

Our ref: NIA/6244/15/6098/v3

23rd May 2016

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Dear Mr Bailey

**NOISE IMPACT ASSESSMENT FOR PROPOSED RESIDENTIAL DEVELOPMENT
LAND TO THE SOUTH OF THE WHARNCLIFFE ARMS, SHAW LANE, CARLTON, BARNSELY
APPLICATION REF: 2015/1436**

1.00 INTRODUCTION

- 1.01 Environmental Noise Solutions Ltd (ENS) has been commissioned by Andrew Bailey Architects, on behalf of its client Triple G Developments Ltd, to carry out a noise impact assessment for the proposed residential development of land to the south of the Wharncliffe Arms, Shaw Lane, Carlton, Barnsley (hereafter referred to as the application site).
- 1.02 This version of the noise impact assessment (NIA) supersedes the previous version (ref: NIA/6244/15/6098/v2) and has been prepared to address concerns raised in planning representations made on behalf of Premier Foods, which operates a facility (Manor Bakeries) located to the south of the application site.
- 1.03 The objectives of the noise impact assessment were to:
- Determine the ambient noise climate at the application site during representative periods of the daytime and night time.
 - Assess the potential impact of the ambient noise climate on the proposed residential development with reference to the National Planning Policy Framework and other pertinent guidelines.
 - Provide recommendations for a scheme of sound attenuation works, as necessary, so that the future occupants of the proposed development do not experience any unacceptable loss of amenity due to noise.
 - Consider the potential impact on local commercial premises associated with introducing a residential receptor at the site.
- 1.04 This report details the methodology and results of the assessment and provides recommendations for the building envelope (fenestration and ventilation) and boundary screening. It has been prepared to accompany a planning application submitted to Barnsley Metropolitan Borough Council (BMBC) for the residential development of the application site.
- 1.05 This report has been prepared for Andrew Bailey Architects and its client Triple G Developments for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult the parties above and ENS as to the extent to which the findings may be appropriate for their use.
- 1.06 A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

2.00 APPLICATION SITE SETTING AND PROPOSED DEVELOPMENT

- 2.01 The application site is located in a mixed use residential and commercial environment. An annotated aerial image of the site, including an overlay of the development layout, is contained in Appendix 2. Roughly rectangular in shape, the application site is bound by:
- The former Wharnccliffe Arms public house site and wooded land to the north, with Shaw Lane beyond.
 - Fish Dam Lane to the west.
 - Open land to the east (understood to be in the ownership of Premier Foods), with residential development beyond.
 - Premier Foods' Manor Bakeries site to the south.
- 2.02 The noise environment across the application site is characterised by road traffic noise from Fish Dam Lane (circa 500 vehicles per hour during the daytime), Shaw Lane (circa 300 vehicles per hour during the daytime) and vehicle movements/general commercial activity associated with the Manor Bakeries site to the south.
- 2.03 The proposed development consists of 13 dwellings with associated estate roads and landscaping. A proposed development layout is contained in Appendix 2. With reference to the layout, the nearest dwellings are set back circa 10 metres from the nearside kerb of Fish Dam Lane (with gardens to the rear (east) of the dwellings), circa 28 metres from the nearside kerb of Shaw Lane (circa 18 metres to the garden boundary) and circa 17 metres to the Manor Bakeries site service access road (circa 8 metres to the nearest garden boundary).
- 2.04 The Manor Bakeries site is understood to operate on a 24 hour basis, from Sunday night to Friday evening. There are understood to be three shifts operating, nominally 06:00 to 14:00 hours, 14:00 to 22:00 hours and 22:00 to 06:00 hours. HGV access to the site is via the service access road, via a controlled gatehouse. The northern façade of the bakery building is circa 70 metres from the southern boundary of the application site, with delivery activity occurring in a service area to the north of the building. Staff car parking is located to the west of the bakery building, with cars accessing the car park at the western end of the service access road and exiting at the southern end of the car park (away from the application site).

