13 NOISE

13.1 Introduction

13.1.1 This Chapter of the Environmental Statement ('ES') assesses the potential effects of noise, associated with the Proposed Development, to the surrounding area. The potential effect of extant noise affecting the proposed development is also assessed.

13.1.2 This chapter describes the assessment methodology, the baseline conditions currently existing at noise sensitive receptors; the likely significance of noise effects, the mitigation measures required to prevent, reduce or offset any significant adverse effects and the likely residual effects after these mitigation measures have been employed. The chapter is supported by Technical Appendix 13.

13.1.3 Given the large distances between the proposed development and neighbouring residential receptors, the effects of vibration have been scoped out of the assessment.

13.1.4 The author of this Chapter is Chris Parker of Environmental Noise Solutions (ENS), a Senior Acoustic Consultant and corporate member of the Institute of Acoustics (IOA) with 16 years' experience in the acoustics and noise assessment consultancy industry. The author has extensive experience in surveying, modelling and assessing environmental noise impacts for numerous UK and international projects in sectors such as residential planning, manufacturing, mining, waste, transportation and renewable energy.

13.2 Assessment Approach

Methodology

13.2.1 This section outlines the relevant national guidance with regard to noise assessment that has been used to determine noise impact magnitudes for sources associated with (and affecting) the Proposed Development.

National Planning Policy Framework

13.2.2 The National Planning Policy Framework (NPPF)[1] was updated in 2019 and sets out the Government's planning policies for England and how these are expected to be applied.

13.2.3 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'.

13.2.4 Paragraph 180 advises that:

[1] National Planning Policy Framework. Ministry of Housing, Communities and Local Government (2019)

'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'.

13.2.5 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

13.2.6 The Noise Policy Statement for England[2] (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

13.2.7 The 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

13.2.8 According to the explanatory notes in the statement, where a noise level falls between the lowest observable adverse effect level (LOAEL) and a level which represents a significant observable adverse effect level (SOAEL):

'….all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur.'

Planning Practice Guidance on Noise

13.2.9 Planning Practice Guidance[3] (PPG) is an online resource providing additional guidance and elaboration on the NPPF. It advises that:

[2] Government Department for Environment, Food and Rural Affairs. Noise Policy Statement for England (2010)

[3] Planning Practice Guidance on Noise (http://planningguidance.planningportal.gov.uk/blog/guidance/noise/). Ministry of Housing, Communities and Local Government (2019)

'Plan making and decision making need to take into account the acoustic environment and in doing so consider:

- ***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; and***
- ***whether or not a good standard of amenity can be achieved.'***

13.2.10 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. 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'.

13.2.11 Table 13.1 summarises the PPG noise exposure hierarchy.

Table 13.1: PPG Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No effect	No observed effect	No specific measures required
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			
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	Observed adverse effect	Mitigate and reduce to a minimum

Perception	Examples of Outcomes	Increasing Effect Level	Action
	life		
Significant Observed Adverse Effect Level			
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

British Standard 8233:2014

13.2.12 British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS8233)[4] provides recommendations for the control of noise both in and around buildings and suggests criteria and limits appropriate to their function. For dwellings, the main considerations are:

- Bedrooms - the effect of noise upon sleep
- Other habitable rooms - the effect of noise upon resting, listening and communicating

13.2.13 It is desirable that the internal ambient noise level does not exceed the guideline values set out in Table 4 of BS8233, as replicated in Table 13.2.

[4] British Standard 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings. BSI (2014)

Table 13.2: Indoor Ambient Noise Levels for Dwellings - BS8233:2014

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 $L_{Aeq,8hour}$

13.2.14 BS8233 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.'***

13.2.15 For traditional external areas that are used for amenity space, such as gardens, BS8233 states that:

> ***'……it is desirable that the external noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,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.'***

ProPG Planning and Noise: New Residential Development

13.2.16 ProPG Planning and Noise: New Residential Development (ProPG)[5] promotes a systematic two-stage, risk-based approach to noise assessments that inform planning applications for new residential developments.

13.2.17 The 'Stage 1 Initial Site Noise Risk Assessment' should be conducted, at the proposed development site, at the earliest opportunity, before any planning application is submitted. The noise risk assessment should provide an indication of the likely risk of adverse effects from noise were no subsequent mitigation to be included as part of the development proposal. It should indicate whether the proposed site is considered to pose a negligible, low, medium or high risk from a noise perspective. Appendix 13.1 Figure 1 summarises the initial noise risk assessment and demonstrates how measured site noise levels relate to potential adverse effects from noise.

13.2.18 ProPG recommends compliance with indoor noise level targets in residential dwellings based on the guidance contained in BS8233 (see Table 13.2). Additionally, with regard to individual noise events, ProPG states:

[5] 'ProPG Planning and Noise: New Residential Development (ProPG)', 2017. Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH)

'Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LAmax,F, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB LAmax,F more than 10 times a night.'

13.2.19 ProPG acknowledges that the internal target noise levels may only be practically achieved with windows closed in certain areas (e.g. in urban areas or sites adjacent to transportation noise sources) and states that:

'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).

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

13.2.20 ProPG also considers compliance with ambient noise level targets for external amenity areas in line with the recommendation of BS8233. On this issue, ProPG states that:

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

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

Building Bulletin 93 – Acoustic Design of Schools

13.2.21 Section 1 (Performance Standards) of Building Bulletin 93 'Acoustic Design of Schools: Performance Standards' (BB93)[6] was updated in February 2015. The overall objectives of the BB93 performance standards are to provide acoustic conditions in schools that:

- Facilitate clear communication of speech between teachers and students
- Do not interfere with study activities

13.2.22 Where a natural ventilation strategy is to be employed, the IANL limits can be relaxed by 5 dB $L_{Aeq,30min}$ where the 'normal condition' is achieved. However, this does not apply to spaces with an indoor ambient noise limit of 45 dB $L_{Aeq,30min}$ or higher. For hybrid ventilation systems, the mechanical system noise component must comply with the limits set out in Table 1 of BB93, however the overall noise limit can also be relaxed by 5 dB $L_{Aeq,30min}$ if the 'normal condition' is achieved.

13.2.23 BB93 states that:

> ***'The normal condition for a natural or hybrid ventilation mode is defined as when the system is operating to limit the daily average carbon dioxide concentration to no more than 1,500ppm with the maximum concentration not exceeding 2,000ppm for more than 20 consecutive minutes on any day. This would normally equate to a minimum ventilation rate of approximately 5l/s per person.***
>
> ***The mid-season design condition can be used in simple ventilation calculations and is defined as an outside temperature of 11 °C and an internal air temperature of 20 °C with no external wind effect….***
>
> ***… Where there is a hybrid system, any mechanical system components should meet the IANL limits from Table 1. The total noise level including external noise ingress may exceed the IANL limit from Table 1 by up to 5 dB.'***

13.2.24 Typically, the most onerous indoor ambient noise level requirement given within BB93 is 35 dB $L_{Aeq,30min}$ (or 40 dB $L_{Aeq,30min}$ if naturally ventilated) which applies to most teaching spaces. However, where a teaching space is 'intended specifically for students with special hearing and communication needs', a lower IANL requirement of 30 dB $L_{Aeq,30min}$ (or 35 dB $L_{Aeq,30min}$ if naturally ventilated) is required.

13.2.25 BB93 also sets a maximum noise level of 60 dB $L_{A1,30min}$ in teaching spaces and is used to assess short transient noise levels associated with aircraft, railways and other similar sources. This is achieved by default for spaces with indoor ambient noise levels up to 40 dB $L_{Aeq,30min,}$ but requires assessment in spaces with indoor ambient noise level targets of 45 dB $L_{Aeq,30min}$ or above.

[6] 'Building Bulletin 93 - Acoustic Design of Schools: Performance Standards', 2015. Department for Education (DfE).

British Standard 4142:2014+A1:2019

13.2.26 BS4142:2014[7] presents methods for rating and assessing the potential impact of commercial and industrial sound upon noise sensitive receptors.

13.2.27 The scope of BS4142 specifically includes sound from industrial and manufacturing processes, sound from fixed plant, sound from loading and unloading of goods at industrial and commercial sites and mobile plant forming an intrinsic part of the overall sound from a premises or process.

13.2.28 A rating penalty can be applied to account for the character of the noise, namely tonality, impulsivity and intermittency. All of these corrections can be added together in linear fashion where appropriate.

13.2.29 Tonality can be determined objectively (using adjacent third octave band analysis / the Joint Nordic method) or subjectively as listed below:

- +2 dB penalty: Just perceptible
- +4 dB penalty: Clearly perceptible
- +6 dB penalty: Highly perceptible

13.2.30 Impulsivity (the rapidity of the change in sound level) can be determined objectively (using Fast Fourier Transform analysis) or subjectively as listed below:

- +3 dB penalty: Just perceptible
- +6 dB penalty: Clearly perceptible
- +9 dB penalty: Highly perceptible

13.2.31 Where intermittency is present (i.e. when the specific noise has identifiable on/off conditions) a +3 dB penalty can be applied.

13.2.32 Where the specific sound feature characteristics are neither tonal nor impulsive, but are distinguishable against the residual noise, a +3 dB penalty can be applied.

