Our ref: NIA/8529/19/8485/v4/Stairfoot

24th September 2019

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NOISE IMPACT ASSESSMENT FOR PROPOSED RESIDENTIAL DEVELOPMENT AT LAND AT SANDYGATE LANE, STAIRFOOT, BARNSLEY

BARNSLEY METROPOLITAN BOROUGH COUNCIL PLANNING APPLICATION REF 2018/1040

1.00 INTRODUCTION

1.01 Environmental Noise Solutions Limited (ENS) has been commissioned by Blackstone Developments to carry out a noise impact assessment for a proposed residential development at land at Sandygate Lane, Stairfoot, Barnsley (hereafter referred to as the subject site).

1.02 Outline planning permission (ref: 2016/0288) for the development was granted by Barnsley Metropolitan Borough Council (BMBC) in June 2016, subject to conditions. There are no conditions relating to noise for the operational phase of the development.

1.03 A noise report (report ref: 3438-R1) was prepared by Clover Acoustics in February 2016 in support of the outline planning application. The report characterised the noise environment at the subject site and provided a scheme of sound attenuation.

1.04 The report noted that a commercial unit adjacent to the south western boundary of the subject site was unused/vacant at the time of the survey, and stated that *'…the dominant noise source impacting on the proposed development site is road traffic, although the site is adjacent to a McDonalds and a car lot.'*

1.05 It is now understood that the vacant unit adjacent to the south western boundary of the subject site has come into use as a scrapyard (Stairfoot Metals).

1.06 Following site visits and subsequent noise monitoring undertaken by BMBC in December 2018 and January 2019, it was recommended by the local authority that a further noise survey be undertaken to fully assess noise from the scrapyard and to review the design, layout and mitigation measures at the subject site.

1.07 With cognisance to this, the objectives of this noise impact assessment were to:

- Determine the current ambient noise climate at the subject site.
- 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, to ensure that the future occupants of the proposed residential development do not experience any unacceptable loss of amenity due to noise.

1.08 This report details the methodology and results of the assessment and provides recommendations for the building envelope (fenestration and ventilation) and boundary screening, as necessary.

1.09 This report has been prepared to accompany reserved matters Planning Application ref: 2018/1040 submitted to BMBC.

1.10 This report has been prepared for Blackstone 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 Blackstone Developments and ENS as to the extent to which the findings may be appropriate for their use.

1.11 A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

2.00 SUBJECT SITE SETTING AND PROPOSED RESIDENTIAL DEVELOPMENT

2.01 The subject site is located in a predominantly commercial area in Stairfoot, near Barnsley and is bound by (see site location plan in Appendix 2):

- The A635 Doncaster Road to the north west.
- Sandygate Lane to the north east.
- The Transpennine Way (footpath) to the south west, with commercial units beyond.
- Open woodland to the south east.

2.02 The commercial units to the south west of the subject site include a McDonald's restaurant, a car sales forecourt and a scrapyard (Stairfoot Metals).

2.03 The scrapyard consists of an external storage yard and a 250 m² masonry building (circa 6 metres high). The masonry building has a single access door on the south eastern elevation of the building. Scrap metal is moved within the yard with the use of 2 no. hydraulic grabs.

2.04 The proposed residential development consists of two blocks of 6 no. townhouses (3.5-storey) and one block of apartments (3-storey). A sketch layout indicates that the apartment block is located in the southern part of the subject site. The lounges of the apartment block will front towards the south western (scrapyard) boundary, whilst bedrooms will front towards the north eastern (Sandygate Lane) boundary.

2.05 In order to minimise the impact of the neighbouring scrapyard on proposed gardens at the subject site, the townhouses have been located in the northern part of the subject site, to the rear of the scrapyard building.

3.00 BASELINE NOISE SURVEY

3.01 In order to establish the ambient noise levels at the subject site, a baseline noise survey was carried out during the daytime on Tuesday 17th September 2019. The scrapyard was observed operating throughout the survey.

3.02 For the purpose of the assessment, the following noise monitoring positions (MPs) were adopted (the approximate locations of the positions are contained in Appendix 2 for):

- MP1 was located midway along the south-western boundary of the subject site, at 10 metres above ground level (AGL).

