Integrated Acoustics Ltd

Land East of Manor Trading Estate, Benfleet, Essex, SS7 4PS

Noise Constraint Study to Proposed Residential Development

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Prepared by: Douglas Duce B.Sc. (Hons) MIOA (Member of the Institute of Acoustics)

Integrated Acoustics Ltd
12 Riverside Road
Burnham-on-Crouch
Essex
CM0 8JY

doug@integratedacoustics.co.uk
07544 534000

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1 THE BRIEF AND INTRODUCTION

1.1 Integrated Acoustics Ltd was commissioned to:

- Conduct updated noise measurements of existing operations from the Benfleet Scrap (BS) site on the proposed development site (Note: this would take into account the recently extended BS 5m high concrete barrier wall adjacent to their east site boundary);

- Whilst attending the site, conduct updated background noise measurements (Note: these and the above measurements, together with those made on the site in June 2018, would inform the prediction and assessment of noise on the development site);

- Using the above measurements, model and assess the likely noise constraint to future dwellings on the development site assuming BS's recently extended 5m high concrete barrier wall for the following single scenario:

    i. The optimum height and effect of a single noise barrier that would be positioned 1m 'in' from GSK Groundworks site boundary; and

- Consider noise from activities associated with the existing commercial/industrial units immediately to the west of the 'triangle' of land to the north of the BS site, where residential development is now being considered.

1.2 This Noise Constraint Study presents our findings. Section 2 of this report outlines the relevant the noise criteria and Section 3 presents the noise measurements and assessments. For ease of reference the poignant points of this report are underlined.

1.3 This report is necessarily technical in nature. Please refer to Appendix 1 for a guide to the acoustic terminology used.

2 NOISE ASSESSMENT CRITERIA

2.1 The relevant guidance to assess commercial/industrial noise on a site where it is intended to promote residential development remains the same as that described in our Noise Assessment report of July 2018, namely BS 4142: 2014[1]. The July 2018 report gives a full description of this Standard together with the relevant advice of the Noise Policy Statement for England (NPSE)[2], the National Planning Policy Framework (NPPF)[3], the Planning Practice Guidance suite[4] and Professional Practice Guidance on Planning and Noise New Residential Development (ProPG Noise[5]).

2.2 Perhaps the most relevant advice to this report within the above Planning documents is:

- Significant adverse effects should be avoided i.e. planning permission should be refused; and

- Where the impact is less than significant but still adverse, all reasonable steps should be taken to mitigate and minimise adverse effects. Importantly, the NPSE advises that '*this does not mean that such adverse effects cannot occur.'*

BS 4142

2.3 BS 4142 is commonly used to determine the level of sound of a commercial or industrial nature together with procedures for assessing the likely effects of sound at dwellings or premises used for residential purposes. BS 4142 does not apply to other premises. The determination of noise amounting to a nuisance is beyond the scope of BS 4142.

2.4 BS 4142 compares and 'rates' the difference between the sound level from the source (an 'L_{Aeq}' noise level) and the background sound level (an 'L_{A90}' noise level) and considers the context in which the sound occurs. Appendix 1 provides a guide to acoustic terminology.

2.5 The sound level from the source(s) is either calculated and/or measured at the receptor location and this is termed the 'Specific Sound Level' (or '$L_{Aeq,Tr}$'). If certain acoustic 'features' or 'characteristics' are present the Specific Sound Level may have to be 'corrected' and this is then termed the 'Rating Level' (or '$L_{Ar,Tr}$'). These acoustic features being a tone, impulse or, where neither, the characteristics are readily distinctive against the residual acoustic environment. Intermittency is also considered. All these qualities can increase the significance of impact over that expected from a comparison between the specific sound level and the background level.

2.6 A correction of up to +6 dB is made if the noise is tonal, up to +9 dB if impulsive, +3 dB where the characteristics are neither tonal nor impulsive but the sound is readily distinctive against the residual acoustic environment and +3 dB if intermittency is readily distinctive. If

1 British Standard (BS) 4142: 2014. Methods for rating industrial and commercial sound. BSI.
2 The Noise Policy Statement for England. March 2010. Department for Environment, Food and Rural Affairs.
3 National Planning Policy Framework. June 2019. Ministry of Housing, Communities and Local Government. HMSO.
4 http://planningguidance.planningportal.gov.uk (accessed July 2020)
5 ProPG: Planning & Noise. Professional Practice Guidance on Planning & Noise. New Residential Development. May 2017. Association of Noise Consultants, Institute of Acoustics and Chartered Institute of Environmental Health.

there are no such features present then the rating noise level is equal to the specific noise level.