13.2.33 In order to assess the impact, the 'Rating level' of the new noise source is compared with the existing 'Background level' and the following analysis made:

- Typically, the greater this difference, the greater the magnitude of the impact
- A difference of +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context
- A difference of +5 dB is likely to be an indication of an adverse impact, depending on the context
- 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

[7] British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound, BSI (2019)

13.2.34 BS4142 requires separate analysis for day and night time periods, evaluating the Rating level over an appropriate reference time interval (T_r) of:

- 1 hr during the day (between 07:00 - 23:00 hrs)
- 15 min during the night (between 23:00 - 07:00 hrs)

Artificial Grass Pitch (AGP) Acoustics – Planning Implications

13.2.35 Sport England's 'Artificial Grass Pitch (AGP) – Planning Implications: New Guidance for 2015'[8] provides guidance to assess the noise impact of new artificial grass pitches on noise sensitive receptors. The following two assessment methodologies are considered the most appropriate in this case:

- Absolute Assessment Method: This method refers to the World Health Organisation (WHO) 'Guidelines for Community Noise' (1999) recommending that noise levels at 1 metre from the façades of living spaces should not exceed 50 dB $L_{Aeq,16hr}$ during the day.
- Comparative Assessment Method: This method makes comparison of external sports activity noise against the existing noise climate. Reference is made to the IOA/IEMA Working Party Consultation Draft 2002, superseded by Guidelines for Environmental Noise Impact, providing the impact of change in noise levels. Sport England recommends the introduction of a new pitch should not result in an increase of the existing noise climate by more than 3 dB, which is the 'minimum perceptible under normal conditions'.

13.2.36 Typical AGP noise levels are presented in the document, based on noise levels measured during nine sports sessions on three separate AGPs. The sessions included football, hockey and rugby and participation by men, women and children. Noise level measurements were taken at a distance of 10 metres behind the mid-way points along goal lines and side-lines. The most significant noise source from typical AGP sports sessions was found to be that from voices.

13.2.37 From the measurement data, a typical free-field noise level of 58 dB $L_{Aeq,1hr}$ at a distance of 10 metres from the side-line halfway marking has been determined as representative for noise from AGPs.

Design Manual for Roads and Bridges (DMRB)

13.2.38 Section 3 (Assessment Methodology) of the 2020 Design Manual for Roads and Bridges (DMRB) [9] sets out procedures for categorising the magnitude of noise impact due to a new road scheme. The principles of the approach contained within the document can also be applied to the assessment of changes in road traffic flows on existing roads and noise from road traffic in general.

13.2.39 Initial screening using this document seeks to identify existing roads or possible new routes where traffic flow changes, exceeding plus 25% or minus 20%, are expected in the year of development opening / completion. DMRB states that traffic flow variations below this level would give rise to a change in noise level of less than 1 dB $L_{A10,18hr}$.

[8] 'Artificial Grass Pitch (AGP) Acoustics – Planning Implications: New Guidance for 2015 August Revision 001', 2015. Sport England

[9] Design Manual for Roads and Bridges, Sustainability & Environment Appraisal LA111, Noise and Vibration, Revision 1. Highways England (2020)

13.2.40 DMRB requires comparisons of the following sets of data:

- Do-Minimum scenario (without the Scheme) in the opening year (DMOY) against Do-Something scenario (with the Scheme) in the opening year (DSOY)
- Do-Minimum scenario in the opening year (DMOY) against Do-Something scenario in the future assessment year (DSFY)
- Do-Minimum scenario in the opening year (DMOY) against Do-Minimum scenario in the future year (DMFY)

13.2.41 The DMRB assessment suggests that the magnitude of noise changes from a project should be classified into levels of impact, and gives detailed consideration to how impact magnitude will be affected by whether a noise level change will occur in the short term (e.g. as a result of a sudden opening of a scheme), or whether the noise level change would occur in the long term (e.g. gradually over time, such as that associated with natural traffic growth).

13.2.42 The 'magnitude of change' classifications are replicated in Tables 13.3 and 13.4 below.

Table 13.3: Classification of Magnitude of Noise Effects in the Short Term

Noise Change, $L_{A10,\ 18h}$, dB	**Magnitude of Change**
Less than 1.0	Negligible
1.0 to 2.9	Minor
3.0 to 4.9	Moderate
5.0+	Major

Table 13.4: Classification of Magnitude of Noise Effects in the Long Term

Noise Change, $L_{A10,\ 18h}$, dB	**Magnitude of Change**
Less than 3.0	Negligible
3.0 to 4.9	Minor
5.0 to 9.9	Moderate
10.0+	Major

13.2.43 It can be seen that road traffic noise level of less than 1 dB $L_{A10,18hr}$ would give rise to a negligible noise impact. It follows that negligible noise impacts are expected where traffic flow changes are expected to be subject to less than a 25% increase (or <20% decrease) in the year of development opening/completion.

Calculation of Road Traffic Noise (CRTN)

13.2.44 The 'Calculation of Road Traffic Noise' (CRTN)[10] sets out standard procedures for calculating noise levels from road traffic. These procedures are necessary to determine entitlement under the Noise Insulation Regulations but they also provide guidance appropriate to the calculation of traffic noise for more general applications e.g. environmental appraisal of road schemes, highway design and land use planning.

13.2.45 The calculation methods use a number of input variables, including traffic flow volume, average vehicle speed, percentage of heavy goods vehicles, type of road surface, site geometry and the presence of noise barriers or acoustically absorbent ground. CRTN predicts the $L_{A10,18hr}$ noise level (the level exceeded for 10% of any 18-hour period between 06:00 – 24:00 hrs) for any receptor point at a given distance, up to 300 metres, from the road.

British Standard 5228-1: 2009+A1:2014

13.2.46 British Standard 5228-1: 2009+A1:2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites. Noise' (BS5228-1) [11] sets out techniques to predict and assess the likely noise effects from construction works, based on detailed information on the type and number of plant being used, their location, and the length of time they are in operation.

13.2.47 The noise prediction method is used to establish likely noise levels in terms of the $L_{Aeq,T}$ over the core working day. BS5228 also documents a database of information, comprising previously measured sound power level data for a variety of different construction plant undertaking various common activities.

13.2.48 The standard provides methods for determining the significance of construction noise levels considering the change in the ambient noise level brought about by the construction work. For one of the example assessment methods, the ABC method, the threshold limits are replicated in Table 13.5.

Table 13.5: BS5228:1 – Example Thresholds of Significant Effects (ABC Method)

Assessment Period	**Threshold value $L_{Aeq,T}$ (dB)**		
	Category A[A]	**Category B[B]**	**Category C[C]**
Night-time (23:00 – 07:00)	45	50	55
Evenings and Weekends [D]	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
[A] Category A: threshold values to use when ambient levels (when rounded to the nearest 5 dB) are less than these values. [B] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as Category A values. [C] Category C: threshold values to use when ambient noise levels (when rounded to the			

[10] Calculation of Road Traffic Noise, 1988. Department of Transport and the Welsh Office.

[11] British Standards Institution (2014) *British Standard 5228-1: 2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites. Noise*

Assessment Period	Threshold value $L_{Aeq, T}$ (dB)		
	Category A[A]	Category B[B]	Category C[C]
nearest 5 dB) are higher than Category A values. [D] 19.00-23.00 weekdays, 13.00-23.00 Saturdays and 07.00-23.00 Sundays			

Assessment Criteria

13.2.49 This section outlines the criteria for establishing which effects would be considered significant (based on impact magnitude and sensitivity) with reference to the guidance documentation outlined in the foregoing subsection.

Construction Noise

13.2.50 For construction activities, following the ABC Method for determining significance provided within BS 5228-1 (see Table 13.5) and given the prevailing ambient noise levels at the sensitive receptors established as part of the baseline noise survey (as set out in the Baseline Conditions section of this Chapter), it is considered appropriate that the construction noise assessment be undertaken against the external noise limits identified in Table 13.6.

Table 13.6: Impact Magnitude Criteria for Construction Noise

Daytime Construction Noise Level, LAeq (dB)			Impact Magnitude
Category A	Category B	Category C	
≤ 60	≤ 65	≤ 70	Negligible
61 – 65	66 – 70	71 – 75	Low
66 – 70	71 – 75	76 – 80	Medium
> 70	> 75	> 80	High
N.B. – Based on the findings of the baseline study, the NSRs are classified as Category A			

Road Traffic Noise Impact

13.2.51 Amongst the projected traffic data provided by the Applicant, 18hr Annual Average Weekday Traffic (AAWT) data for the following scenarios have been provided:

- Without Development - 2026 opening year and 2033 year of completion (with and without other committed developments)
- With Development - 2026 opening year and 2033 year of completion (with and without other committed developments)

13.2.52 In the 2026 scenario, the following elements of the Proposed Development are considered:

- Phase 1a – i.e. Phase 1 of the residential development (up to a worse-case of 275 no. dwellings for assessment purposes) including the primary school and

the first part of the Link road running from Barugh Green Road to the northernmost internal roundabout

- Phase 1b - the Employment development

13.2.53 The thresholds for differentiating the magnitude of effect criteria (set out in Table 13.7) are based on the guidance of DMRB (replicated in Tables 13.3 and 13.4). The impact criteria relate to a relative increase in noise in comparison to an existing noise level, such as the change due to increased traffic on the road network or due to new road links.

Table 13.7: Road Traffic Noise Impact Magnitude

Noise Change, $L_{A10, 18h}$, dB		**Impact Magnitude**
Short Term	**Long Term**	
Less than 1.0	Less than 3.0	Negligible
1.0 to 2.9	3.0 to 4.9	Minor (Low)
3.0 to 4.9	5.0 to 9.9	Moderate (Medium)
5.0+	10.0+	Major (High)

13.2.54 The impact significance will depend upon both the impact magnitude and the sensitivity of the receiving environment. To aid in the determination of significance, DMRB sets out operational noise LOAELs and SOAELs as shown in Table 13.8.

Table 13.8: DMRB Operational Noise LOAELS and SOALS

Time Period	**LOAEL**	**SOAEL**
Day (0600–2400)	55 dB $L_{A10\ (18\ hour)}$ façade	68 dB $L_{A10\ (18\ hour)}$ façade
Night (0000–0600)	40 dB $L_{night,\ outside}$ (free field)	55 dB $L_{night,}$ outside (free field)

13.2.55 The initial assessment of likely significant effect on noise sensitive buildings shall be determined using Table 13.9.