- MP2 and MP5 were located at the northern end of the south-western boundary of the subject site, at 1.5 metres AGL (note: representative of the nearest proposed gardens to the scrapyard).

- MP3 was located along the north-western (A635 Doncaster Road) boundary of the subject site, at 1.5 metres AGL.

- MP4 was located along the north-eastern (Sandy Gate Lane) boundary of the subject site, at 1.5 metres AGL.

3.03 Noise measurements were undertaken in free field conditions using Bruel & Kjaer 2250 Type 1 integrating sound level meters. The measurement systems 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 levels were noted. Weather conditions throughout the survey were appropriate for monitoring.

3.04 Measurements consisted of A–weighted broadband parameters, together with linear 1/3rd octave band L_{eq} levels. Tables 3.1 and 3.2 contain a summary of the measurement data from the 17th September 2019 survey, rounded to the nearest 0.1 decibel.

Table 3.1 – Summary of Noise Measurement Data (17/09/19 MP1 and MP2)

Position	Date	Time	L_{Aeq} (dB)	L_{A90} (dB)	L_{A10} (dB)	L_{A1} (dB)	L_{AFMax} (dB)	Comment
MP1	17/09/19	1124–1224	60.5	56.3	62.0	69.5	82.2	Road traffic on the A635 Doncaster Road, Wombwell Lane and the surrounding road network, impact noise associated with the scrapyard (grab in use, metal being dropped, hammering noise breakout from building), no noise noted from the car sales forecourt or McDonalds
MP1	17/09/19	1224–1324	60.2	56.0	62.2	68.9	80.2	
MP1	17/09/19	1324–1424	61.2	56.4	63.7	70.4	78.5	
MP1	17/09/19	1124–1224	58.8	56.1	60.6	64.2	76.3	As above with scrapyard noise excluded using Bruel & Kjaer Evaluator software.
MP1	17/09/19	1224–1324	58.5	55.6	60.3	64.5	73.9	
MP1	17/09/19	1324–1424	59.5	56.1	61.5	67.3	74.1	
Noise levels circa 60.5 dB $L_{Aeq\ (1124\text{-}1224)}$, 60.2 dB $L_{Aeq\ (1224\text{-}1324)}$, 61.2 dB $L_{Aeq\ (1324\text{-}1424)}$ including scrapyard activity Noise levels circa 58.8 dB $L_{Aeq\ (1124\text{-}1424)}$, 58.5 dB $L_{Aeq\ (1224\text{-}1324)}$, 59.5 dB $L_{Aeq\ (1324\text{-}1424)}$ in the absence of scrapyard activity This is an indication that scrapyard activity ≈ 56 dB $L_{Aeq\ (1\ hour)}$ at MP1 (line-of-sight to scrapyard)								
MP2	17/09/19	1124–1224	55.5	52.9	57.4	60.6	70.5	Road traffic on the A635 Doncaster Road and the surrounding road network, impact noise associated with the scrapyard audible (grab in use, metal being dropped, hammering noise breakout from building), no noise noted from the car sales forecourt or McDonalds
MP2	17/09/19	1224–1324	55.3	52.3	57.2	60.5	70.0	
MP2	17/09/19	1324–1424	55.4	52.7	57.3	61.3	70.2	
MP2	17/09/19	1124–1224	54.8	52.7	56.4	58.7	63.5	As above with scrapyard noise excluded using Bruel & Kjaer Evaluator software.
MP2	17/09/19	1224–1324	54.6	52.0	56.5	58.9	65.3	
MP2	17/09/19	1324–1424	54.7	52.4	56.4	58.7	64.7	
Noise levels circa 55.5 dB $L_{Aeq\ (1124\text{-}1224)}$, 55.3 dB $L_{Aeq\ (1224\text{-}1324)}$, 55.4 dB $L_{Aeq\ (1324\text{-}1424)}$ including scrapyard activity Noise levels circa 54.8 dB $L_{Aeq\ (1124\text{-}1224)}$, 54.6 dB $L_{Aeq\ (1224\text{-}1324)}$, 54.7 dB $L_{Aeq\ (1324\text{-}1424)}$ in the absence of scrapyard activity This is an indication that scrapyard activity ≈ 47 dB $L_{Aeq\ (1\ hour)}$ at MP2 (screened from scrapyard) Comparison of L_{Aeq} and L_{A1} parameters indicates that scrapyard noise levels are circa 9 dB lower at MP2 than at MP1								