3.00 BASELINE NOISE SURVEY

- 3.01 In order to establish the ambient and background noise levels at the application site, an initial baseline noise survey was undertaken on Wednesday 16th September 2015. Following discussions with the Environmental Health Department at BMBC, it was agreed to undertake a further twelve hour manned monitoring session in the vicinity of the Manor Bakeries service access road. This monitoring session took place between 22:00 hours on Monday 25th April and 10:00 hours on Tuesday 26th April 2016.
- 3.02 For the purpose of the assessment, the following noise monitoring positions were adopted (the approximate location of the noise monitoring positions is contained in Appendix 2 for reference):
- MP1 was located towards the western boundary of the application site, at circa 8 metres to the nearside kerb of Fish Dam Lane (representative of the nearest dwelling façade to Fish Dam Lane).
 - MP2 was located towards the southern boundary of the application site, at circa 15 metres to the Manor Bakeries access road (representative of the nearest dwelling façade to the access road).
 - MP3 was located towards the northern boundary of the application site at circa 20 metres to the nearside kerb of Shaw Lane (representative of the nearest garden areas to Shaw Lane).

- 3.03 Noise measurements were made in a free field environment at 1.5 metres above ground level and undertaken using Bruel & Kjaer 2250 Type 1 integrating sound level meters. A windshield was fitted for all measurements. The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end, using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration level was noted. Weather conditions throughout the surveys were appropriate for monitoring. During the April 2016 measurements, the roads were dry and the average wind speed was < 1.0 m/s.
- 3.04 Measurements consisted of A-weighted broadband parameters, together with linear one-third octave band L_{eq} levels. The following tables contains a summary of the measurement data for each measurement session, at each measurement position, rounded to the nearest decibel.

Table 3.1 – Summary of Noise Measurement Data, September 2015

Position	Date	Time	L _{Aeq} (dB)	L _{A90} (dB)	L _{A10} (dB)	L _{A1} (dB)	Comment
MP1	16/09/15	11:38–12:38	61	53	64	68	Fish Dam Lane traffic Circa 500 vehicles per hour
MP1	16/09/15	12:38–13:38	61	51	64	71	
MP1	16/09/15	13:38–14:38	61	53	64	70	
MP1	16/09/15	23:00–00:00	55	42	58	68	Fish Dam Lane traffic (typically 71 dB L _{AFMax})
Daytime ambient noise level 61 dB L_{Aeq} (0700-2300) based on CRTN methodology Night time ambient noise level of 53 dB L_{Aeq} (2300-0700) based on TRL methodology (note: typically 71 dB L_{AFMax} at night)							
MP2	16/09/15	12:53–14:22	55	50	57	62	HGV traffic on access road, 12 no. vehicle passes (typically 70 dB L _{AFMax})
MP2	16/09/15	23:00–00:00	52	43	54	61	HGV traffic on access road, 10 no. vehicle passes (typically 70 dB L _{AFMax})
Daytime ambient noise level circa 55 dB L_{Aeq, T} Night time ambient noise level 52 dB L_{Aeq, T} (note: typically 70 dB L_{AFMax} at night)							
MP3	16/09/15	11:17–11:32	54	46	57	62	Shaw Lane traffic Circa 300 vehicles per hour
MP3	16/09/15	14:56–15:11	54	46	56	64	
Daytime ambient noise level circa 54 L_{Aeq, T}							

Table 3.2 – Summary of Noise Measurement Data, April 2016

Position	Date	Time	L_{Aeq} (dB)	L_{A90} (dB)	L_{A10} (dB)	L_{A1} (dB)	Comment
MP2	25/04/16	22:00-23:00	48	42	51	58	Road traffic on Fish Dam Lane audible. Regular HGV movements entering and exiting the bakery site via the access road, distant air handling unit (AHU) noise, forklift truck (FLT) movements on the bakery site, reversing alarms and horn 'beeps' (see Para 3.12).
MP2	25/04/16	23:00-07:00	49	40	52	58	
MP2	26/04/16	07:00-10:00	54	51	56	61	Dawn chorus noted at circa 04:00 hours, with increasing levels of birdsong. Shift change at circa 06:00 hours, with significant car movements on western end of access road.

