), which defines three categories, as follows:

'NOEL – No Observed Effect Level

- *This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*

LOAEL – Lowest Observed Adverse Effect Level

- *This is the level above which adverse effects on health and quality of life can be detected.*

SOAEL – Significant Observed Adverse Effect Level

- *This is the level above which significant adverse effects on health and quality of life occur.'*

2.3.4 However, whilst the above terms are provided in NPSE, paragraph 2.22 acknowledges that these terms require further research in order to establish what is meant in terms of 'adverse impact'.

'2.22 It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.'

World Health Organisation Guidelines for Community Noise (WHO, 1999)

2.3.5 In accordance with the requirements of WHO: 1999 the following internal daytime and night-time noise limits for noise from external sources will need to be met within sensitive rooms of the residential dwellings:

- 35dB $L_{Aeq\ (16\ hour)}$ during the daytime in noise sensitive rooms other than bedrooms; and
- 30dB $L_{Aeq\ (8\ hour)}$ during the night-time in bedroom areas.

2.3.6 WHO 1999 also proposes an external noise limit of 55dB $L_{Aeq\ (16\ hour)}$ during the daytime in outdoor living areas.

BS8233: Sound Insulation and Noise Reduction for Buildings – Code of Practice

2.3.7 BS8233 gives recommendations for the control of noise in and around buildings and suggests appropriate criteria and internal noise limits to achieve good to reasonable conditions for resting and sleeping for different area types, for example in living room and bedroom areas. These are outlined in Table 1.

Table 1
BS8233 Noise Limits Corresponding to Good and Reasonable Conditions for resting and sleeping in bedrooms and living rooms (as per Table 5 of the Guidance Document)

Criterion	Typical Situations	Design Range $L_{Aeq,T}$ dB	
		Good	Reasonable
Reasonable resting/sleeping conditions	Bedrooms[a]	30	35
	Living Rooms	30	40
[a] For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45dB L_{Amax}			

2.3.8 For the purpose of this assessment the internal noise levels in habitable rooms have been assessed against the following criteria:

- 35dBL$_{Aeq}$ during the daytime in living room areas[1]
- 30dBL$_{Aeq}$ during the night-time in bedroom areas

3 NOISE SURVEY

3.1.1 On the 31st October and the 4th/5th November 2013 Wardell Armstrong LLP carried out noise surveys to assess noise levels across the development site.

3.1.2 Noise measurements were taken at four accessible monitoring locations; considered to be representative of proposed residential receptors. The monitoring locations are as follows; and are shown on Figure 1:

- Monitoring Location 1: In the south-eastern corner of the site, approximately 10m from Brock Lane, 5m from a bus stop and 14m from an existing residential property. This location was selected to be representative of proposed residential properties in the south-eastern area of the site, closest to the Brock Lane and existing houses;
- Monitoring Location 2: Located in the south-western corner of the site approximately 45m from the A189 dual carriageway and slip road, with allotment gardens to the south and east. This location was selected as it is the closest point to the A189 dual carriageway and should be representative of proposed residential properties in the south-western area of the site;
- Monitoring Location 3: In the north-western part of the site, approximately 15m from the A189 slip road and 50m from the A189 dual carriageway itself, with Brock Lane 60m to the north. This location was selected because it is relatively close to the three roads and should be representative of proposed residential properties in the north-western part of the site; and
- Monitoring Location 4: In the north-eastern part of the site; approximately 30m from Brock Lane to the north and east and 65m from the junction at the end of the A189 slip road. This location was selected to be representative of proposed residential properties in the north-eastern part of the site.

3.1.3 Attended day-time noise monitoring was carried out during the following period:

- Between 1300 and 1700 hours, on the 31st October 2013.

[1] This recommended noise limit has been set in accordance with WHO 1999. It is also an average between the good and reasonable standards in accordance with BS8233.

3.1.4 Attended night-time noise monitoring was carried out during the following period:

- 2300 and 0100 hours, on the 4th/5th November 2013.

3.1.5 The noise measurements were made using a Type 1, integrating sound level meter. The sound level meter was mounted vertically on a tripod 1.5m above the ground and more than 3.5 metres from any other reflecting surfaces.