Table 3.2 – Summary of Noise Measurement Data (17/09/19 MP3, MP4 and MP5)

Position	Date	Time	L_{Aeq} (dB)	L_{A90} (dB)	L_{A10} (dB)	L_{A1} (dB)	L_{AFMax} (dB)	Comment
MP3	17/09/19	1220–1235	61.5	54.1	64.5	67.2	70.8	Road traffic on the A635 Doncaster Road dominant, scrapyard occasionally audible but not significant
MP3	17/09/19	1350–1402	63.8	56.6	66.9	71.3	75.2	
Daytime ambient noise levels circa 62–64 dB $L_{Aeq, T}$								
MP4	17/09/19	1247–1306	55.7	51.8	57.5	64.8	70.1	Road traffic on the A635 Doncaster Road and occasional vehicles on Sandy Gate Lane, scrapyard occasionally audible but not significant
MP4	17/09/19	1413–1423	56.2	52.5	57.9	65.2	69.6	
Daytime ambient noise levels circa 56 dB $L_{Aeq, T}$								
MP5	17/09/19	1104–1124	55.3	52.6	57.2	60.0	70.0	Road traffic on the A635 Doncaster Road and the surrounding road network, impact noise associated with the scrapyard audible
MP5	17/09/19	1403–1412	55.3	51.9	57.7	60.3	64.4	
Noise levels circa 55.3 dB $L_{Aeq, T}$ (and 60.3 dB $L_{A1. T}$) including scrapyard activity **Note: Negligible difference in noise levels between MP5 and MP2**								

3.05 During scrapyard activity, ambient noise levels at MP1 (fronting towards the yard and the open building door) were measured at circa **60.5 dB $L_{Aeq\ (1124\text{-}1224)}$**, **60.2 dB $L_{Aeq\ (1224\text{-}1324)}$** and **61.2 dB $L_{Aeq\ (1324\text{-}1424)}$**.

3.06 With scrapyard activity excluded from the measurement[1], residual ambient noise levels at MP1 were measured at **58.8 dB $L_{Aeq\ (1124\text{-}1224)}$**, **58.5 dB $L_{Aeq\ (1224\text{-}1324)}$** and **59.5 dB $L_{Aeq\ (1324\text{-}1424)}$** and were due to road traffic on the A635 Doncaster Road, Wombwell Lane and the wider surrounding road network. No noise was noted from the nearby car sales yard or from the McDonald's restaurant.

3.07 Noise associated with scrapyard activity is therefore calculated at circa **56 dB $L_{Aeq\ (1\ hour)}$** at MP1 (i.e. logarithmic subtraction of residual ambient noise level (traffic) from ambient noise level including scrapyard noise).

3.08 During scrapyard activity, ambient noise levels at MP2 (considered representative of the nearest proposed garden to the scrapyard) were measured at circa **55.5 dB $L_{Aeq\ (1124\text{-}1224)}$**, **55.3 dB $L_{Aeq\ (1224\text{-}1324)}$** and **55.4 dB $L_{Aeq\ (1324\text{-}1424)}$**.

3.09 With scrapyard activity excluded from the measurement[1], residual ambient noise levels at MP2 were measured at **54.8 dB $L_{Aeq\ (1124\text{-}1224)}$**, **54.6 dB $L_{Aeq\ (1224\text{-}1324)}$** and **54.7 dB $L_{Aeq\ (1324\text{-}1424)}$** and were due to road traffic on the A635 Doncaster Road and the wider surrounding road network. No noise was noted from the nearby car sales yard or from the McDonald's restaurant.