3.05 Noise levels along the western boundary of the application site (MP1) were dominated by road traffic on Fish Dam Lane.

3.06 For the prediction of daytime road traffic noise, the Department of Transport's Memorandum on the Calculation of Road Traffic Noise (CRTN) explains that the following shortened measurement procedure may be used. Measurements of L_{A10} are made over any three consecutive hours between 10:00 and 17:00 hours. Using $L_{A10(3 \text{ hour})}$ as the arithmetic mean of the three consecutive values of hourly L_{A10} , the $L_{A10(18 \text{ hour})}$ can be calculated from the equation:

$$(i) \quad L_{A10(18 \text{ hour})} = L_{A10(3 \text{ hour})} - 1 \text{ dB}$$

3.07 PPG24 further states that for road traffic noise:

$$(ii) \quad L_{Aeq(0700-2300)} \approx L_{A10(0600-0000)} - 2 \text{ dB}$$

3.08 Substituting (ii) into (i) gives the following approximation:

$$(iii) \quad L_{Aeq(0700-2300)} \approx L_{A10, 3 \text{ hour}} - 3 \text{ dB}$$

3.09 Based on the above formula, the daytime ambient noise level at MP1 is measured / calculated at 61 dB $L_{Aeq(0700-2300)}$.

3.10 A study prepared by TRL Limited on behalf of the Department for Environment, Food and Rural Affairs (DEFRA) entitled 'Converting the UK Traffic Noise Index $L_{A10(18 \text{ hour})}$ to EU Noise Indices for Noise Mapping' presents a methodology for calculating night time road traffic noise levels based on daytime road traffic noise level based on the following formula:

$$(iv) \quad L_{Aeq(23:00-07:00)} \approx 0.90 * L_{A10, 18 \text{ hour}} - 3.77 \text{ (for non-motorways)}$$

3.11 Based on the above formula, the night time ambient noise levels at MP1 is measured / calculated at 53 dB $L_{Aeq(2300-0700)}$. Maximum noise levels at MP1 during the night time were typically 71 dB L_{AFmax} .

3.12 A fully manned twelve hour noise survey was undertaken at MP2 between 22:00 hours on Monday 25th April and 10:00 hours on Tuesday 26th April 2016. Based on the survey, the following observations have been drawn:

- The noise climate at the southern end of the application site consists of road traffic on Fish Dam Lane, birdsong, regular HGV movements entering and exiting the bakery site via the access road, distant air handling unit (AHU) noise, forklift truck (FLT) movements on the bakery site, reversing alarms, horn 'beeps' and general low level commercial noise sources (occasional impacts etc.).
- Traffic volumes on Fish Dam Lane were circa 120 vehicles/hour during the late evening/early night time, dropping to circa 35 vehicles/hour during the middle of the night time before rising to circa 400 vehicles/hour from around 05:30 hours onwards (including shift change).
- HGV movements entering and exiting the bakery site were regular during the monitoring period, with of the order of three to five movements per hour. L_{AFmax} levels at MP2, associated with HGV movements on the access road, ranged from 59 to 70 dB.
- Low level AHU noise was audible at MP2, as were FLT movements in the service yard, reversing alarms and warning horn 'beeps'. L_{AFmax} levels associated with reversing alarms and warning horn 'beeps' were lower than those associated with HGV movements on the access road.
- The volume of car traffic entering the bakery car park increased significantly during the shift change (circa 05:15 – 06:00 hours). Subjectively, this was not assessed as significant by the survey engineer relative to the general increase in road traffic noise on the surrounding road network (for reference: 52 dB $L_{Aeq,04:00-05:00}$ and 51 dB $L_{Aeq,05:00-06:00}$ at MP2).