3.1.6 All noise monitoring took place during dry and calm weather conditions. The sound level meter was calibrated to a reference level of 93.9dB at 1kHz both before and after the noise surveys. No drift in the calibration during the survey was noted.

3.1.7 For the purpose of this assessment daytime hours are taken to be 0700 to 2300 hours and night-time hours to be 2300 to 0700 hours.

3.1.8 The attended noise measurements were taken over a 15-minute period during the daytime survey and over a 5-minute period during the night time. A-weighted[2] Leqs[3] were recorded to comply with the requirements of NPPF, WHO 1999 and BS8233, together with A-weighted L90s[4] to comply with the requirements of BS4142. The maximum and minimum sound pressure levels were also recorded to provide additional information. The measured noise levels are set out in full in Appendix 1.

3.1.9 Attended noise monitoring allows observations and detailed notes to be made of the significant noise sources which contribute to each of the measured levels. The observations identified the significant noise sources at the site to be as follows:

Road Traffic: Noise from both the A189 and Brock Lane was audible throughout the survey; however due to the speed and frequency of the traffic, noise from the A189 was considered dominant at all four monitoring locations. A drop in the level of road traffic noise was noted during the night-time period.

Birdsong: Birdsong was audible throughout the day at all locations.

3.1.10 ***Other Sources:*** Other sources included horses, ducks and dogs that were kept towards the south west of the site near Monitoring Location 2.

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[2] A' Weighting — An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions

[3] L_{eqs} — Equivalent continuous noise level; the steady sound pressure which contains an equivalent quantity of sound energy as the time-varying sound pressure levels.

[4] L_{90} — The noise level which is exceeded for 90% of the measurement period.

4 NOISE IMPACT ASSESSMENT

4.1 Existing Noise Levels

4.1.1 The calculated noise levels for each monitoring location have been divided into daytime (0700-2300 hours) and night-time (2300-0700 hours) categories. The individual levels have been arithmetically averaged and then rounded up to give a single daytime and night-time level for each location. The results for each of the monitoring locations are presented in Table 2.

Table 2
Average Daytime and Night-time Noise Levels (Figures in dB L_{Aeq})

Time	Monitoring Location	Average Measured Noise Level
0700-2300	1	64.7
2300-0700		53.3
0700-2300	2	67.9
2300-0700		54.5
0700-2300	3	63.6
2300-0700		54.9
0700-2300	4	61.5
2300-0700		51.9

4.1.2 It should be noted that the night-time noise monitoring carried out does not include what is normally considered to be the quieter hours (i.e. between 0100 and 0400 hours) and consequently the average noise levels for 2300 – 0700 hours are slightly over-stated. However, the results obtained allow a robust assessment to be made of the noise levels at the site and of the mitigation necessary to achieve the required internal night-time noise levels at the development.

4.1.3 The maximum noise levels recorded during each night-time period of the survey, at each of the monitoring locations, are summarised in Table 3

Table 3
Summary of the Maximum Night-time Noise Levels (Figures in dB L_{Amax})

Monitoring Location	Range of Maximum Measured Noise Levels
1	60.1 – 81.8
2	62.9 – 65.9
3	62.2 – 81.5
4	64 – 67.5

4.2 BS8233 and WHO 1999 Guideline Assessment of Daytime Noise Levels in Living Rooms

4.2.1 In accordance with the requirements of WHO 1999 and BS8233, the acceptable daytime noise level within living room areas is 35dB LAeq.

4.2.2 The measured daytime noise levels have been used to determine the noise levels likely at the facades of the properties in the vicinity of the monitoring locations, during the daytime period.

4.2.3 Before internal noise levels can be calculated 2.5dB(A) must be added to the free-field measured levels to allow for the reflection of noise from the proposed housing façades when the buildings are in place.

4.2.4 The internal noise levels for the proposed living room areas have been calculated, using the required glazing schemes to achieve 35dB LAeq in the noise sensitive rooms.

4.2.5 The calculated noise levels at the façades of the proposed living room areas, together with the level of attenuation required to achieve 35dB LAeq in the living room areas are summarised in Table 4.