3.10 Noise associated with scrapyard activity is therefore calculated at circa **47 dB $L_{Aeq\ (1124\text{-}1424)}$** at MP2 (i.e. logarithmic subtraction of residual ambient noise level (traffic) from ambient noise level including scrapyard noise).

3.11 It is evident that scrapyard noise levels at MP2 are circa 9 decibels quieter than at MP1, due to increased distance and reduced angle-of-view to scrapyard activities. This is corroborated by measurements using the L_{A1} parameter (i.e. the noise level exceeded for 1% of the measurement period), which were **70 dB $L_{A1\ (1124\text{-}1424)}$** at MP1 and **61 dB $L_{A1\ (1124\text{-}1424)}$** at MP2.

1 Scrapyard noise events excluded using Bruel & Kjaer Evaluator software.

3.12 Ambient noise levels at MP3 (fronting towards the A635 Doncaster Road) were measured at **62–64 dB $L_{Aeq, T}$** and were wholly due to road traffic on the A635 Doncaster Road. Noise from the scrapyard was occasionally audible but was not significant or measurable.

3.13 Ambient noise levels at MP4 (fronting towards Sandy Gate Lane) were measured at circa **56 dB $L_{Aeq, T}$** and were due to road traffic on the A635 Doncaster Road and occasional car passes on Sandy Gate Lane. Noise from the scrapyard was occasionally audible but was not significant or measurable.

3.14 For reference, ambient and background noise measurements at MP3 and MP4 correlate well with corresponding noise measurements undertaken by BMBC, with levels generally within 1 dB. As expected, noise levels decrease with increasing distance to the A635 Doncaster Road.

3.15 Supplementary measurements were also undertaken at MP1 on Tuesday 11th June and Thursday 20th June 2019 during scrapyard operations.

3.16 Noise measurements were undertaken in free field conditions using Bruel & Kjaer 2250 Type 1 integrating sound level meters. The measurement systems 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 levels were noted. Weather conditions throughout the survey were appropriate for monitoring.

3.17 Measurements consisted of A–weighted broadband parameters, together with linear 1/3rd octave band L_{eq} levels. Table 3.3 contains a summary of the measurement data from the June 2019 surveys, rounded to the nearest 0.1 decibel.

Table 3.3 – Summary of Noise Measurement Data (11/06/19 and 20/06/19)

Position	Date	Time	L_{Aeq} (dB)	L_{A90} (dB)	L_{A10} (dB)	L_{A1} (dB)	L_{AFMax} (dB)	Comment
MP1	11/06/19	1140–1224	59.5	54.9	61.0	68.5	85.3	Road traffic on the A635 Doncaster Road, Wombwell Lane and the surrounding road network, impact noise associated with the scrapyard (grab in use, metal being dropped, hammering noise breakout from building), no noise noted from the car sales forecourt or McDonalds
MP1	20/06/19	0936–0933	60.1	53.6	58.8	70.1	85.5	
Noise levels circa 59.5 dB $L_{Aeq, T}$ to 60.1 dB $L_{Aeq, T}$								

3.18 The measurement data demonstrates that the ambient noise climate at MP1 is consistent.

4.00 NATIONAL PLANNING POLICY FRAMEWORK AND OTHER RELEVANT GUIDANCE

National Planning Policy Framework

4.01 The National Planning Policy Framework (NPPF) was updated in July 2018 and sets out the Government's planning policies for England and how these are expected to be applied.

4.02 Where issues of noise impact are concerned the NPPF provides brief guidance in paragraph 170 where it states that planning policies and decisions should contribute to and enhance the natural and local environment by:

'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of…..noise pollution'.

4.03 Paragraph 180 advises that:

'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…..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'.

4.04 With regard to extant community noise sources and the potential to affect proposed new developments, paragraph 182 states that:

'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.'

4.05 The NPPF also refers to the 2010 DEFRA publication, the Noise Policy Statement for England (NPSE) which reinforces and supplements the NPPF.

Noise Policy Statement for England

4.06 The Noise Policy Statement for England (NPSE) sets out the long-term vision of promoting good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development. This long-term vision is supported by the following aims:

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

4.07 NPSE describes the following levels at which noise impacts may be identified:

- 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.