2.7 An initial assessment is conducted by subtracting the rating level from the background sound level and the greater the difference, the greater the magnitude of the impact. Table 1 summarises this advice.

Table 1 BS 4142 advice

Rating sound level - Background sound level	Likely to be an indication of:
Difference of around +10 dB or more	A significant adverse impact, depending on context
Difference of around +5 dB	An adverse impact, depending on context
The lower the rating level is relative to the background sound level, the less likely it is that the specific sound level will have an adverse impact or significant adverse impact	
Difference of 0 dB or less	Low impact, depending on context

2.8 The initial assessment can be modified after consideration of the context, which can include regard of :

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound; and
- The sensitivity of the receptor and whether design measures are already incorporated that ensure good internal and/or outdoor acoustic conditions.

2.9 Given the above guidance, it is assumed that a difference of +5 dB (i.e. Rating sound level – Background sound level = +5 dB), which equates to an adverse impact, would represent the limit up to which 2-storey dwellings (i.e. ground and first floor), including their gardens, could be built on the development site.

2.10 The assessment methodology of BS 4142 assesses external noise levels and the use of improved sound insulation to the building envelope of proposed dwellings will not reduce the calculated results of BS 4142 assessments.

3 NOISE MEASUREMENTS AND ASSESSMENT

Noise Measurements

3.1 This assessment is based on the measurements that we made on the development site in June 2018 and early March 2020.

3.2 From the measurements made on the site in early March 2020 it was evident that the shear/baler (the Lefort 'crusher' that is located in the north-east corner of the BS site) and attendant 'Atlas' long-reach hydraulic excavator generated the same level of noise as in June 2018. The other 3 Atlas's generated generally less noise across the development site than they did in 2018, which is primarily due to the mitigation provided by the recently extended BS 5m high concrete wall.

3.3 Since the 2018 measurements were made, BS have improved slightly the quality of their sheet steel boundary wall immediately to the east of the baler. However, this approximate 20m stretch remains of a much lower quality and height than the recently extended 5m high concrete wall that makes up the remainder of BS's eastern boundary treatment. Furthermore, BS's northern boundary sheet steel wall appears to remain as it was in 2018.

3.4 As detailed in previous project correspondence, the early March 2020 measurements included some background noise measurements (made when no operations were taking place on the BS site) and as agreed, this study makes use of those measurements together with the background measurements we made on the development site in June 2018.

Assessment

3.5 Using the representative levels of noise established by the above noise measurements, the cumulative level of noise from Benfleet Scrap has been modelled across the development site in accordance with the guidance of ISO 9613-2[6] that takes account of the:

- Frequency content of the noise sources;
- Attenuation due to distance;
- Attenuation provided by existing and proposed barriers; and
- Varying ground height across the site as shown by the detailed topographic survey of late August 2018 (i.e. after our previous work was undertaken).

3.6 This modelling includes noise from the fragmentiser on the BS site that is located to the south of their waste processing building, which like the baler, is a significant source of noise, albeit it appears to be not used as often as the baler. However, as with our previous work, noise from the fragmentiser has to be considered.

Noise levels across the site with the existing BS boundary treatment

3.7 Although it does not fall within the Brief (see section 1 of this report), we have also evaluated the noise constraint to the residential development of the site with the existing BS boundary treatment. BS 4142 assessment levels vary from +15 dB at the south-east corner of the development site to +41 dB on the site just to the east of the baler. These levels are significantly more than +10 dB above the background sound level, which is an indication of a

[6] ISO 9613-2 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation. 1996. International Organization for Standards.

likely significant adverse impact across the whole site. This is no different from that reported in July 2018.

3.8 Both the NPSE and NPPF (see section 2 of this report) advise that significant adverse impacts should be prevented or avoided, whilst taking into account the guiding principles of sustainable development. Therefore, consent for residential development on the proposed site would be refused on noise grounds in order to prevent/avoid significant adverse effects.

3.9 This planning guidance also advises to mitigate and reduce adverse impacts to a minimum through the use of planning conditions. Therefore, in conformance with the brief, mitigation measures have been considered to minimise the significant adverse impacts indicated by BS 4142 and these are presented in the next sub-sections.