- 3.13 With reference to the MP2 measurements on the 16/09/15 and 25/04/16, the 'snap shot' measurements undertaken on the 16/09/15 are considered robust, as daytime levels are comparable (at 54 to 55 dB $L_{Aeq,T}$) and the 23:00 to 00:00 hours levels used for design purposes (52 dB $L_{Aeq,T}$ and 70 dB L_{AFmax}) are higher than the eight hour average measured on the 25/4/16 (49 dB $L_{Aeq,23:00-07:00}$) and at the upper limit of the HGV L_{AFmax} levels measured on the 25/4/16 (range of 59 to 70 dB).

4.00 NOISE IMPACT ASSESSMENT CRITERIA

National Planning Policy Framework

- 4.01 The National Planning Policy Framework (NPPF), came into force on 27 March 2012 and is a material consideration in planning decisions. At the heart of the NPPF is a presumption in favour of sustainable development, and the policies in Paragraphs 18 to 219 of the NPPF, taken as a whole, constitute the Government's view on what sustainable development in England means in practice for the planning system.
- 4.02 The NPPF states that there are three dimensions to sustainable development, which include an economic role (contributing to building a strong, responsive and competitive economy), a social role (providing the supply of housing required to meet the needs of present and future generations) and an environmental role (which includes minimising waste and pollution).
- 4.03 The NPPF supersedes Planning Policy Guidance Note 24 (PPG 24). The main policy statement in relation to noise is Paragraph 123 of the NPPF, which 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.*
- 4.04 In relation to 'adverse impacts', the NPPF refers to the Explanatory Note to the Noise Policy Statement for England (NPSE) for guidance.
- 4.05 The Noise Policy Statement for England (NPSE) and associated Explanatory Note were published by DEFRA in 2010 and set out the Government's noise management strategy to enable noise management decisions to be made within the wider context (i.e. guiding principles of sustainable development), in a cost-effective manner and in a timely fashion.
- 4.06 Fundamental to this approach is '*there is a need to integrate consideration of the economic and social benefit of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focussing solely on the noise impact without taking into account other related factors*'.
- 4.07 The noise policy aims of NPSE are to (i) avoid significant adverse impact on health and quality of life, (ii) mitigate and minimise adverse impacts on health and quality of life, and (iii) where possible, contribute to the improvement of health and quality of life. The policy aims are always to be considered within the context of the Government's policy on sustainable development.

- 4.08 In relation to the mitigation and minimisation of adverse impacts, NPSE considers that *'in reality, although not always stated, the aim has tended to be to minimise noise 'as far as is reasonably practical'.* This is reinforced in Paragraph 2.24 of the Explanatory Note, which requires that *'all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur'.*
- 4.09 In relation to explaining the 'significant adverse' and 'adverse' effects quoted in the NPPF, NPSE uses the two established concepts from toxicology that are currently being applied to noise impacts, for example by the World Health Organisation (WHO), these are:
- 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 noise.
 - LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.
- 4.10 The NPSE then extends these concepts to lead to a SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.
- 4.11 No specific criteria are presented in the NPSE, to provide the necessary policy flexibility until further evidence and suitable guidance is available. In lieu of specific criteria, for this assessment, ENS makes reference to existing guideline documents, which are summarised in the following paragraph(s).

BS 8233:2014

- 4.12 BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings'* (BS 8233) sets guideline indoor ambient noise levels for dwellings, for steady external noise sources, which it is desirable are not exceeded. These levels are reproduced in Table 4.1 and are based on guidelines issued by the World Health Organisation (WHO). The Standard also states that 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. The Standard considers that for regular individual noise events, a guideline value may be set in terms of SEL or L_{AFmax} depending on the character and number of events per night. The WHO Guidelines on Community Noise (1999) considers that if negative effects on sleep are to be avoided, noise events exceeding 45 dB L_{Amax} should be limited.