Planning Practice Guidance – Noise

4.08 In December 2014, Planning Practice Guidance (PPG) was updated online which provides additional guidance and elaboration on the NPPF. It advises that the Local Planning Authority should consider the acoustic environment in relation to:

- Whether or not a significant adverse effect is occurring or likely to occur.
- Whether or not an adverse effect is occurring or likely to occur.
- Whether or not a good standard of amenity can be achieved.

4.09 In line with the Explanatory Note of the NPSE, the PPG references the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome.

4.10 The following table summarises noise exposure hierarchy, based on likely average response.

Table 4.1 – Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level (NOEL)			
Not Noticeable	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level (NOAEL)			
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

4.11 However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that:

'…the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation'.

4.12 The PPG also provides general advice on the typical options available for mitigating noise. It goes on to suggest that Local Plans may include noise standards applicable to proposed developments within the Local Authority's administrative boundary, although it states that:

'Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed'.

4.13 In lieu of specific criteria, for residential development, ENS makes reference to existing guideline documents, which are summarised in the following paragraph(s).

<u>BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings</u>

4.14 British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS 8233) defines a range of internal noise level criteria for dwellings as follows which represent good living conditions.

Table 4.2 – Indoor Ambient Noise Levels in Dwellings

Activity	Location	Good Indoor Ambient Noise Levels	
Resting	Living Room	35 dB $L_{Aeq\ (0700–2300)}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq\ (0700–2300)}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq\ (0700–2300)}$	30 dB $L_{Aeq\ (2300–0700)}$

4.15 Note 5 to the above table 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.*'

4.16 This is consistent with the guidance contained within the PPG, which states that:

'… consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations'.

4.17 With respect to external amenity, BS 8233 states:

For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also 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.'

BS 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound'

4.18 The NPPF PPG requires that the character of the noise is taken into account. With cognisance to this, further useful contextual guidance is taken from British Standard BS 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS 4142).

4.19 BS 4142 describes methods for determining, at the outside of a building, noise levels from factories or industrial premises and a method for assessing whether the noise is likely to give rise to adverse impacts, and 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*
- *Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.* ***Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background****.* ***This is especially true at night****.*

4.20 The rating level is described as the specific sound level (the equivalent continuous A-weighted sound pressure level at the assessment (receptor) position produced by the specific sound source) 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.

4.21 In terms of particular acoustic features, noise from the scrapyard was noted to subjectively impulsive and therefore an impulsivity penalty may be considered appropriate.

4.22 Annex E of BS 4142 provides a method for calculating an impulsivity character penalty (K_I) using the following equation:

$K_I = 1.8\ (P - 5)$

Where P = prominence of an impulse

4.23 P is calculated using the equation:

P = [3 x log (onset rate)] + [2 log (level difference)].

4.24 The 'onset' is the starting point of an impulse and the 'onset rate' is defined as *'the slope in dB/s of the straight line that gives the best approximation to the onset'*. The 'level difference' is defined as the difference in dB between the start and end point of an impulse.

4.25 The typical onset rate and level difference of impulses at MP1 were 90 dB/s and 16 dB respectively. This equates to a prominence (*P*) of 8.2 and a penalty (K_I) of **+6 dB**. For reference, this is consistent with the subjective penalty applied by BMBC.

4.26 The typical onset rate and level difference of impulses at MP2 were 67 dB/s and 10 dB respectively. This equates to a prominence (*P*) of 7.4 and a penalty (K_I) of **+4 dB**. This is consistent with subjective aural observations on site that the impulsivity was less noticeable at MP2 compared to MP1, due to increased distance from the yard and open scrapyard building door.

4.27 To reiterate, although scrapyard activity was occasionally audible at MP3, ambient noise levels at MP3 were wholly due to road traffic on the A635 and were not influenced by the scrapyard. A character penalty is therefore not appropriate for ambient noise levels at MP3.

4.28 Although scrapyard activity was also occasionally audible at MP4, ambient noise levels at MP4 were wholly due to road traffic on the A635 and Sandy Gate Lane, and were not influenced by scrapyard activity. It should also be noted that habitable rooms fronting towards Sandy Gate Lane will be significantly screened from the scrapyard by the development itself. A character penalty is therefore not appropriate for noise levels at MP4.