Existing BS boundary treatment together with 10m high GSK Groundworks barrier

3.10 To reduce noise from BS across the development site, the mitigation measures shown by Table 2 have been taken into consideration and Appendix 2 shows the 'barrier reference points'.

Table 2

Barrier reference points (see Appendix 2)	Height above existing ground level (m)
A to B	5
B to C	10
C to D	10

3.11 As outlined in the previous section, the 'build-line' that represents the limit up to which dwellings (including their gardens) could be built on the site, which equates to an adverse impact, is shown at Appendix 3.

3.12 During any detailed design, careful consideration must be given to ensure that there would be no gap or discontinuity in the 90° barrier 'abutment' at point C that would compromise the acoustic performance of the barrier as a major noise source on the BS site (the baler) is adjacent to this point.

Existing BS boundary treatment together with 12m high GSK Groundworks barrier

3.13 In addition to the above, further assessments were conducted to determine the best performance a barrier could provide to BS noise across the site i.e. the 'optimum' performance and this is summarised in Table 3 below and shown also at Appendix 3.

Table 3

Barrier reference points (see Appendix 2)	Height above existing ground level (m)
A to B	5
B to C	12
C to D	12

3.14 Appendix 3 shows that with the 12m barrier scenario, a swathe of land to the west of the BS site becomes viable. The build-line that appears to be almost parallel with the west boundary of the development site, where it abuts the southern half of the BS site, denotes that the optimal barrier performance has been attained in this area. Therefore, increasing the barrier height would not change the build-line in this area.

3.15 Furthermore, Appendix 3 shows that the build-lines for both scenarios are the same at certain site areas (to the north-west, north and north-east of point C) which signifies that the optimal barrier performance has been achieved at those areas and increasing the barrier height would also not change the build-line in this area.

3.16 To reiterate, the 12m barrier scenario attains the optimal barrier effect i.e. the maximum possible attenuation a barrier could provide so increasing the barrier height would not change the build-line across the site.

3.17 It is acknowledged that there will be both visual and engineering challenges associated with the optimum barrier but given the use of the adjoining site and the development proposed these will not be unanticipated.

Land to the north of A to C

3.18 It can be seen that Appendix 3 also includes consideration of the 'triangular' area of land to the north of A to C, up to the northern-most point of the site. If dwellings were to be proposed on this area then it would be prudent to incorporate a timber acoustic fence from point A to the northern-most point of the site. It is recommended that the height of this acoustics barrier should be a minimum of 2.4m above ground level. This treatment would provide significant attenuation to noise associated with the occasional activities that occur on the existing commercial/industrial parking/storage areas that are to the rear of the units on the east side of Brunel Road.

3.19 If the proposed layout on this area of land was to be the same as that shown by the August 2019 Nigel Cowlan Masterplan (commercial B1 units), then the above suggested timber acoustic fence should be positioned from point C up to the northern-most point of the site. In the position that the B1 units are shown currently by the above Masterplan, in particular the southern–most unit, the built-form of this commercial development would offer little attenuation to BS noise to proposed dwellings. Therefore, barriers B to C as shown by Tables 2 and 3 would still be required and the respective build-lines shown by Appendix 3 on the remaining land to the east of these proposed commercial units would still be apply.

APPENDIX 1 Glossary of acoustic terminology

Noise is defined as unwanted sound. The range of audible sound is from 0 dB to 140 decibels (dB). The frequency response of the ear is usually taken to be about 18 Hertz (Hz - number of oscillations per second) to 18000Hz (18KHz.). The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a 'weighting' (filtering) circuit to the noise-measuring instrument. The weighting which is most widely used and which correlates best with the subjective response to noise is the 'A' weighting scale, identified by the notation dB(A). This is an internationally accepted standard for noise measurements.

For variable noise sources such as traffic, a difference of 3 dB(A) is just distinguishable. Furthermore, a doubling of traffic flow would increase the overall noise by 3 dB(A). Generally, for every doubling of distance from a busy road (a line source) the level of noise would decrease by 3 dB(A) and for every doubling of distance from a stationary noise source i.e. a parked car with a 'running' engine (a point source) the level of noise would decrease by 6dB(A). Compared to a single noise source, if there were two identical sources operating next to one another i.e. two identical 'running' generators, the noise level in the vicinity would increase by 3 dB(A). The loudness of a noise is purely a subjective parameter but is generally accepted that an increase or decrease of 10 dB(A) corresponds to a doubling or halving in perceived loudness.