Table 13.9: Initial Assessment of Road Traffic Noise Significance

Short Term Magnitude of Change	**Significance**
Major	Significant
Moderate	Significant
Minor	Not Significant
Negligible	Not Significant

13.2.56 Where the magnitude of change in the short term is negligible at noise sensitive buildings, it shall be concluded that the noise change will not cause changes to

behaviour or response to noise and as such, will not give rise to a likely significant effect.

13.2.57 For noise sensitive receptors where the magnitude of change in the short term is minor, moderate or major at noise sensitive buildings, the guidance set out in Table 3.60 of DMRB (as replicated in Table 13.10) shall be used, together with the output of Table 13.9 to determine final significance.

Table 13.10: Determining Final Operational Significance on Noise Sensitive Buildings

Local Circumstance	Influence on Significance Judgement
Noise level change (is the magnitude of change close to the minor/moderate boundary?)	• Noise level changes within 1 dB of the top of the 'minor' range can indicate that it is more appropriate to determine a likely significant effect • Noise level changes within 1 dB of the bottom of a 'moderate' range can indicate that it is more appropriate to consider a change is not a likely significant effect
Differing magnitude of impact in the long term and/or future year to magnitude of impact in the short term	• Where a greater impact in the long term and/or future year is predicted, it can be more appropriate to consider that a smaller change is a likely significant effect • A lower impact in the long-term and/or future year over the short-term can indicate that it is more appropriate to consider that a larger change is not significant • A similar change in the long term and non-project noise change can indicate that the change is not due to the project and not an indication of a likely significant effect
Absolute noise level with reference to LOAEL and SOAEL (by design this includes sensitivity of receptor)	• A noise change where all do-something absolute noise levels are below SOAEL requires no modification of the initial assessment • Where any do-something absolute noise levels are above the SOAEL, a noise change in the short term of 1.0dB or over results in a likely significant effect
Location of noise sensitive parts of a receptor	• If the sensitive parts of a receptor are protected from the noise source, it can be appropriate to conclude a moderate or major magnitude change in the short term and/or long term is not a likely significant effect. An example of this would be where no windows of sensitive rooms face the road, and outdoor spaces are protected from the road by buildings • Conversely, if the sensitive parts of the receptor are exposed to the noise source, it can be more appropriate to conclude a minor change in the short term and/or long term is a likely significant effect. An example of this would be when a house has many windows of sensitive rooms and outdoor spaces facing the road

Local Circumstance	Influence on Significance Judgement
	• It will only be necessary to look in detail at individual receptors in terms of this circumstance where the decision on whether the noise change gives rise to a significant environmental effect is marginal
Acoustic context	• If a project changes the acoustic character of an area, it can be appropriate to conclude a minor magnitude of change in the short term and/or long term is a likely significant effect
Likely perception of change by residents	• If the project results in obvious changes to the landscape or setting of a receptor, it is likely that noise level changes will be more acutely perceived by the noise sensitive receptors. In these cases, it can be appropriate to conclude that a minor change in the short term and/or long term is a likely significant effect • Conversely, if the project results in no obvious changes for the landscape, particularly if the road is not visible from the receptor, it can be appropriate to conclude that a moderate change in the short term and/or long term is not a likely significant effect

13.2.58 Where significant adverse effects occur, DMRB outlines example measures to mitigate and manage operational noise, including, but not limited to:

- Vertical or horizontal alignment of the road
- Earth bunds to act as a noise barrier
- Noise barriers
- Low noise road surfacing
- Speed limits
- Restrictions on noisy vehicle types

Impact of Commercial / Industrial Use

13.2.59 It is anticipated that there will be operations and mechanical and electrical plant items associated with the proposed mixed-use elements of the Proposed Development (e.g. commercial / industrial units).

13.2.60 Operations could include HGV deliveries and fixed plant could include equipment required for heating, cooling and ventilation. These have the potential to generate external noise and the impact from these will depend upon factors such as the timing and frequency of deliveries and the location of the activity / plant, in relation to noise sensitive receptors.

13.2.61 At this stage, details of the proposed type, number and location of any such operations or plant are not available. Therefore, it is considered appropriate at this stage to specify suitable design noise targets based on relevant guidance.

13.2.62 The BS4142 assessment method enables rating noise level criteria applicable to noise generating activities to be specified relative to typical background $L_{A90,T}$ sound levels experienced at specific receptors under consideration. On this basis, within BS4142 it is stated:

'Where a rating level does not exceed the background sound level, this is an indication of the specific source having a low impact, depending on the context.'

13.2.63 In order to avoid adverse impacts from noise generated by any future proposed industrial and commercial sound sources (i.e. fixed plant and deliveries), Rating Levels ($L_{Ar,Tr}$) should be no greater than the representative background sound level ($L_{A90,T}$) at the nearest existing and future proposed noise sensitive receptors, depending on the context.

13.2.64 Table 13.11 presents the impact magnitude criteria for industrial and commercial sound sources.

Table 13.11: Impact Magnitude for Industrial / Commercial Noise

Difference between Rating Level, $L_{Ar,Tr}$ and Background Noise Level, $L_{A90,T}$ (dB)	**Impact Magnitude**	**Notes**
≤ 0	Negligible	Indicates a low impact in accordance with the BS4142 methodology
1 - 4	Low	Indicates a low likelihood of adverse impact in accordance with the BS4142 methodology
5 - 9	Medium	Indicates an adverse impact in accordance with the BS4142 methodology
10 +	High	Indicates a significant adverse impact in accordance with the BS4142 methodology

13.2.65 Providing that any fixed plant / commercial sources and activities associated with the Proposed Development can be designed, selected, located and/or configured such that Rating Levels do not exceed prevailing background noise levels, it follows that negligible impacts would be expected.

Impact of School Sports Facilities

13.2.66 Using the 'Comparative Assessment Method' outlined in Sport England's 'Artificial Grass Pitch (AGP) – Planning Implications: New Guidance for 2015, impact magnitude has been determined by comparison of external sports activity noise against the existing ambient noise climate.

13.2.67 The guidance advises that the introduction of a new sports area should not result in an increase of the existing noise climate by more than 3 dB, which is the 'minimum perceptible under normal conditions'.

13.2.68 Table 13.12 presents the adopted impact magnitude criteria for proposed sports courts based on the above guidance.

Table 13.12: Impact Magnitude Criteria for Sports Courts

Increase in Ambient Noise Level, $L_{Aeq,T}$ (dB) due to Sports Courts	**Impact Magnitude**	**Notes**
≤ 0	Negligible	Ambient noise climate unaffected by Sports Courts
1 - 2	Low	Ambient noise climate increased slightly due to Sports Courts
3 - 4	Medium	The introduction of a new pitch should not result in an increase above this threshold (as per Sport England guidance)
5 +	High	Indicates a notable increase in ambient noise levels due to Sports Courts

Impact of Environmental Noise Sources on Proposed Residential Development

13.2.69 As detailed earlier in this Chapter, for 'good' internal noise conditions, it is desirable that the internal noise levels within dwellings do not exceed the BS8233 / ProPG thresholds of:

- 35 dB $L_{Aeq\ (07:00–23:00)}$ in living areas during the day
- 30 dB $L_{Aeq\ (23:00-07:00)}$ in bedrooms at night

13.2.70 BS8233 also states that the above values may be relaxed by 5 dB in certain circumstances resulting in 'reasonable' internal noise conditions.

13.2.71 Based on the above, Table 13.13 presents the adopted impact magnitude criteria for the proposed residential development in terms of internal noise levels.

Table 13.13: Impact Magnitude Criteria for Proposed Residential Development (Indoor Noise Levels)

Daytime Internal Ambient Noise Level, $L_{Aeq,T}$ (dB)	**Night-time Internal Ambient Noise Level, $L_{Aeq,T}$ (dB)**	**Magnitude of Impact**
≤ 35	≤ 30	Negligible
36 - 40	31 - 35	Low
41 - 45	36 - 40	Medium
> 45	> 40	High

13.2.72 As detailed earlier in this Chapter, it is desirable that ambient noise levels do not exceed the BS8233 / ProPG threshold of 50 dB $L_{Aeq\ (07:00–23:00)}$ in external amenity areas (such as gardens) during the day. The threshold of 55 dB $L_{Aeq\ (07:00–23:00)}$ should be viewed as upper guideline value. On this basis, Table 13.14 presents the adopted impact magnitude criteria for the proposed residential development in terms of external amenity.

Table 13.14: Impact Magnitude Criteria for Proposed Residential Development (External Amenity)

Daytime External Ambient Noise Level, $L_{Aeq,T}$ (dB)	**Magnitude of Impact**
≤ 50	Negligible
51 – 54	Low
55 – 60	Medium
> 60	High

Impact of Environmental Noise Sources on Proposed School

13.2.73 As detailed earlier in this Chapter, the most onerous Indoor Ambient Noise Level (IANL) requirement given within BB93 is 35 dB $L_{Aeq,30min}$ which applies to most teaching spaces. However, where a teaching space is 'intended specifically for students with special hearing and communication needs', a lower IANL requirement of 30 dB $L_{Aeq,30min}$ is required.

13.2.74 BB93 also states that the above values may be relaxed by 5 dB if naturally ventilated.

13.2.75 Based on the above, Table 13.15 presents the adopted impact magnitude criteria for external noise ingress to the proposed school.