5.00 SOUND ATTENUATION SCHEME

Habitable Rooms fronting towards the Scrapyard

5.01 Noise associated with scrapyard activity has been calculated at circa **56 dB $L_{Aeq\ (1\ hour)}$** at MP1. Robustly applying a +6 dB impulsivity penalty (see Paragraph 4.25), this equates to a scrapyard rating noise level of circa **62 dB $L_{Ar\ (1\ hour)}$** at MP1.

5.02 Background noise levels in the absence of scrapyard noise were measured at **56 dB $L_{A90\ (1\ hour)}$** at MP1.

5.03 The margin between the rating level and the background level is +6 dB. In accordance with BS 4142 this is assessed as an adverse impact, **subject to context**.

5.04 In relation to 'context', BS 4142 states that the assessment should take into account whether dwellings will incorporate façade insulation treatment.

Note: It is therefore considered that adverse impacts can be avoided through appropriate building envelope sound attenuation measures.

5.05 Further guidance is contained in Paragraph 8.5 of BS 4142 which states:

*'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.'*

Note: With cognisance to 'other guidance' it is considered that assessing the development to BS 8233 internal noise level criteria, whilst including a character penalty for scrapyard noise, represents a robust assessment methodology.

5.06 With scrapyard activity noise excluded from the measurement, residual ambient noise levels at MP1 were measured at **59 dB $L_{Aeq\ (1\ hour)}$**, and were due to road traffic.

5.07 The cumulative noise level at MP1 (representative of the habitable rooms fronting towards the scrapyard) is therefore taken as circa **64 dB $L_{Aeq\ (1\ hour)}$** (i.e. logarithmic addition of 59 dB (traffic) and 62 dB (scrapyard including penalty).

5.08 In order to achieve the daytime internal ambient noise levels described in BS 8233, habitable rooms fronting towards the scrapyard should therefore be fitted with glazing rated at least **29 dB R_w+C_{tr}**. This can be achieved with enhanced double glazing comprising 8 mm glass / 6–20 mm air / 4 mm glass. See Appendix 3 for glazing/ventilation markup.

Remaining Habitable Rooms

5.09 Ambient noise levels at the northern end of the subject site were measured at **≤ 64 dB $L_{Aeq,\ T}$** and were wholly due to road traffic on the A635 Doncaster Road.

5.10 Although external noise levels will be lower at the development footprint due to increased distance from the A635, it is recommended that a road-fronting habitable rooms at the townhouses are also fitted with glazing rated at least **29 dB R_w+C_{tr}**.

5.11 Ambient noise levels at the north eastern (Sandy Gate Lane) boundary were measured at circa **56 dB $L_{Aeq,\ T}$** and were wholly due to road traffic on the A635 Doncaster Road and Sandy Gate Lane.

5.12 On this basis, standard double glazing rated at circa **25 dB R_w+C_{tr}** is appropriate for the bedrooms of the apartments, which face away from the scrapyard and front onto Sandy Gate Lane.

Ventilation

5.13 As the façade sound reduction scheme relies on windows being kept closed, an alternative means of whole dwelling ventilation (as defined in Approved Document Part F – Ventilation) is required, in accordance with BS 8233. Appendix 3 contains a glazing/ventilation markup.

5.14 It is understood that the townhouses at the site will include a positive input ventilation (PIV) system. For these systems, in dwellings where the designed air permeability is tighter than (<) 5 $m^3/(h.m^2)$, 2500 mm^2 EA background ventilators are required. In order to maintain the sound insulation properties of the façade, any trickle vents should be rated at least **41 dB $D_{n,e,w}+C$** per 2500 mm^2 EA (vent open), such as the Greenwood 2500EAW.AC1, or equivalent.

5.15 As PIV is not feasible within the apartment block, an individual room ventilator, such as the Titon Sonair unit (or equivalent) is recommended for the **lounges** of the apartment block (as these will front towards the scrapyard).