Table 4
Façade Noise Level at Properties in the Vicinity of the Monitoring Locations and Level of Attenuation Required to Achieve the Internal Daytime Noise Limit (Figures in dB(A))

Properties	Noise Level at the Façade of the Property	Level of Attenuation Needed To Achieve Noise Limit in Living Room Areas
Monitoring Location 1	67.3	27.3
Monitoring Location 2	70.4	30.4
Monitoring Location 3	66.1	26.1
Monitoring Location 4	64	24

4.2.6 The façades of the buildings further into the site will be protected by the buildings themselves and/or screened by other buildings and topography. It is considered that the noise levels at these façades, and therefore the level of attenuation the façades would need to attenuate, to achieve noise limits in accordance with WHO 1999 and BS8233, will be less than those detailed in Table 4.

4.2.7 Mitigation measures and glazing recommendations are discussed further in Section 5 of this report.

4.3 BS8233 and WHO 1999 Guideline Assessment of Night-time Noise Levels in Bedrooms

4.3.1 In accordance with the requirements of BS8233 and WHO 1999, the acceptable night-time noise level within bedroom areas for the good standards is 30dB L_{Aeq}.

4.3.2 The measured night-time noise levels have been used to determine the noise levels likely, at the facades of the properties in the vicinity of the monitoring locations, during the night-time period

4.3.3 Before internal noise levels can be calculated 2.5dB(A) must be added to the free-field measured levels to allow for the reflection of noise from the proposed housing facades when the buildings are in place.

4.3.4 The calculated noise levels at the façades of the dwellings, together with the level of attenuation required to achieve 30dB L_{Aeq} and 45dB L_{Amax} in the bedrooms, are summarised in Table 5.

Table 5
Façade Noise Level at Properties in the Vicinity of the Monitoring Locations and Level of Attenuation Required to Achieve the Internal Night-time Noise Limit (Figures in dB(A))

Property	Noise Level at the Façade of the Property (L_{Aeq})	Noise Level at the Façade of the Property (L_{Amax})	Level of Attenuation Needed To Achieve the Noise Limits in Bedrooms
Monitoring Location 1	55.8	84.3	39.3
Monitoring Location 2	57	68.4	27
Monitoring Location 3	57.4	84	39
Monitoring Location 4	54.4	70	25

4.3.5 The facades of the dwellings facing into the site will be protected by the building itself and/or screened by other buildings and topography. It is considered that the noise levels at these facades and therefore the level of attenuation the facades would need to attenuate to achieve the 30dB L_{Aeq} in the bedrooms will be less than those detailed in Table 5.

4.3.6 Mitigation measures and glazing recommendations are discussed further in Section 5 of this report.

5 NOISE ATTENUATION SCHEME

5.1 Introduction

5.1.1 The results of the WHO1999/BS8233 assessments, for the proposed residential areas of the development, indicate that noise mitigation measures need to be incorporated into the proposed site design to ensure that the required noise levels are achieved within outdoor living areas, internal living room areas and bedrooms.

5.2 Outdoor Living Areas

5.2.1 The measured noise levels, as detailed in Table 2, indicate that the outdoor noise limit would not be met along the site boundaries adjacent to the A189 and Brock Lane.

5.2.2 To mitigate noise generated by the A189 to the west and Brock Lane to the north, it is recommended that any outdoor living areas located closest to, and with a direct line of sight be provided with local mitigation comprising a close boarded fence/wall.

5.2.3 To achieve the 55dB L_{Aeq} outdoor living area limit, it is calculated that approximately 13dB of sound attenuation is required for properties in the south west corner (Monitoring Location 2) where the highest L_{Aeq} was measured. For this level of sound attenuation to be achieved it is recommended that gardens be positioned at facades facing away from the road to attenuate noise more effectively from the A189. This approach could reduce sound levels in the gardens near to the house by as much as 18dB, sufficient to comply with the outdoor living area limit. Alternatively, a close boarded fence/wall of 3m height would be required for plots 9 to 17, shown at Appendix 2.