Table 13.15: Impact Magnitude Criteria for Noise at Proposed School (Indoor Levels)

Internal Ambient Noise Level (IANL), $L_{Aeq,T}$ (dB)*		Magnitude of Impact
Mechanical Ventilation	**Passive Ventilation**	
≤ 30	≤ 35	Negligible
31 – 35	36 – 40	Low
36 – 40	41 – 45	Medium
> 40	> 45	High
**Applies to most teaching spaces with the exceptions of areas intended specifically with special hearing and communication needs. For such areas, the IANL criteria should be reduced by 5 dB*		

Significance Criteria

Sensitivity of Receptors

13.2.76 The sensitivity criteria for construction phase and the operational phase of the proposed development are considered to be the same and are presented in Table 13.16.

Table 13.16: Receptor Sensitivity

Sensitivity of Receptor	Description	Examples
High	Receptors where people or operations are particularly susceptible to noise and/or vibration	Residential, schools, hotels and hospitals
Medium / Low	Receptors of moderate to low sensitivity to noise and/or vibration, where it may cause some distraction or disturbance	Offices and restaurants
Negligible	Receptors where distraction or disturbance from noise and/or vibration is minimal	Buildings not occupied, factories and working environments with existing levels of noise

Significance

13.2.77 Drawing upon the defined impact magnitude and receptor sensitivity, the significance criteria has been determined with reference to the significance matrix presented in Table 13.17.

Table 13.17: Impact Significance Matrix

Impact Magnitude	**Receptor Sensitivity**			
	Negligible	**Low**	**Medium**	**High**
Negligible	No effect	No effect	No effect	No effect
Low	No effect	No effect	No effect	Minor
Medium	No effect	No effect	Minor	Moderate
High	No effect	Minor	Moderate	Major

13.2.78 Effects that are identified to be 'Major' and 'Moderate' are considered to be **significant**. 'No effects' and 'Minor' effects are considered to be **not significant**.

Consultation

13.2.79 Consultation has been undertaken with the Environmental Health Department at Barnsley Metropolitan Borough Council via telephone conversations in July 2019 and November 2020. It has been agreed that the following would be assessed:

- Potential noise impact during the construction phase of the Proposed Development on existing noise sensitive receptors using BS5228
- Potential noise impact of changes to traffic flows on the existing road noise network, generated by the Proposed Development using DMRB / CRTN
- Potential impact of the operation of the introduced non-residential (mixed-use) element of the development on existing and proposed noise sensitive receptors using BS4142
- Assessment of site suitability for residential use using the guidance set out in BS8233 and ProPG
- Assessment of noise affecting the proposed school and impact of associated sports facilities upon neighbouring receptors

Assumptions and Limitations

13.2.80 BS5228-1 provides guidance on the measurement and prediction of construction noise. The calculation procedures allow noise levels to be determined for various construction activities. However, the value of any such predictions is necessarily limited by the number of assumptions that have to be made regarding the number and type of construction plant to be utilised, their location and detailed operating arrangements. Some of this information will be clarified as the project design progresses and later when resources are mobilised, but other information (such as exactly where the construction plant operates and for how long) will remain uncertain, even after the works have commenced.

13.2.81 At this stage, detailed information on the techniques and equipment to be deployed during the construction phase is not available and consequently it has not been possible to accurately calculate the noise associated with works / activities during construction. The approach to the noise assessment has therefore been to consider the potential effects based on a number of

assumptions of likely on-site operations based on experience gained from other similar sites.

13.2.82 At this stage, detailed information on the noise sources associated with the fixed plant and operational activities of the commercial / industrial uses within the Proposed Development is not available. The approach has therefore been to set appropriate noise limits drawing on the results of the baseline noise survey. At this stage, detailed information on the noise sources associated with the fixed plant and operational activities of the Development is not available. The approach has therefore been to set appropriate noise limits drawing on the results of the baseline noise survey. This is a conservative assessment and enables the likely significant effects to be identified at this stage. As the detailed design of the Proposed Development progresses and source noise level data becomes available, the operational phase noise assessment would be updated to refine mitigation measures and ensure the potential noise impacts at existing and proposed noise sensitive receptors are minimised where possible.

13.2.83 Traffic data provided by the Applicant have been used as the basis for the assessment of changes in noise levels associated with traffic from the Proposed Development. The accuracy of the assessment is therefore limited by the assumptions applied during the generation of the traffic figures.

13.3 Baseline Conditions

Noise Sensitive Receptors

13.3.1 The nearest existing Noise Sensitive Receptors (NSRs; approximate locations as illustrated in Appendix 13.1 Figure 2) to the Proposed Development have been identified as:

- Dwellings to the north of the site on Barugh Green Road (NSR1)
- Dwellings to the north-west of the site on Barugh Green Road (NSR2)
- Dwellings to the west of the site on St. Johns Avenue (NSR3)
- Dwellings to the west of the site on Welland Court, St. Johns Avenue (NSR4)
- Dwellings to the south-west of the site on Hermit Lane (NSR5)
- Dwellings to the south-east of the site on Harden Close / Drury Farm Court (NSR6)
- Dwellings to the east of the site on Wharfedale Road (NSR7)
- Dwellings to the north-east of the site on St. Thomas's Road (NSR8)

13.3.2 Based on professional judgement, it is considered that sufficient separation distances exist between the Proposed Development footprint and the existing noise sensitive receptors such that the potential effect of vibration (during the construction and operational phases of the Development) can be scoped out of the assessment.

Baseline Noise Monitoring

13.3.3 In order to quantify the level of external noise affecting the site and local vicinity, a baseline noise monitoring survey was performed in October 2019.The adopted noise monitoring positions (as illustrated in Appendix 13.1 Figure 3) were as follows:

- 1 – Northern boundary of the site, at a position representative of the nearest proposed dwellings to the Barugh Green Road (at a distance of approximately 18 metres from nearside kerb)
- 2 – South-eastern boundary of the site, at a position representative of the southern-most proposed dwellings (i.e. closest to the M1 motorway); this position is also representative of the nearest existing noise sensitive receptors (NSRs) to the proposed commercial use at the south-east area of the development
- 3 – North-western boundary of the site, at a position representative of the proposed school (i.e. similar distance from Barugh Green Road); this position is also representative of the nearest existing NSRs to the north-west area (including proposed school and commercial use) of the development
- 4 – Western boundary of the site, representative of the nearest existing NSRs to the western area of the development (construction phase)
- 5 – South-western boundary, representative of the nearest existing NSRs to the proposed commercial use at the south-west area of the development
- 6 – Central part of the site, representative of proposed dwellings adjacent to Hermit Lane
- 7 – North-eastern boundary of the site, representative of the nearest existing NSRs to the eastern area of the development (construction phase)

Baseline Noise Survey Results

13.3.4 Table 13.18 presents a summary of the noise data for each measurement session, at each measurement position, rounded to the nearest decibel.

Table 13.18: Summary of Baseline Noise Measurement Data

Position	Date	Time (hh:mm)	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{A10} (dB)	$L_{A90,15min}$ Range (dB)
1	07/10/2019	10:02 – 11:02	60	79	63	52 – 53
		11:02 – 12:02	59	74	62	51
		12:02 – 13:02	59	73	62	51 – 53
		23:01 – 23:16	55	79	58	47
	08/10/2019	00:04 – 00:19	50	64	53	45
		23:00 – 23:15	56	74	59	50

Position	Date	Time (hh:mm)	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{A10} (dB)	$L_{A90,15min}$ Range (dB)
	09/10/2019	00:00 – 00:16	51	64	54	45
2	07/10/2019	13:16 – 14:16	50	70	52	48 – 49
		14:16 – 15:16	51	69	52	48 – 49
		15:16 – 16:16	52	62	54	47 – 51
		23:42 – 23:57	48	55	49	46
	08/10/2019	23:20 – 23:35	49	67	51	46
	09/10/2019	00:22 – 00:37	48	64	50	45
3	08/10/2019	01:20 – 01:35	46	59	48	43
		01:35 – 01:50	45	53	48	42
		11:17 – 11:32	53	65	54	50
		11:32 – 11:47	53	73	56	49
	09/10/2019	01:39 – 01:54	48	58	50	45
		01:54 – 02:09	48	61	50	43
		11:23 – 11:38	49	61	52	45
		11:38 – 11:53	47	55	49	46
4	08/10/2019	12:01 – 12:16	53	62	54	51
		12:16 – 12:31	53	62	55	51
	09/10/2019	11:56 – 12:11	51	57	52	49
		12:11 – 12:26	50	61	52	48
5	08/10/2019	00:43 – 00:58	52	63	54	49
		00:58 – 01:13	52	69	54	48
		12:38 – 12:53	59	66	61	57
		12:53 – 13:08	59	67	61	57
	09/10/2019	01:01 – 01:16	51	59	53	47
		01:16 – 01:31	52	62	55	49
		12:31 – 12:46	57	70	59	52

Position	Date	Time (hh:mm)	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{A10} (dB)	$L_{A90,15min}$ Range (dB)
		12:46 – 13:01	56	70	59	51
6	07/10/2019	23:22 – 23:37	51	73	50	43
	08/10/2019	00:25 – 00:40	47	68	47	43
		13:12 – 13:27	57	75	59	47
		13:27 – 13:42	60	82	63	47
		23:40 – 23:55	48	69	48	42
	09/10/2019	00:42 – 00:57	49	71	51	44
		13:08 – 13:23	57	77	57	43
		13:23 – 13:38	59	82	61	43
7	08/10/2019	13:55 – 14:10	54	66	57	50
		14:10 – 14:25	51	67	53	49
	09/10/2019	13:44 – 13:59	52	65	54	50
		13:59 – 14:14	52	66	54	50

Analysis

Northern Boundary

13.3.5 At Position 1, the dominant noise source was observed to be due to road traffic on Barugh Green Road (A635). No contributions from the existing nearby commercial premises (to the north) were observed at any time during the noise survey.