Table 4.1 – Indoor Ambient Noise Levels in Dwellings (as recommended in BS 8233:2014)

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

- 4.13 In relation to the internal design criteria detailed above, BS 8233 states: *'if relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.'*
- 4.14 For traditional external areas that are used for amenity space, such as gardens and patios, BS 8233 considers that 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. BS 8233 also states *'However, it is also recognized 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 can 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'.

- 4.15 With reference to the BS 8233 guidelines, by definition, 'reasonable internal conditions' cannot represent a significant adverse impact (the prevention of which is the 1st aim of NPSE). With cognisance to the 2nd aim of NPSE (to minimise noise impact), the internal ambient noise levels detailed in Table 4.1 are considered appropriate.
- 4.16 Likewise, for external amenity space, a design range of 50 to 55 dB $L_{Aeq,T}$ is considered appropriate to comply with the requirements of the NPPF. Furthermore, the BS 8233 guidance that in certain circumstance *'development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited'*, is considered to be in keeping with the NPSE Explanatory Note, which requires that *'all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur'*.

BS 4142:2014

- 4.17 The methods described in British Standard BS 4142:2014 *'Methods for Rating and Assessing Industrial and Commercial Sound'* (BS 4142) use outdoor sound levels to assess the likely effects of sound on people for the purposes of (i) investigating complaints, (ii) assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature, and (iii) assessing sound at proposed new dwellings or premises used for residential purposes.
- 4.18 BS 4142 considers that the potential impact is dependent on the difference between the rating level and background noise level; the greater this difference the greater the potential impact, depending on the context in which the sound occurs/will occur. BS 4142 states:

'The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs'. Typically, the greater this difference, the greater the magnitude of the impact. For example:

- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

- 4.19 The rating level is described as the specific sound level (the equivalent continuous A-weighted sound pressure level at the assessment position (NSR) produced by the specific sound source over the given reference time interval) plus any adjustment for the characteristic features of the sound. The character correction relates to whether and to what degree the specific sound is assessed to have an element of tonality, impulsivity and/or characteristics that are readily distinctive against the residual acoustic environment.

- 4.20 BS 4142 considers that *'where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied'*.
- 4.21 The background noise level is the A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 percent of a given time interval, T, measured using time weighting 'F' and quoted to the nearest whole number of decibels.
- 4.22 Where the initial estimate of the impact needs to be modified due to the context, factors to be taken into account include the absolute level of sound and whether dwellings will already incorporate design measures that secure good internal and/or outdoor acoustic conditions. In addition, for the introduction of a new noise sensitive receptor, BS 4142 considers *'where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation.'*

Summary of Noise Impact Assessment Criteria

- 4.23 Based on the guidance detailed above, it is accepted that the BS 8233 noise level criteria are based on steady external noise sources. It is also recognized that BS 4142 considers the character of the noise and, for new noise sensitive receptors, identifies that existing commercial sound forms a component of the existing acoustic environment. In terms of the context within which the noise occurs, BS 4142 also considers that pertinent factors to be taken into account include the absolute level of sound and mitigation measures that are/can be incorporated into the design.
- 4.24 On the basis of the above, for the residential development of the application site, the following criteria are considered to be in keeping with the aims of the NPPF and associated guidance, with the proviso that the character of noise sources of an industrial/commercial nature is accounted for by the inclusion of a character penalty of +3 dB over the measured specific $L_{Aeq,T}$ noise levels:
- 35 dB $L_{Aeq(0700-2300)}$ in living rooms and bedrooms during the daytime.
 - 30 dB $L_{Aeq(2300-0700)}$ in bedrooms at night.
 - 45 dB L_{AFmax} not normally exceeded in bedrooms at night.
 - Guideline range of 50 - 55 dB $L_{Aeq(0700-2300)}$ in gardens during the daytime and where this is not achievable, design to achieve the lowest practicable levels.