5.2.4 Properties in the north west corner (plots 18 to 26) require 9dB of sound attenuation which can be achieved, again by positioning gardens on the screened side of facades away from the adjacent road, or with a close boarded fence/wall of 2m height. This would also be required for gardens facing or with direct line of sight of Brock Lane to the north and east of the site (plots 27 to 33, plots 1 to 3 and plot 44).

5.3 Glazing Requirements for Living Room Areas:

5.3.1 When assessing daytime noise levels in living room areas the noise attenuation provided by the overall building facade should be considered. To mitigate noise the composition of the building facade can be designed to provide the level of attenuation required. Glazing is generally the building element which attenuates

noise the least; so the proportion of glazing in a building facade is an important consideration when assessing overall noise attenuation.

5.3.2 In the absence of design details for the building facades, it has been assumed that the glazing to noise sensitive rooms would comprise about 25% of the facade area. To calculate the overall attenuation provided by this percentage of glazing in a brick or block facade, a non-uniform partition calculation can be used.

5.3.3 The calculation combines the different degrees of attenuation of the wall element and the window element. A facade element comprising a solid brick or blockwork, will attenuate by 45-50dB (British Standard 8233: "Sound insulation and noise reduction for buildings – Code of practice" 1999) whereas standard double glazing will attenuate road traffic noise by 26-29dB(A) (BRE Digest 379 "Double glazing for heat and sound insulation"). The overall noise attenuation provided by this combination is, therefore, between 31.9dB(A) and 34.9dB(A).

5.3.4 The noise attenuation requirements for living rooms in properties in different areas of the site are summarised in Table 4. The requirements indicate that standard thermal double glazing would ensure that internal noise levels are met with the windows closed across the site.

5.3.5 With windows open, the attenuation provided by the façade will be approximately 15dB(A). This would exceed the recommended internal noise limit across the site.

5.3.6 On occasions this may be acceptable to the resident, but when quiet conditions are required, the resident should be able to close the windows whilst maintaining adequate ventilation. Some form of acoustic ventilation would therefore need to be installed in some of the living rooms. Alternatively, to meet the required noise levels, living rooms could be located on the screened side of the proposed plots, away from the main source of noise.

5.3.7 Proposed dwellings further into the site would be protected by the buildings themselves and/or screened by other buildings. Therefore noise levels at these façades are likely to be no more than 45dB L_{Aeq}. To achieve 35dB L_{Aeq} in living rooms the façades would therefore only need to attenuate noise by 15dB(A) and this can be provided with standard thermal double glazing, even with windows open.

5.4 Glazing Requirements for Bedroom Areas

5.4.1 The noise attenuation requirements for bedrooms across the site areas are summarised in Table 5. The requirements indicate that standard thermal double

glazing would not meet the internal noise limit for bedrooms with windows closed based on the L_{Amax} measurements at Monitoring Locations 1 and 3, resulting from passing vehicles on the A189 and Brock Lane.

5.4.2 It is therefore recommended that bedrooms on facades facing or with direct line of sight of the A189 and Brock Lane would require attenuation from road traffic noise in bedroom areas of R_{TRA} =34dB when also taking into consideration the wall element of the facades. This can be achieved using, for example, a Pilkington Glass specification of 10mm pane, 12mm cavity and 6.4mm pane PVB.

5.4.3 With windows open, the attenuation provided by the façade would be approximately 15dB(A). This would allow the recommended internal noise limit to exceed 30dB L_{Aeq}. On occasions this may be acceptable to the resident, but when quiet conditions are required, the resident should be able to close the windows whilst maintaining adequate ventilation. Some form of acoustic ventilation would therefore need to be installed in bedrooms facing or with direct line of sight of the A189 and Brock Lane. Alternatively, to meet the required noise levels, bedrooms could be located on the screened side of the proposed plots, away from the main source of noise, i.e. the adjacent roads.

5.4.4 Some facades would also be protected by the buildings themselves and/or screened by other buildings. Noise levels at these façades are likely to be no more than 45dB L_{Aeq} and 60dB L_{Amax}. To achieve 30dB L_{Aeq} and 45dB L_{Amax} in bedrooms the façades would therefore only need to attenuate noise by 15dB(A) and this can be provided with standard thermal double glazing, even with windows open.