13.3.6 For the prediction of daytime road traffic noise, 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 - 17:00 hrs. Using $L_{A10,\ 3hr}$ as the arithmetic mean of the three consecutive values of hourly L_{A10}, the $L_{A10,\ 18hr}$ can be calculated from the equation:

(i) $L_{A10,\ 18hr} = L_{A10,\ 3hr} - 1$ dB

(ii) $L_{Aeq,\ 16hr} \approx L_{A10,\ 18hr} - 2$ dB

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

(iii) $L_{Aeq,\ 16hr} \approx L_{A10,\ 3hr} - 3$ dB

13.3.8 Based on the above formula, the 16-hr daytime ambient noise level is calculated to be 59 dB $L_{Aeq,16hr}$.

13.3.9 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 LA10 (18 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 levels, using the following formulae:

(iv) $L_{Aeq,\ 8hr} \approx 0.9 \times L_{A10,\ 18hr} - 3.77$ (for non-motorway roads)

(v) $L_{Aeq,\ 8hr} \approx 0.87 \times L_{A10,\ 18hr} + 4.24$ (for motorways)

13.3.10 Based on the above formula (iv) for non-motorway roads, the 8-hr night-time ambient noise level is calculated to be 51 dB $L_{Aeq,8hr}$.

13.3.11 Maximum noise levels were due to passing vehicle movements and were ≤ 79 dB L_{AFmax} at night.

South-Eastern Boundary

13.3.12 At Position 2, the dominant noise source was observed to be due to distant road traffic on the M1 Motorway.

13.3.13 Using the CRTN formula (iii) presented in the foregoing subsection, the 16-hr daytime ambient noise level is calculated to be 50 dB $L_{Aeq,16hr}$.

13.3.14 Based on the TRL formula (v) for motorways, the 8-hr night-time ambient noise level is calculated to be 49 dB $L_{Aeq,8hr}$.

13.3.15 Maximum noise levels were ≤ 67 dB L_{AFmax} at night.

13.3.16 Background noise levels ranged from 47 – 51 dB $L_{A90,15min}$ during the day and 45 – 46 dB $L_{A90,15min}$ at night. Typical background noise levels were around:

- 49 dB $L_{A90,15min}$ during the day
- 46 dB $L_{A90,15min}$ at night

North-Western Boundary

13.3.17 At Position 3, the dominant noise source was observed to be due to distant road traffic on the M1 Motorway. Daytime ambient noise levels were around 47 – 53 dB $L_{Aeq,T}$ and night-time ambient noise levels were around 45 – 48 dB $L_{Aeq,T}$. Maximum noise levels were ≤ 61 dB L_{AFmax} at night.

13.3.18 Background noise levels ranged from 45 – 50 dB $L_{A90,15min}$ during the day and 42 – 45 dB $L_{A90,15min}$ at night. Typical background noise levels were around:

- 48 dB $L_{A90,15min}$ during the day
- 43 dB $L_{A90,15min}$ at night

Western Boundary

13.3.19 At Position 4, the dominant noise source was observed to be due to distant road traffic on the M1 Motorway with daytime ambient noise levels of around 50 – 53 dB $L_{Aeq,T}$.

South-Western Boundary

13.3.20 At Position 5, the dominant noise source was observed to be due to distant road traffic on the M1 Motorway, particularly at night. During the daytime, additional contributions were also noted from Higham Road.

13.3.21 Daytime ambient noise levels were around 56 – 59 dB $L_{Aeq,T}$ and night-time ambient noise levels were around 51 – 52 dB $L_{Aeq,T}$. Maximum noise levels were ≤ 69 dB L_{AFmax} at night.

13.3.22 Background noise levels ranged from 51 – 57 dB $L_{A90,15min}$ during the day and 47 – 49 dB $L_{A90,15min}$ at night. Typical background noise levels were around:

- 57 dB $L_{A90,15min}$ during the day
- 49 dB $L_{A90,15min}$ at night

Central Area

13.3.23 At Position 6, the dominant noise source was observed to be due to distant road traffic on the M1 Motorway and occasional vehicle movements on Hermit Lane. Daytime ambient noise levels were around 57 – 60 dB $L_{Aeq,T}$ and night-time ambient noise levels were around 47 – 51 dB $L_{Aeq,T}$. Maximum noise levels were ≤ 73 dB L_{AFmax} at night.

13.3.24 Background noise levels ranged from 43 – 47 dB $L_{A90,15min}$ during the day and 42 – 44 dB $L_{A90,15min}$ at night. Typical background noise levels were around:

- 47 dB $L_{A90,15min}$ during the day
- 43 dB $L_{A90,15min}$ at night

North-Eastern Boundary

13.3.25 At Position 7, the dominant noise source was observed to be due to road traffic on the A635 (Barugh Green Road and Wilthorpe Road) with daytime ambient noise levels of around 51 – 54 dB $L_{Aeq,T}$.

Future Baseline

13.3.26 The findings of the baseline noise survey established that dominant noise source at the Site of the Proposed Development was road traffic noise. It is likely that future road traffic flows on the surrounding road network will be subject to change due to natural growth in addition to the influence of other committed developments within the locality. Such changes are likely to result in corresponding changes to road traffic noise levels.

13.3.27 With regard to the potential increase in road traffic noise levels affecting the Site of the Proposed Development (and neighbouring noise sensitive receptors in the immediate locality), it is considered prudent to compare traffic flows present at the time of the baseline noise survey (2019) with projected traffic flows anticipated in the future year of 2033 to gauge whether any significant increases to baseline noise levels are to be expected, irrespective of contributions the Proposed Development.

13.3.28 Amongst the projected traffic provided by the Applicant, 18hr Annual Average Weekday Traffic (AAWT) data for the following scenarios have been provided:

- Do Minimum – 2019 base year
- Do Minimum – 2033 (with other committed developments)

13.3.29 Table 13.19 presents projected traffic flows on the dominant local noise sources affecting the site (Barugh Green Road/A635 and M1 Motorway) for the above scenarios.

Table 13.19: Local Road Traffic Flows - 2019 Base Year v 2033 Future Year

Link	2019 Base Year Do Minimum, 18hr AAWT	2033 Future Year Do Minimum (With Other Committed Developments), 18hr AAWT	Increase (%)
A635	23,688	28,426	20
M1 southbound	86,279	102,892	19
M1 northbound	82,878	98,836	19

13.3.30 Table 13.19 shows that the increases in baseline (without development) traffic flows on the dominant noise sources affecting the site (Barugh Green Road/A635 and M1 Motorway) are expected to increase by no more than 20% between 2019 and 2033 due to the influence of natural growth and other committed developments. Since this increase is less than 25% it is considered to be negligible in terms of increase in baseline noise levels at the site.

13.4 Assessment of Likely Significant Effects

Construction Phase

13.4.1 Construction works have the potential to cause disturbance through noise. The disturbance is, however, temporary in nature and localised.

13.4.2 Noise from earthworks and construction activities can be generated from a variety of sources including excavation activities and the use of hand-held power tools together with other noisy activities.

13.4.3 The techniques available to predict the likely effect of noise from earthwork / construction works, such as those contained within BS 5228-1, are necessarily based on detailed information of the type and number of plant items being used, their location and the length of time they are in operation. Sufficient detailed information upon which to base detailed construction noise calculations such as construction techniques and equipment is not currently available. Notwithstanding this, for purposes of assessment, estimated construction noise levels have been calculated based on assumed typical traditional construction phases and techniques, as follows:

- Ground Engineering / Earthworks
- Road Construction
- Building Foundations

- Building Erection

13.4.4 An estimate of the likely noise from the construction activities during each phase presented above has been made at the nearest existing NSRs.

13.4.5 The predictions have been undertaken based on the methodology contained within BS 5228-1 and are in terms of the equivalent continuous sound level ($L_{Aeq,T}$) over the core working day.

13.4.6 Assumed standard working hours are 07:00 - 18:00 hours (Monday to Friday) and 08:00 - 13:00 hrs (Saturdays), unless otherwise agreed. It is assumed that working on Sundays and bank holidays will not occur, unless in exceptional circumstances, which would be agreed in advance with BMBC.

13.4.7 It is assumed that site compound areas will be positioned sensibly so that they do not cause a noise nuisance to adjacent land users. These compounds will be used to offload, store and handle materials as well as providing welfare facilities for the construction workforce.

13.4.8 Table 13.20 sets out anticipated construction plant along with sound power level data (sourced from BS 5228-1) and assumed utilisation (the percentage of time plant is actually operating during the working day - the 'on-time') that have been used in the noise level predictions.