5.00 SOUND ATTENUATION SCHEME PROPOSALS

- 5.01 A scheme of sound insulation for the application site was developed in the previous version of the NIA (ref: NIA/6244/15/6098/v2). Based on the specific noise levels measured during the April 2016 noise monitoring, the sound insulation scheme remains valid. Notwithstanding this, with cognisance to the commercial operation to the south and the NPPF requirement that *'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'*, the sound insulation scheme proposals have been revised on a precautionary basis as detailed below (taking into account the current plot layout/numbering). For plots not identified below, standard double glazing, trickle vents and boundary screening are considered appropriate.

Plots 1 to 4

- 5.02 For plots 1 to 4 towards the western boundary of the application site, habitable rooms on the road frontage elevation should be fitted with enhanced glazing rated at ≥ 29 dB R_w+C_{tr} , such as a generic 8 mm float glass (16 mm air) 4 mm float glass double glazing system with standard trickle vents. Standard thermal double glazing and standard window frame trickle

vents are considered appropriate for habitable rooms screened from Fish Dam Lane.

Plots 6 to 9

- 5.03 For plots 6 to 9 towards the southern boundary of the applications site, habitable rooms on the southern elevation should be fitted with enhanced glazing rated at ≥ 29 dB $R_{w+C_{tr}}$, such as a generic 8 mm float glass (16 mm air) 4 mm float glass double glazing system. The dwellings should include an alternative mechanical ventilation strategy, such as a System 3 mechanical extract ventilation (MEV) system. Note: it is understood that where the designed air permeability is leakier than ($>$) $5 \text{ m}^3/(\text{h.m}^2)$ at 50 Pa, background ventilators are not necessary. Where the designed air permeability is tighter than ($<$) $5 \text{ m}^3/(\text{h.m}^2)$, 2500 mm^2 EA background ventilators are required. These should have a vent open $D_{n,e,w} + C_{tr}$ (per 2500 mm^2 EA) of ≥ 34 dB (e.g. Greenwood 2500EAW.AC1, or equivalent).
- 5.04 As a precautionary measure, it is also recommended that a 2 metre high reflective timber acoustic barrier is installed along the garden boundaries facing the commercial use to the south of the site. The acoustic barrier should have a mass per unit area of $\geq 10 \text{ kg/m}^2$, should be sealed to the ground and be fitted with cover strips to prevent gaps forming over time. The recommended barrier location is identified in Appendix 2.

6.00 CONCLUSIONS

- 6.01 A noise impact assessment has been undertaken for the proposed residential redevelopment of land to the south of the Wharncliffe Arms, Shaw Lane, Carlton, Barnsley.
- 6.02 Recommendations for a scheme of sound insulation works have been developed to protect the proposed residential development from the ambient noise climate in accordance with the requirements of the National Planning Policy Framework. Equally, the sound insulation works are considered appropriate to ensure that the proposed development does not present an unreasonable restriction on the existing commercial business to the south. On this basis, the ambient noise climate is not considered to represent a constraint to the proposed residential development of the application site.

I trust the foregoing is sufficient for your needs. Should you have any queries regarding the above, please do not hesitate to contact me.

Yours sincerely,



Richard Pennell
For Environmental Noise Solutions Limited

Appendix 1

Glossary of Acoustic Terms

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 μ Pa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 μ Pa).

A-weighting Network

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T , has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T . $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T . L_{A90} is typically taken as representative of background noise.