5.16 Standard trickle vents are appropriate for the **bedrooms** of the apartments, which face away from the scrapyard.

External amenity (gardens)

5.17 Noise associated with scrapyard activity has been calculated at circa **47 dB $L_{Aeq\ (1\ hour)}$** at MP2. Robustly applying a +4 dB impulsivity penalty (see Paragraph 4.26), this equates to a scrapyard rating noise level of circa **51 dB $L_{Ar\ (1\ hour)}$** at MP2.

5.18 Background noise levels in the absence of scrapyard noise were measured at **52 dB $L_{A90\ (1\ hour)}$** at MP2 (with comparable levels measured at MP4 (which is set back a similar distance from the A635 and less exposed to the scrapyard) by both ENS and BMBC).

5.19 The margin between the rating level and the background level is therefore –1 dB. In accordance with BS 4142 this is assessed as a low impact, subject to context.

5.20 For reference, a lower background noise level of **47 dB $L_{A90\ (1\ hour)}$** was adopted for the BS 4142 noise assessment carried out by BMBC. Even robustly adopting this lower level, the margin between the rating level and the background level is +4 dB, which is less than an adverse impact in accordance with BS 4142, subject to context.

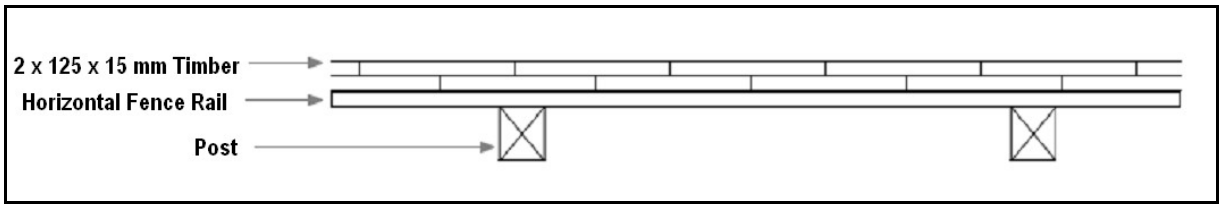
5.21 In relation to 'context' it should be noted that the scrapyard forms a part of the existing noise environment, and that absolute scrapyard noise levels (including a character penalty) are:

- At the 'desirable' standard for external amenity in accordance with BS 8233
- Below the residual noise level (existing ambient noise levels in absence of scrapyard activity)

5.22 Notwithstanding this, as part of a robust scheme of sound attenuation, it is recommended that a 2.2 metre close-boarded timber fence (or a combination of bund and fence) is installed along the south western boundary of the townhouse gardens to provide further screening to the scrapyard (see Appendix 3 for the location of the fence).

5.23 In order to protect against road traffic noise, 2.2 metre close-boarded timber fences (or a combination of bund and fence) should be installed to the north western (A635 Doncaster Road) and north eastern (Sandygate Lane) garden boundaries (see Appendix 3 for the location of the fence).

5.24 The timber fence should be built in double-thickness solid timber construction as illustrated below. The fence should have no gaps or holes (cover strips should also be used to prevent gaps forming over time) and should be fully sealed at the ground (i.e. include a gravel board).



6.00 CONCLUSIONS

6.01 A noise impact assessment has been undertaken for the proposed residential development at land at Sandygate Lane, Stairfoot, Barnsley.

6.02 Outline planning permission for the development was granted by Barnsley Metropolitan Borough Council in June 2016.

6.03 Since outline planning permission was granted, a previously-vacant commercial site has come into use as a scrapyard.

6.04 The noise environment at the subject site is characterised by road traffic on the surrounding road network, with localised contributions from the neighbouring scrapyard.

6.05 A scheme of sound insulation (fenestration and ventilation) and boundary screening has been developed to protect residential amenity from the ambient noise climate. As a consequence, the ambient noise climate is not considered to represent a constraint to the proposed residential development.

6.06 Furthermore, the proposed residential development will not place any unreasonable constraints on the neighbouring commercial uses.

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

T. Crabb

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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 µPa 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 µPa).

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.