5.5 Acoustic Ventilation Requirements

5.5.1 It is recommended that the acoustic ventilation proposed at the site should, as a minimum, comply with Building Regulations 2000 Approved Document F1 Means of Ventilation and British Standard BS5925 1991: “Code of Practice for Ventilation Principles and Designing for Natural Ventilation”. Acoustic ventilation is only recommended for noise sensitive rooms, which are bedrooms and living rooms.

5.5.2 The implementation of the recommended glazing together with appropriate acoustic ventilation should ensure that the required internal daytime and night-time noise limits are achieved.

5.5.3 The façades of some of the properties further into the site would be protected by the buildings themselves and/or screened by other buildings. Therefore, acoustic ventilation may not be required for these plots.

6 CONCLUSIONS

6.1 Introduction

6.1.1 Wardell Armstrong has carried out a noise survey for the proposed residential development at East Sleekburn, Northumberland.

6.2 Proposed Sensitive Receptors and Noise

6.2.1 The assessment indicates that on-site mitigation measures will need to be implemented to ensure that the noise from the A189 and Brock Lane is reduced to an acceptable level to ensure the appropriate limits for both day and night time are achieved.

6.2.2 Local mitigation comprising a close boarded fence/wall will be required on any garden areas adjacent to the A189 and Brock Lane or within direct line of sight of the roads or consideration should be given to locating garden areas on the facades facing away from the adjacent roads.

6.2.3 To achieve the internal noise levels required in living room areas, in accordance with WHO 1999 and BS8233, standard thermal double glazing (which attenuates by 26-29dB(A) from traffic dominated noise) in a solid brick or blockwork façade would be sufficient.

6.2.4 To achieve the internal noise levels required in bedroom areas, in accordance with WHO 1999, standard thermal double glazing (which attenuates by 26-29dB(A) from traffic dominated noise) in a solid brick or blockwork façade would not be sufficient for properties at the perimeter of the site adjacent to the A189 and Brock Lane. Glazing attenuation for these properties has been provided at paragraph 5.4.2.

6.2.5 Acoustic ventilation would be required within living rooms and bedrooms located nearest to, and with a direct line of sight of, the A189 and Brock Lane to enable the windows to remain closed when required.

APPENDIX 1
Noise Monitoring Results

CLIENT: Dysart Developments
JOB NO: NT11543
CALCULATION: Noise Assessment
SCENARIO: Day Time
DATE: 31/10/2013
CALC'D BY: NJD
CHECKED BY:

REVISION:								
CLIENT:	Dysart Developments							
JOB NO:	NT11543							
Location	Measurement Period			Noise Level dB(A)				Comments
	Date	Start	Finish	L_{eq}	L_{90}	L_{max}	L_{min}	
1	31/10/2013	12.50	13.05	63.10	56.50	63.00	82.70	RTN
1	31/10/2013	14.24	14.39	67.00	56.60	65.40	95.80	Gate opened and rattled. horse. RTN
1	31/10/2013	15.37	15.52	64.00	56.40	64.40	80.60	RTN
				64.70	**56.50**	**64.27**	**86.37**	

Location	Measurement Period			Noise Level dB(A)				Comments
	Date	Start	Finish	L_{eq}	L_{90}	L_{max}	L_{min}	
2	31/10/2013	13.26	13.41	65.50	62.20	67.40	76.50	RTN. horse. ducks. dogs
2	31/10/2013	14.44	14.59	68.80	64.90	71.10	74.00	RTN. horse. ducks. dogs
2	31/10/2013	15.56	16.11	69.40	65.70	71.50	73.80	RTN. horse. ducks. dogs
				67.90	**64.27**	**70.00**	**74.77**	

Location	Measurement Period			Noise Level dB(A)				Comments
	Date	Start	Finish	L_{eq}	L_{90}	L_{max}	L_{min}	
3	31/10/2013	13.48	14.03	63.40	60.20	65.40	73.30	RTN
3	31/10/2013	15.03	15.18	63.30	60.50	65.00	71.70	RTN
3	31/10/2013	16.25	16.40	64.20	61.50	66.00	74.00	RTN
				63.63	**60.77**	**65.47**	**74.00**	