Table 13.20 Plant and Equipment Assumed for Construction Phase

Phase	Plant/Equipment	Assumed No. of Items	Sound pressure level, dB(A) at 10m distance	Assumed 'On-Time' (%)
Ground Engineering / Earthworks	Tracked Excavator	6	79	50
	Articulated Dump Truck	8	79	50
	Crusher	2	90	50
	Bulldozer	4	80	50
	Roller	3	79	50
	Diesel Generator	1	66	100
Road Construction	Tracked Excavator	4	79	50
	Articulated Dump Truck	6	79	50
	Diesel Generator	1	66	50
	Asphalter	2	82	50
	Roller	2	79	50
	Road Sweeper	1	76	10

Phase	Plant/Equipment	Assumed No. of Items	Sound pressure level, dB(A) at 10m distance	Assumed 'On-Time' (%)
	Circular Saw	2	87	10
Building Foundations	Tracked Excavator	3	79	50
	Wheeled Loader	3	84	50
	Articulated Dump Truck	3	79	50
	Concrete Mixer Truck	2	79	50
	Poker Vibrator	2	78	50
	Diesel Generator	1	66	100
Building Erection	Telescopic Handler	2	71	50
	Mobile Telescopic Crane	2	70	50
	Diesel Generator	1	66	50
	Circular Saw	2	87	10
	Core Drill	2	85	5

13.4.9 In practice, the plant items identified for each stage will move around the Site, operating at different times, for different durations and at different locations on any one day for the duration of the works. As a consequence, noise levels at any receptor may vary considerably day-on-day. Hence, it is necessary to rationalise the geographic and temporal spread of activities to obtain a meaningful prediction (and subsequent assessment) and to this end, various assumptions have necessarily been made as follows:

- It is assumed for the purposes of this noise assessment that the site will be split up into six primary construction work areas, as shown in Appendix 13.1 Figure 4
- For each construction work area, it is assumed that the full complement of plant presented in Table 13.20 will operate together at a position roughly central to each construction work area
- It is assumed that piling will not be required to construct the development buildings
- No barrier attenuation has been assumed in the preliminary calculations
- Acoustically 'soft' ground cover has been assumed between the noise source and receptor
- No atmospheric absorption has been included

- Meteorological conditions have been taken to be 'neutral'

13.4.10 On the basis described above, construction noise levels have been determined at NSRs. The results are presented in Table 13.21.

Table 13.21 Calculated Construction Noise Levels

Construction Area / Phase	**Calculated Construction Noise Levels, $L_{Aeq,T}$ (dB)**							
	NSR1	**NSR2**	**NSR3**	**NSR4**	**NSR5**	**NSR6**	**NSR7**	**NSR8**
Area 1 Worked								
Ground Engineering / Earthworks	58	59	76	52	47	40	41	50
Road Construction	53	55	72	48	43	36	37	46
Building Foundations	54	56	72	49	43	36	37	47
Building Erection	47	49	65	42	36	30	30	40
Area 2 Worked								
Ground Engineering / Earthworks	58	55	55	51	47	42	43	59
Road Construction	54	51	51	47	43	38	39	55
Building Foundations	54	51	51	47	43	38	39	56
Building Erection	47	44	44	40	36	31	32	49
Area 3 Worked								
Ground Engineering / Earthworks	50	49	52	58	53	44	45	53
Road Construction	46	45	48	54	49	40	41	49
Building Foundations	46	45	48	54	49	40	41	49
Building	39	38	41	47	42	34	34	42

Construction Area / Phase	Calculated Construction Noise Levels, $L_{Aeq,T}$ (dB)							
	NSR1	**NSR2**	**NSR3**	**NSR4**	**NSR5**	**NSR6**	**NSR7**	**NSR8**
Erection								
Area 4 Worked								
Ground Engineering / Earthworks	45	45	46	51	53	49	49	49
Road Construction	41	41	42	47	49	45	45	45
Building Foundations	41	41	42	47	49	45	45	46
Building Erection	35	34	36	41	42	38	39	39
Area 5 Worked								
Ground Engineering / Earthworks	42	41	42	45	47	54	61	46
Road Construction	38	37	38	41	43	50	57	42
Building Foundations	38	37	38	41	43	50	57	42
Building Erection	31	30	31	34	36	43	50	35
Area 6 Worked								
Ground Engineering / Earthworks	42	41	43	48	54	54	49	44
Road Construction	38	37	39	44	50	50	45	40
Building Foundations	38	37	39	45	50	50	45	40
Building Erection	31	31	32	38	43	43	38	34

13.4.11 With reference to the impact magnitude thresholds outlined in Table 13.6, the impact magnitude is considered to be:

- High at NSR3 when Area 1 is worked during the ground engineering / earthworks, road construction and building foundations phases
- Low at NSR3 during the building erection phase
- Negligible at all other receptors

13.4.12 Since the sensitivity of the nearest existing residential dwellings is considered to be high, there is likely to be a temporary, major effect at NSR3 when Area 1 is worked. This is considered significant.

13.4.13 The sensitivity of the nearby existing residential dwellings is considered to be high, therefore the temporary effect is likely to be:

- Major at NSR3 when Area 1 is worked during the ground engineering / earthworks, road construction and building foundations phases
- Minor at NSR3 during the building erection phase
- No effect is expected at the other NSRs

13.4.14 The major effect (at NSR3 when Area 1 is worked during the ground engineering / earthworks, road construction and building foundations phases) is considered to be significant, all other effects considered to be not significant.

Operational Phase

Road Traffic Impact

13.4.15 The Proposed Development will generate additional vehicle movements on the surrounding road network. It is therefore possible that local road traffic noise levels may change as a result of additional traffic generated by the Proposed Development.

13.4.16 Amongst the projected traffic provided by the Applicant, 18hr Annual Average Weekday Traffic (AAWT) data for the following scenarios have been provided:

- 2026 year of opening (Phase 1)
- 2033 year of full completion (adopted as 'future assessment' year)

13.4.17 For the above assessment years, data has been provided with regard to the following scenarios:

- With Development - with and without other committed developments
- Without Development - with and without other committed developments

13.4.18 Appendix 13.2 presents projected AAWT traffic flows on local road links for 'without development' and 'with development' scenarios, with other committed developments considered.

13.4.19 With reference to the above, the following terms are used:

- DMOY = Do Minimum Opening Year (i.e. 2026 Without Development but with other committed developments)

- DMFY = Do Minimum Future Year (i.e. 2033 Without Development but with other committed developments)
- DSOY = Do Something Opening Year (i.e. 2026 With Development and with other committed developments)
- DSFY = Do Something Future Year (i.e. 2033 With Development and with other committed developments)

DMOY to DMFY Long Term Assessment

13.4.20 The DMRB requires a comparison of DMOY against DMFY, in order to demonstrate how noise levels will vary in the long-term, irrespective of the Proposed Development.

13.4.21 The long-term changes in road traffic noise levels without the Proposed Development have been predicted for all NSRs in the study area using the traffic flows and HGV percentages provided. The results of the calculations are summarised in Table 13.22. For reference, Appendix 13.1 Figure 5 presents an illustrative noise difference map.

Table 13.22 DMOY to DMFY Long-Term Changes without the Proposed Development

Change in Noise Level dB(A)		**No. of Dwellings**	**No. of Other Noise Sensitive Receptors**
Increase in noise level dB $L_{A10, 18h}$ / L_{night}	< 3.0	1425	3
	3.0–4.9	0	0
	5.0–9.9	0	0
	> 10.0	0	0
No Change	0	0	0
Decrease in noise level dB $L_{A10, 18h}$ / L_{night}	< 3.0	0	0
	3.0–4.9	0	0
	5.0–9.9	0	0
	> 10.0	0	0

13.4.22 It can be seen that, without the Proposed Development, the long-term magnitude of change is negligible at all NSRs in the vicinity.

DMOY to DSOY Short Term Assessment

13.4.23 The short-term changes in road traffic noise levels with the Proposed Development have been predicted for all NSRs in the study area using the traffic flows and HGV percentages provided. The results of the calculations are

summarised in Table 13.23. For reference, Appendix 13.1 Figure 6 presents an illustrative noise difference map.

Table 13.23 DMOY to DSOY Short-Term Changes with the Proposed Development

Change in Noise Level dB(A)		**No. of Dwellings**	**No. of Other Noise Sensitive Receptors**
Increase in noise level dB $L_{A10, 18h}$ / L_{night}	< 1.0	1220	3
	1.0–2.9	195	0
	3.0–4.9	0	0
	> 5.0	0	0
No Change	0	7	0
Decrease in noise level dB $L_{A10, 18h}$ / L_{night}	< 1.0	0	0
	1.0–2.9	0	0
	3.0–4.9	0	0
	> 5.0	0	0

13.4.24 The modelling exercise indicates that 195 no. dwellings (along Higham Common Road) are set to experience a minor change in noise levels in the short-term. In accordance with the DMRB, the initial assessment of this is that the effect not is significant.

13.4.25 With reference to the guidance set out in Table 3.60 of DMRB, consideration of various local circumstances has been undertaken, as summarised in Table 13.24.

Table 13.24 Determination of Significance (DMOY to DSOY)

Local Circumstance	**Comment**	**More Likely to Indicate a Significant Effect?**
Noise level change (is the magnitude of change close to the minor/moderate boundary?)	Noise level changes at dwellings on Higham Common Road are <1.6 dB and so are comfortably below the minor/moderate boundary	No
Differing magnitude of impact in the long term and/or future year to magnitude of impact in the short term	Dwellings on Higham Common Road will experience lower impact magnitudes in the long term (i.e. negligible) than	No

Local Circumstance	Comment	More Likely to Indicate a Significant Effect?
	in the short term	
Absolute noise level with reference to LOAEL and SOAEL (by design this includes sensitivity of receptor)	Noise levels are above the SOAEL and increase by more than 1 dB at dwellings on Higham Common Road	Yes
Location of noise sensitive parts of a receptor	Receptors appear to have windows to habitable rooms (e.g. living rooms or bedrooms) facing the primary source of increased noise	Yes
Acoustic context	Project is not expected to change the acoustic character of an area as it is already characterised by road traffic noise	No
Likely perception of change by residents	Dwellings on Higham Common Road are unlikely to perceive any visible changes to the road network and the magnitude of change in terms of noise level is unlikely to be perceptible	No

13.4.26 Table 13.24 shows that, on balance, there are fewer local circumstances that would suggest a significant effect than a 'not significant' effect. On this basis, there is no reason to reconsider the initial assessment; therefore, the overall impact on the nearest NSRs in the short-term is not significant.

13.4.27 A further 1223 no. receptors are set to experience a negligible increase in noise levels, the assessment of this is that the effect is not significant.

13.4.28 Remaining properties are set to experience no increase in noise levels. In accordance with the DMRB this is an indication that the effects are not significant.