External noise levels are rarely steady but rise and fall according to activities within an area. In an attempt to produce a figure that relates this variable noise level to subjective response a number of noise indices have been developed, which include:

The Sound Pressure Level (or L_P or SPL): Ten times the logarithm to the base 10 of the ratio of the square of the sound pressure to the square of the reference sound pressure level of 2×10^{-5} Pascal's.

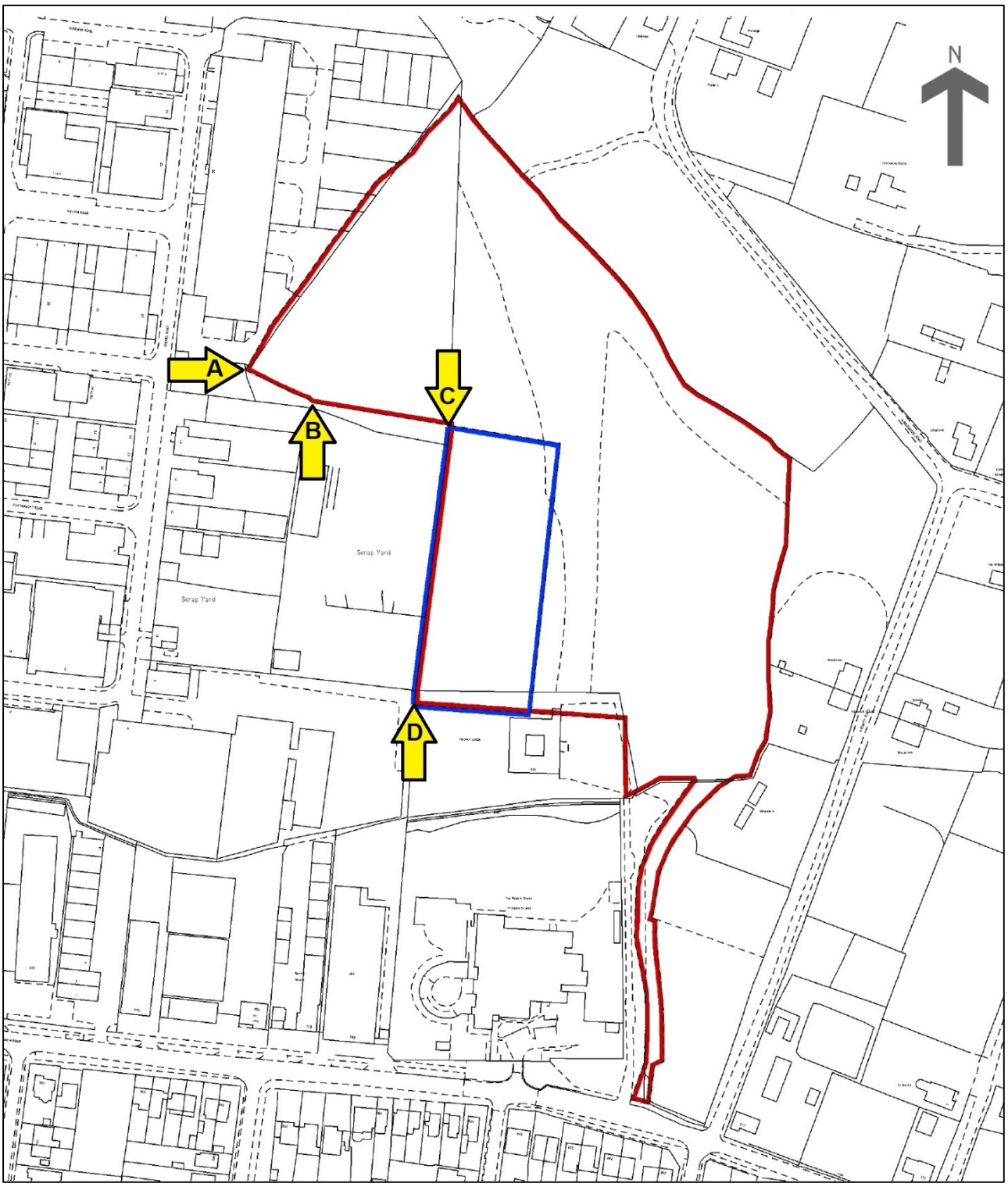
The $L_{Aeq,T}$ noise level is the 'equivalent continuous A-weighted sound level'. This is defined as the sound level of a notional steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is a unit commonly used to describe construction noise and noise from industrial premises.