Location	Measurement Period			Noise Level dB(A)				Comments
	Date	Start	Finish	L_{eq}	L_{90}	L_{max}	L_{min}	
4	31/10/2013	14.04	14.19	61.40	57.80	64.00	68.50	RTN
4	31/10/2013	15.20	15.35	60.90	57.70	63.10	68.80	RTN
4	31/10/2013	16.41	16.56	62.30	58.80	64.90	71.70	RTN
				61.53	**58.10**	**63.90**	**70.67**	

Instrumentation	B & K 2250
Calibration Details	93.9dB at 12.46. 93.9dB at 16.59
Personnel	N.D

CLIENT:	Dysart Developments
JOB NO:	NT11543
CALCULATION:	Noise Assessment
SCENARIO:	Night time
DATE:	04/11/2013
CALC'D BY:	**NJD**
CHECKED BY:	

REVISION:	
CLIENT:	Dysart Developments
JOB NO:	NT11543

Location	Measurement Period			Noise Level dB(A)			
	Date	Start	Finish	L_{eq}	L_{90}	L_{max}	L_{min}
1	04/11/2013	23.29	23.34	50.70	47.00	53.20	60.10
1	04/11/2013	23.34	23.39	56.90	47.50	56.80	61.80
1	04/11/2013	23.41	23.46	50.40	42.90	53.30	64.20
				53.33	**45.80**	**54.43**	**68.70**

Location	Measurement Period			Noise Level dB(A)			
	Date	Start	Finish	L_{eq}	L_{90}	L_{max}	L_{min}
2	04/11/2013	23.50	23.55	55.80	50.40	56.80	62.90
2	04/11/2013	23.56	0.01	53.50	47.90	57.00	63.00
2	05/11/2013	0.01	0.06	54.20	48.00	57.40	65.90
				54.50	**48.77**	**57.73**	**63.93**

Location	Measurement Period			Noise Level dB(A)			
	Date	Start	Finish	L_{eq}	L_{90}	L_{max}	L_{min}
3	05/11/2013	0.08	0.13	59.20	47.20	57.20	61.50
3	05/11/2013	0.14	0.19	54.00	47.30	57.20	66.80
3	05/11/2013	0.20	0.25	51.50	45.00	55.00	62.20
				54.90	**46.50**	**56.47**	**70.83**

Location	Measurement Period			Noise Level dB(A)			
	Date	Start	Finish	L_{eq}	L_{90}	L_{max}	L_{min}
4	04/11/2013	23.09	23.14	53.20	45.60	56.60	67.50
4	04/11/2013	23.14	23.19	51.90	47.20	55.00	64.00
4	04/11/2013	23.20	23.25	50.70	46.10	53.10	65.80
				51.93	**46.30**	**54.90**	**65.77**

Instrumentation	B & K 2250
Calibration Details	93.9dB at 12.46. 93.9dB at 16.59
Personnel	N.D

APPENDIX 2
Viability Sketch Layout

A1

PROPOSED HOUSING MIX

Type A - Semi	2B4P	2 storey/Parking space	755sqft	8no
Type B - Semi/Tce	3B5P	2 storey/Parking space	850sqft	15no
Type B - Detached	3B5P	2 storey/Parking space	850sqft	1no
Type C	3B6P	2.5 storey/Det S.Garage	1125sqft	5no
Type D	3B6P	2 storey/Int Garage	1225sqft	5no
Type E	4B8P	2 storey/Int Garage	1470sqft	8no
Type G	4B8P	2 storey/Det S.Garage	1332sqft	8no
		TOTAL	50,869sqft (4,726sqm)	46no

Approx Gross Site Area =	1.41Ha (3.49 acres)
Approx POS Area =	.058Ha (0.15 acres)
Approx Nett Site Area =	1.35Ha (3.34 acres)