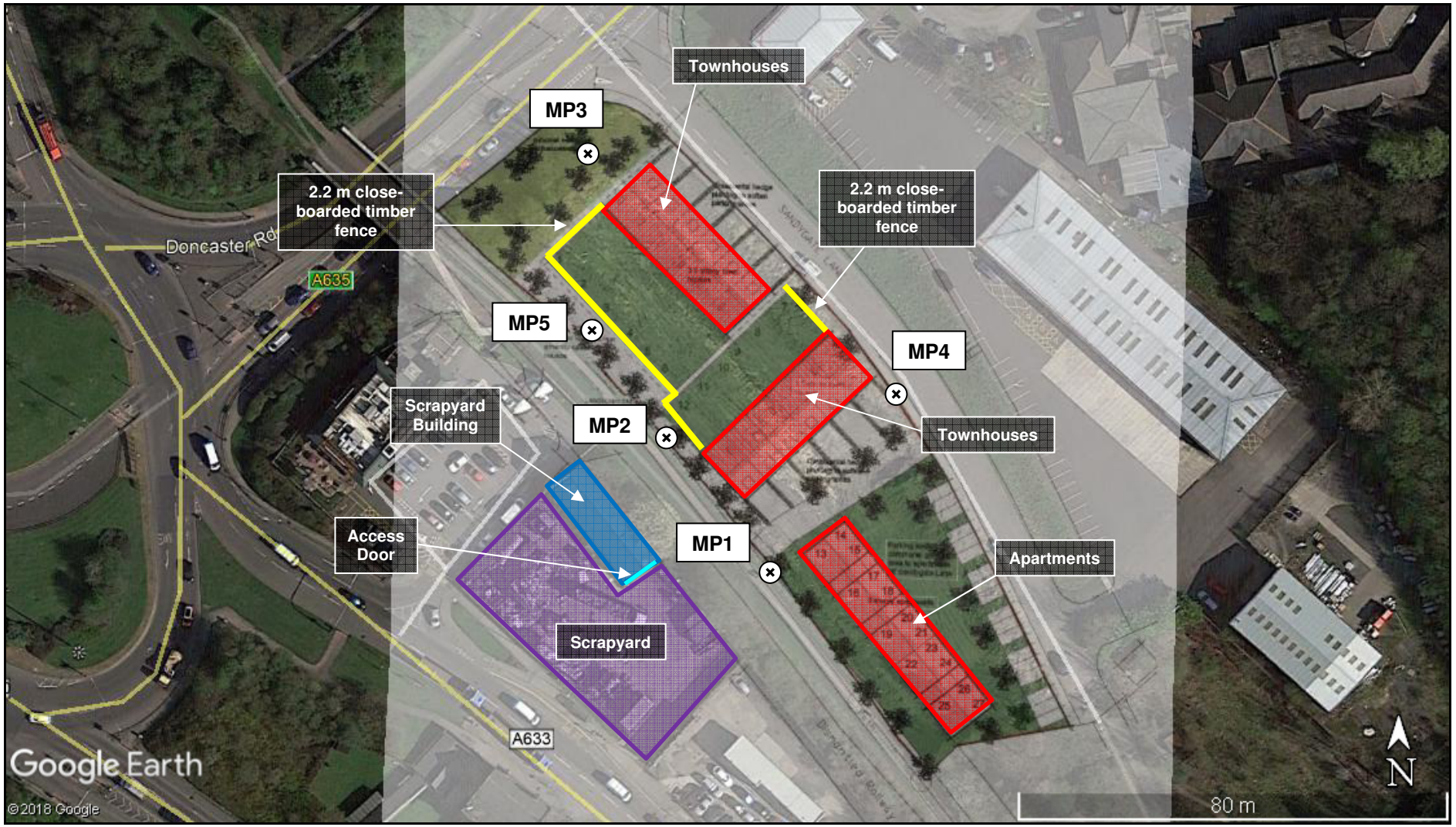
Sound Exposure Level (SEL or L_{AE})

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
Drawings (Annotated Site Plan / Noise Monitoring Positions)



Appendix 3
Drawings (Scheme of Sound Attenuation)