$L_{AF \max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

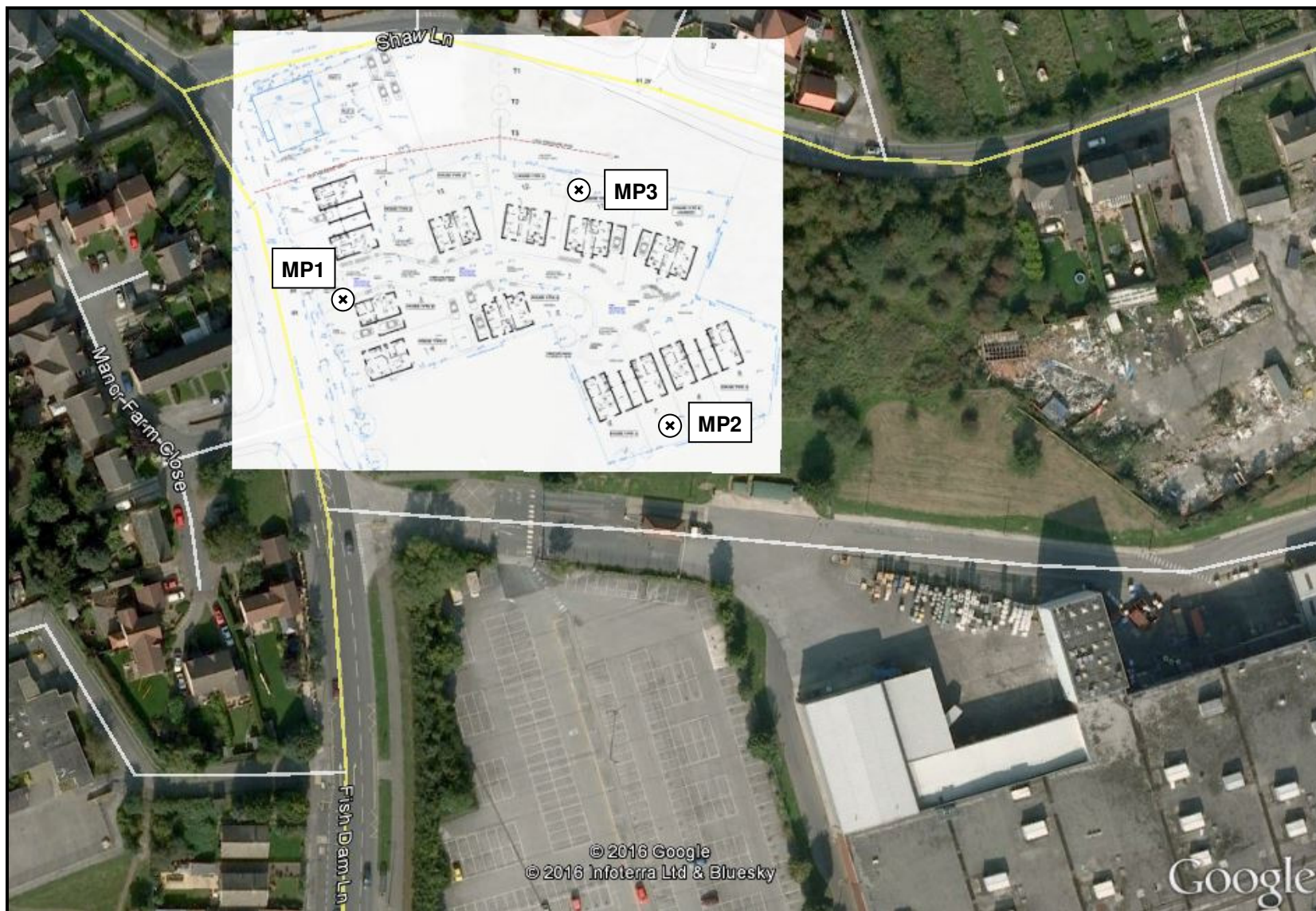
Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. This allows for comparison between different noise events which occur over different lengths of time.

Weighted Sound Reduction Index (R_w)

Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_w is used to characterise the insulation of a material or product that has been measured in a laboratory).

Appendix 2
Annotated aerial image indicating the application site and approximate noise monitoring positions



Appendix 2 Annotated proposed layout