The $L_{A90,T}$ noise level is the A-weighted noise level that is exceeded for 90% of the measurement period (T). It is often referred to as the background noise level.

Specific Sound Level $L_{Aeq,Tr}$: Sound level from the source(s) that are being assessed.

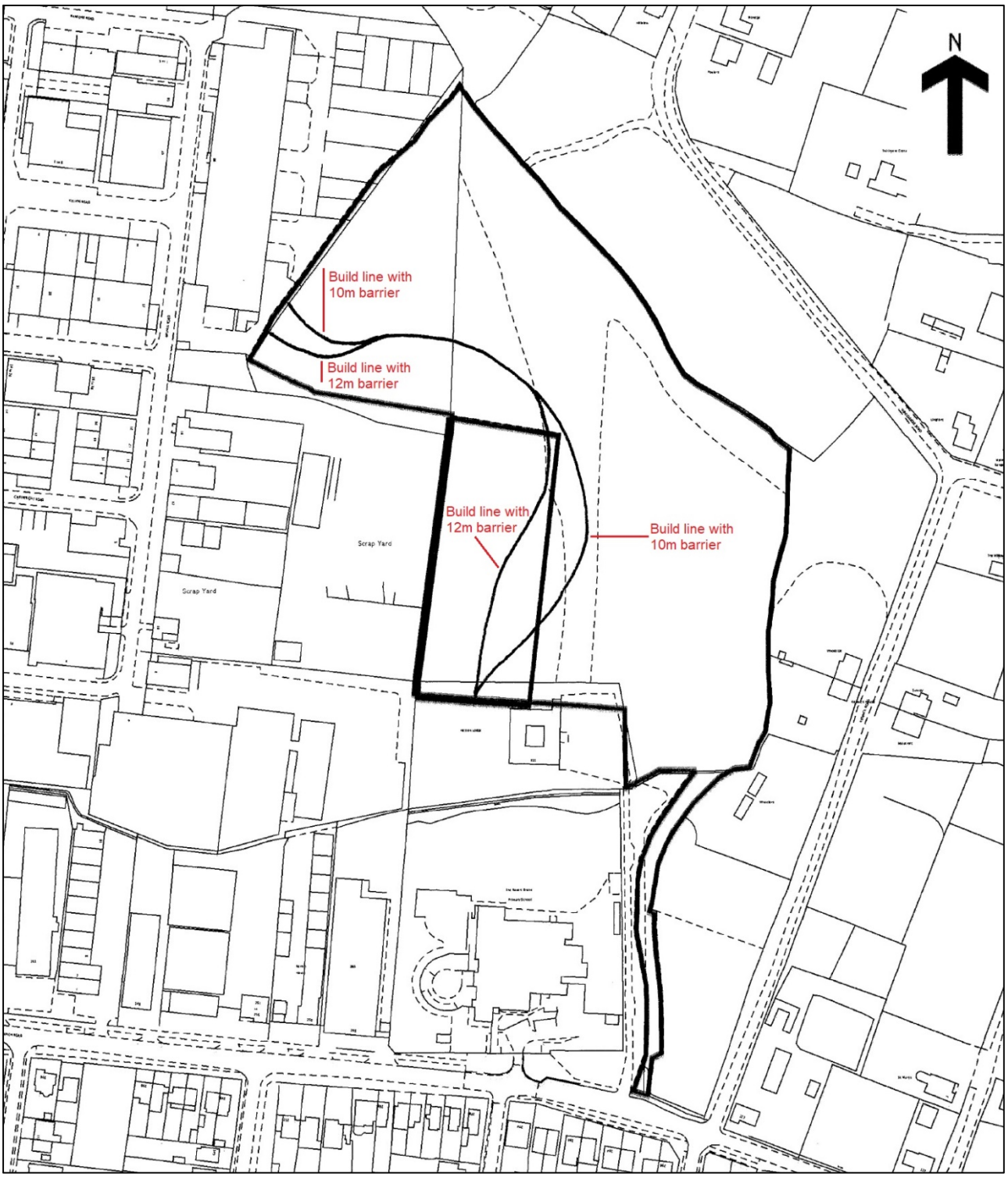
Rating Level $L_{Ar,Tr}$: Specific sound level plus any adjustment for the characteristic features of the sound.

APPENDIX 2 Barrier reference points



As instructed, the apex of the barrier has been taken to be 1m 'in' from the GSK site boundary.

APPENDIX 3 'Build-lines' on the proposed development site



Build-line for 2-storey dwellings, including their gardens