DMOY to DSFY Long Term Assessment

13.4.29 The long-term changes in road traffic noise with the Proposed Development have been predicted for all NSRs in the study area. The results of the calculations are summarised in Table 13.25. For reference, Appendix 13.1 Figure 7 presents an illustrative noise difference map.

Table 13.25 DMOY to DSFY Long-Term Changes with the Proposed Development

Change in Noise Level dB(A)		**No. of Dwellings**	**No. of Other Noise Sensitive Receptors**
Increase in noise level dB $L_{A10, 18h}$ / L_{night}	< 3.0	1314	3
	3.0–4.9	42	0
	5.0–9.9	1	0
	> 10.0	0	0
No Change	0	16	0
Decrease in noise level dB $L_{A10, 18h}$ / L_{night}	< 3.0	49	0
	3.0–4.9	0	0
	5.0–9.9	0	0
	> 10.0	0	0

13.4.30 The modelling exercise indicates that 1 no. dwelling (No. 29 Hermit Lane) is set to a 6 dB increase in noise levels which indicates that a moderate impact which is deemed to be a significant effect.

13.4.31 At remaining properties, the long-term magnitude of change is negligible or minor. In accordance with the DMRB this is an indication that the effects are not significant.

Impact of Commercial / Industrial Use

13.4.32 At the time of writing, the exact details (opening times, servicing arrangements, refrigeration and ventilation plant etc.) of the proposed mixed-use aspect of the Development is yet to be determined. This information will be made available for review at a later stage.

13.4.33 Proposed industrial / commercial units and any associated external plant should be designed so that rating levels (as determined using the guidance of BS4142) do not exceed the existing background noise level at the nearest receptors in order to avoid an adverse impact.

13.4.34 Table 13.26 provides the highest permissible free-field rating noise levels from proposals when measured at the nearest NSRs. These are based on the measured background noise levels presented in the Baseline Conditions section of this Chapter.

Table 13.26 Limiting Rating Noise Levels from Proposed Commercial / Industrial Units and Plant

Receptor	**Limiting Plant Rating Noise Level at NSR $L_{Ar,Tr}$ (dB)**	
	Day (07:00 – 23:00 hrs)	**Night** (23:00 – 07:00 hrs)
Dwellings (existing or proposed) near to south-eastern boundary of site	49	46
Dwellings (existing or proposed) near to north-western boundary of site	48	43
Dwellings (existing or proposed) near to south-western boundary of site	57	49
Dwellings (existing or proposed) near to the centre of site	47	43

13.4.35 It should be noted that the limits presented in Table 13.26 are Rating Levels i.e. plant noise levels when appropriate acoustic feature corrections have been applied, in accordance with the penalties described earlier in this Chapter. It should also be noted that the plant noise limits shown in Table 13.24 are the highest allowable noise levels from all proposed fixed plant. Care should be taken to see that these limits are met with all plant in operation simultaneously and with appropriate acoustic feature correction penalties applied.

13.4.36 With reference to the impact magnitude thresholds outlined in Table 13.11, the impact magnitude is considered to be negligible where proposed external plant is designed such that Rating Levels (as determined using the guidance of BS4142) do not exceed the existing background noise level at the nearest receptors. In such circumstances (since the sensitivity of the nearest residential dwellings is considered to be high) there is likely to be no effect. This is not considered significant.

13.4.37 In addition to the setting of plant rating levels, a separate noise impact assessment has been performed with regard to potential noise break-out from industrial units and activity in the associated service yards areas, this is detailed in full Section 7 of ENS report ref: NIA-8576-21-8758-v2 Barnsley West which is provided in Appendix 3. In summary, the findings of the assessment were that low impacts are expected at the nearest noise sensitive receptors (proposed or existing). This is not considered to be a significant effect.

Impact of School Sports Facilities

13.4.38 The 'typical' noise level of 58 dB $L_{Aeq,1hour}$ at 10 metres from the side-line halfway marking of a sports court has been used based on the guidance offered by Sport England's 'Artificial Grass Pitch (AGP) Acoustics – Planning Implications' detailed earlier in this Chapter.

13.4.39 The nearest existing noise sensitive receptor (NSR) is considered to be proposed dwellings circa 15 metres to the east of the proposed sports field. Using a basic noise propagation calculation incorporating distance attenuation, the noise level due to activity on the school sport field has been calculated at 55 dB $L_{Aeq,1hour}$ at

the nearest proposed dwelling. With reference to the baseline noise data presented earlier in this Chapter, the calculated sports field noise level is around 4 dB higher than the existing average daytime ambient noise levels (i.e. 51 dB $L_{Aeq,T}$) measured at Position 3. In terms of cumulative noise levels, ambient noise levels at the nearest proposed dwellings would increase by 6 dB during the use of the sports field.

13.4.40 With reference to the impact magnitude thresholds outlined in Table 13.12, the impact magnitude is considered to be high. Since the sensitivity of the proposed residential dwellings is considered to be high, there is likely to be a major effect. This is considered significant.

Impact of Extant Environmental Noise on Proposed Residential Development

13.4.41 Assessment of the measured/calculated ambient noise level data (presented in the Baseline Conditions section of this chapter, using the ProPG initial site noise risk assessment diagram (shown in Appendix 13.1 Figure 1), has determined that the site would be categorised as shown in Table 13.27 in terms of adverse effects from noise.

Table 13.27 Risk of Adverse Effects from Extant Environmental Noise

Location	Period	External Noise Level (dB L_{Aeq})	Risk
Northern Boundary	Day (07:00–23:00)	59	Low
	Night (23:00–07:00)	51	Low
South-Eastern Boundary	Day (07:00–23:00)	52	Low
	Night (23:00–07:00)	49	Low
North-Western Boundary	Day (07:00–23:00)	53	Low
	Night (23:00–07:00)	48	Low
Central Area	Day (07:00–23:00)	60	Low
	Night (23:00–07:00)	51	Low

13.4.42 It can be seen that proposed dwellings will experience a low risk of adverse effects from road traffic noise. At low-risk sites, ProPG advises that the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed.

Internal Noise Levels

13.4.43 With regard to internal noise levels when windows are open, the World Health Organisation (WHO) Guidelines for Community Noise (1999) states:

'the noise reduction from outside to inside with the window partly open is 15 decibels'

13.4.44 Based on the above, internal noise levels in dwellings with windows open have been calculated, as set out in Table 13.28.

Table 13.28 Internal Noise Levels in Residential Units – Windows Open

Location	Period	External Noise Level	Resultant Internal Noise Level	Criteria	Criteria Satisfied?
Northern Boundary	Day (07:00–23:00)	59 dB L_{Aeq}	44 dB L_{Aeq}	35 dB L_{Aeq}	No
	Night (23:00–07:00)	51 dB L_{Aeq}	36 dB L_{Aeq}	30 dB L_{Aeq}	No
		79 dB L_{AFmax}	64 dB L_{AFmax}	45 dB L_{AFmax}	No
South-Eastern Boundary	Day (07:00–23:00)	52 dB L_{Aeq}	37 dB L_{Aeq}	35 dB L_{Aeq}	No
	Night (23:00–07:00)	49 dB L_{Aeq}	34 dB L_{Aeq}	30 dB L_{Aeq}	No
		67 dB L_{AFmax}	52 dB L_{AFmax}	45 dB L_{AFmax}	No
North-Western Boundary	Day (07:00–23:00)	53 dB L_{Aeq}	38 dB L_{Aeq}	35 dB L_{Aeq}	No
	Night (23:00–07:00)	48 dB L_{Aeq}	33 dB L_{Aeq}	30 dB L_{Aeq}	No
		61 dB L_{AFmax}	46 dB L_{AFmax}	45 dB L_{AFmax}	No
Central Area	Day (07:00–23:00)	60 dB L_{Aeq}	45 dB L_{Aeq}	35 dB L_{Aeq}	No
	Night (23:00–07:00)	51 dB L_{Aeq}	36 dB L_{Aeq}	30 dB L_{Aeq}	No
		73 dB L_{AFmax}	58 dB L_{AFmax}	45 dB L_{AFmax}	No

13.4.45 It can be seen that internal noise levels would exceed the criteria with open windows.

13.4.46 With reference to the impact magnitude thresholds outlined in Table 13.13, the impact magnitude is considered to be:

- Medium at the northern boundary (for proposed habitable areas with direct exposure to the road to the north) and central area
- Low at the south-eastern and north-western boundaries

13.4.47 The sensitivity of the proposed residential dwellings is considered to be high, therefore the effect is likely to be:

- Moderate at the northern boundary (for proposed habitable areas with direct exposure to the road to the north) and central area
- Minor at the south-eastern and north-western boundaries

13.4.48 The moderate effects at the northern boundary and central area of the site are considered to be significant, the minor effects at the south-eastern and north-western boundaries of the site are considered to be not significant.

External Amenity

13.4.49 With regard to external noise levels during the day, Table 13.27 shows that unmitigated external noise levels are not expected to satisfy the lower 'desirable' guideline value of ≤ 50 dB $L_{Aeq,T}$ for external amenity areas, as recommended by BS8233 / ProPG.

13.4.50 With reference to the impact magnitude thresholds outlined in Table 13.14, the impact magnitude is considered to be:

- Medium at the northern boundary and central area
- Low at the south-eastern and north-western boundaries

13.4.51 The sensitivity of the proposed residential dwellings is considered to be high, therefore the effect is likely to be:

- Moderate at the northern boundary and central area
- Minor at the south-eastern and north-western boundaries

13.4.52 The moderate effects at the northern boundary and central area of the site are considered to be significant, the minor effects at the south-eastern and north-western boundaries of the site are considered to be not significant.