Density Gross	=	32.6 units/Ha (13.18 units/Acre)
Density Nett	=	34 units/Ha (13.75 units/Acre)
Coverage Gross	=	14,575 sqft/Acre (3,352 sqm/Hectare)
Coverage Nett	=	15,229 sqft/Acre (3,500 sqm/Hectare)

MWE

DYSART DEVELOPMENTS

LAND AT SPRING VILLE / BROCK LANE EAST SLEEKBURN

VIABILITY SKETCH LAYOUT

Project No. 13014	Drawing No. P01
Scale 1:500@A1	Rev. -
Date 19.03.12	
Drawn TSP	
Checked	Date

FIGURES

KEY

Noise Monitoring Location

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D

CLIENT

Dysart Developments

PROJECT

Noise Assessment for
Proposed Residential Development
East Sleekburn

DRAWING TITLE

Figure 1
Noise Monitoring Locations

DRG No	SCALE	DATE
NT11543/Figure 1	1:1000 @ A3	November 2013
DRAWN BY	CHECKED BY	APPROVED BY
JDS	NJD	MD

☐ STOKE-ON-TRENT (HEAD OFFICE)	TEL 0178 227 6700	☐ CARDIFF	TEL 029 2072 9191
■ NEWCASTLE UPON TYNE	TEL 0191 232 0943	☐ LONDON	TEL 0207 287 2872
☐ WEST BROMWICH	TEL 0121 580 0909	☐ SHEFFIELD	TEL 0114 245 6244
☐ GREATER MANCHESTER	TEL 0194 226 0101	☐ EDINBURGH	TEL 0131 555 3311

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G:\NT11543\DESIGN\AUTOCAD\FIGURE 1 NOISE MONITORING LOCATIONS 2013-11-07.DWG

JSIMONS

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STOKE-ON-TRENT
Sir Henry Doulton House
Forge Lane
Etruria
Stoke-on-Trent
ST1 5BD
Tel: +44 (0)845 111 7777

CARDIFF
22 Windsor Place
Cardiff
CF10 3BY
Tel: +44 (0)29 2072 9191

EDINBURGH
Suite 2/3, Great Michael House
14 Links Place
Edinburgh
EH6 7EZ
Tel: +44 (0)131 555 3311

GREATER MANCHESTER
2 The Avenue
Leigh
Greater Manchester
WN7 1ES
Tel: +44 (0)1942 260101

LONDON
Third Floor
46 Chancery Lane
London
WC2A 1JE
Tel: +44 (0)20 7242 3243

NEWCASTLE UPON TYNE
City Quadrant
11 Waterloo Square
Newcastle upon Tyne
NE1 4DP
Tel: +44 (0)191 232 0943

PENRYN
Tremough Innovation Centre
Tremough Campus
Penryn
Cornwall
TR10 9TA
Tel: +44 (0)1872 560738

SHEFFIELD
Unit 5
Newton Business Centre
Newton Chambers Road
Thorncliffe Park
Chapeltown
Sheffield
S35 2PH
Tel: +44 (0)114 245 6244

TRURO
Wheal Jane
Baldhu
Truro
Cornwall
TR3 6EH
Tel: +44 (0)1872 560738

WEST BROMWICH
Thynne Court
Thynne Street
West Bromwich
West Midlands
B70 6PH
Tel: +44 (0)121 580 0909

International offices:

ALMATY
29/6 Satpaev Avenue
Rakhat Palace Hotel
Office Tower, 7th Floor
Almaty
050040
Kazakhstan
Tel : +7-727-3341310

MOSCOW
Suite 2, Block 10,
Letnikovskaya St.
Moscow, Russia
115114
Tel: +7(495) 980 07 67

Wardell Armstrong Archaeology:

CUMBRIA
Cocklakes Yard
Carlisle
Cumbria
CA4 0BQ
Tel: +44 (0)1228 564820

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Cundall Johnston & Partners LLP
4th Floor Partnership House Regent Farm Road
Gosforth Newcastle upon Tyne NE3 3AF
United Kingdom Tel:+44 (0)191 213 1515
Asia Australia Europe MENA UK and Ireland
www.cundall.com

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