Impact of Extant Environmental Noise on Proposed School

13.4.53 Earlier in this Chapter it was established that typically, the most onerous Indoor Ambient Noise Level (IANL) requirement within BB93 is 35 dB $L_{Aeq,30min}$ (or 40 dB $L_{Aeq,30min}$ if naturally ventilated) which applies to most teaching spaces. However, where a teaching space is 'intended specifically for students with special hearing and communication needs', a lower IANL requirement of 30 dB $L_{Aeq,30min}$ (or 35 dB $L_{Aeq,30min}$ if naturally ventilated) is required.

13.4.54 It is considered that an appropriate design criterion would be 40 dB $L_{Aeq,30min}$ based on the assumption that the proposed school would have a preference of naturally ventilation. However, if the proposed school will cater for students with special hearing and communication needs, the criteria should be reduced accordingly by 5 dB.

13.4.55 Analysis of the measured/calculated ambient noise level data (presented in the Baseline Conditions section of this chapter) has determined that average daytime external noise levels affecting the location of the proposed school were around 47 – 53 dB $L_{Aeq,T}$. On this basis, indoor ambient noise levels (IANLs) in school teaching spaces with windows open have been calculated, as set out in Table 13.29.

Table 13.29 IANLs in Primary School Teaching Spaces – Windows Open (Existing Noise Sources)

Period	External Noise Level	Resultant Internal Noise Level	Criteria	Criteria Satisfied?
Typical School Day	≤ 53 dB L_{Aeq}	38 dB L_{Aeq}	≤ 40 dB L_{Aeq}	Yes

13.4.56 With reference to the impact magnitude thresholds outlined in Table 13.15, the impact magnitude is considered to be low.

13.4.57 Since the sensitivity of the proposed school is considered to be high, there is likely to be a minor effect. This is not considered significant.

Impact of Potential Future Noise (Due to Link Road) on Proposed Residential Development (General)

13.4.58 In addition to the assessment of the existing noise environment affecting the proposed development, it is considered prudent to consider the potential additional noise contribution from the new link road that will run through the site. This road will be implemented from Barugh Green Road to the northernmost internal roundabout as part of phase 1 and then will be extended to create a complete link between two roundabouts at the northern and southern boundaries of the site prior to construction of the wider residential element of the site.

13.4.59 Projected traffic data, associated with the site access road, have been provided by the Applicant. 18hr Annual Average Weekday Traffic (AAWT) data has been provided for the future year of 2033. The data is replicated in Table 13.30.

Table 13.30 Forecast Site Access / Link Road Traffic Data - 2033

Link / Road Name	18hr AAWT With Development and Other Committed Developments	% HGV
Site Access Road	13423	1

13.4.60 The above traffic flow data has been used, along with the methodology outlined in CRTN to calculate road traffic noise from the new link across the site for up to 300 metres distance. Calculations have incorporated the following assumptions:

- Vehicle speeds of ≤ 30 mph (48 km/h)
- Generally neutral gradient
- Impervious / bituminous road surface (if a pervious macadam surface is to be used then a correction of – 2.5 dB can be applied to calculated noise levels)
- Unobstructed propagation from road to receiver position (where the road is not expected to be visible due to proposed barriers or topographical shielding then additional corrections to the calculated noise levels may be appropriate)

- Hard / reflective intervening ground cover between the road and dwellings

13.4.61 Using the guidance set out in CRTN, along with the assumptions listed above, a basic noise level of 67 dB $L_{A10,18hr}$ has been determined at a distance of 10 metres from the nearest kerb.

13.4.62 Using the CRTN and TRL formulae detailed in Section 3, the 16-hr daytime and 8-hr night-time L_{Aeq} values have been calculated, as shown in Table 13.31.

Table 13.31 Calculated Road Traffic Noise Levels at Various Distances from site Access / Link Road

Distance from Road (m)	Calculated Road Traffic Noise Levels (dB)		
	$L_{A10,18hr}$	Day $L_{Aeq,16hr}$	Night $L_{Aeq,8hr}$
10	67	65	57
20	65	63	54
30	63	61	53
40	62	60	52
50	61	59	51
100	58	56	49
200	55	53	46
300	54	52	44

Internal Noise Levels

13.4.63 With regard to habitable rooms with direct exposure to the site access / link road, internal noise levels with windows open have been calculated, as set out in Table 13.32.

Table 13.32 Internal Noise Levels in Habitable Rooms Facing Site Access Road – Windows Open

Distance from Road (m)	Period	External Noise Levels (dB $L_{Aeq,T}$)	Resultant Internal Noise Level (dB $L_{Aeq,T}$)	Criteria (dB L_{Aeq})	Criteria Satisfied?
10	Day (07:00–23:00)	65	50	35	No
	Night (23:00–07:00)	57	42	30	No
20	Day (07:00–23:00)	63	48	35	No
	Night (23:00–07:00)	54	39	30	No
30	Day (07:00–23:00)	61	46	35	No

Distance from Road (m)	Period	External Noise Levels (dB $L_{Aeq,T}$)	Resultant Internal Noise Level (dB $L_{Aeq,T}$)	Criteria (dB L_{Aeq})	Criteria Satisfied?
	Night (23:00–07:00)	53	38	30	No
40	Day (07:00–23:00)	60	45	35	No
	Night (23:00–07:00)	52	37	30	No
50	Day (07:00–23:00)	59	44	35	No
	Night (23:00–07:00)	51	36	30	No
100	Day (07:00–23:00)	56	41	35	No
	Night (23:00–07:00)	49	34	30	No
200	Day (07:00–23:00)	53	38	35	No
	Night (23:00–07:00)	46	31	30	No
300	Day (07:00–23:00)	52	37	35	No
	Night (23:00–07:00)	44	29	30	Yes

13.4.64 Table 13.32 shows that the internal noise criteria cannot be satisfied, in habitable rooms of dwellings within 300m distance, and with direct exposure to, the site access / link road, when open windows are relied upon as the primary source of background ventilation.

13.4.65 With reference to the impact magnitude thresholds outlined in Table 1.13, the impact magnitude is considered to be:

- High for proposed habitable areas within 30 metres of (and with direct exposure to) the site access / link road
- Medium for proposed habitable areas 40 - 100 metres from (and with direct exposure to) the site access / link road
- Low for proposed habitable areas 200 - 300 metres from (and with direct exposure to) the site access / link road

13.4.66 The sensitivity of the proposed residential dwellings is considered to be high, therefore the effect is likely to be:

- Major for proposed habitable areas within 30 metres of (and with direct exposure to) the site access / link road
- Moderate for proposed habitable areas 40 - 100 metres from (and with direct exposure to) the site access / link road
- Minor for proposed habitable areas 200 - 300 metres from (and with direct exposure to) the site access / link road

13.4.67 The major and moderate effects for proposed dwellings within 100 metres of the proposed site access / link road are considered to be significant, the minor effects (due to the proposed site access / link road) for the rest of the site are considered to be not significant.

External Amenity

13.4.68 With regard to external noise levels during the day, Table 13.31 shows that unmitigated external noise levels are not expected to satisfy the lower 'desirable' guideline value of ≤ 50 dB $L_{Aeq,T}$ for external amenity areas, as recommended by BS8233 / ProPG.

13.4.69 With reference to the impact magnitude thresholds outlined in Table 13.14, the impact magnitude is considered to be:

- High for proposed gardens within 30 metres of (and with direct exposure to) the site access / link road
- Medium for proposed gardens 40 - 100 metres from (and with direct exposure to) the site access / link road
- Low for proposed gardens 200 - 300 metres from (and with direct exposure to) the site access / link road

13.4.70 The sensitivity of the proposed residential dwellings is considered to be high, therefore the effect is likely to be:

- Major for proposed gardens within 30 metres of (and with direct exposure to) the site access / link road
- Moderate for proposed gardens 40 - 100 metres from (and with direct exposure to) the site access / link road
- Minor for proposed gardens 200 - 300 metres from (and with direct exposure to) the site access / link road

13.4.71 The major and moderate effects for proposed gardens within 100 metres of the proposed site access / link road are considered to be significant, the minor effects (due to the proposed site access / link road) for the rest of the site are considered to be not significant.

<u>Impact of Potential Future Noise (Including Site Access / Link Road) on Phase 1 of Proposed Residential Development</u>

13.4.72 A separate noise impact assessment has been performed with regard to potential impact upon Phase 1 of the proposed residential development. This is detailed in full in ENS report ref: NIA-8576-21-9800-v1 Barnsley West provided in Appendix 13.4. The findings are summarised below.

Internal Noise Levels

13.4.73 With regard to habitable rooms with direct exposure to the site access / link road or Barugh Green Road, internal noise levels with windows open have been calculated. With reference to the impact magnitude thresholds outlined in Table 13.13, the impact magnitude is considered to be:

- High for Plots 1, 2, 5, 168 – 172, 210 and 219 – 228 (elevations with direct exposure to the site access / link road)
- Medium for Plots 3 – 4, 10 – 13, 45 - 70 (elevations with direct exposure to the site access / link road)
- Low to medium at the shielded elevations of the above plots
- Negligible for the remainder of the site

13.4.74 The sensitivity of the proposed residential dwellings is considered to be high, therefore the effect is likely to be:

- Major for Plots 1, 2, 5, 168 – 172, 210 and 219 – 228 (elevations with direct exposure to the site access / link road)
- Moderate for Plots 3 – 4, 10 – 13, 45 - 70 (elevations with direct exposure to the site access / link road)
- Minor at the shielded elevations of the above plots
- No effects are expected at the remainder of the Phase 1 area

13.4.75 The major and moderate effects determined for the plots identified above are considered to be significant. All other effects are considered to be not significant.

External Amenity

13.4.76 With regard to external noise levels during the day, external noise levels in most proposed gardens are expected to satisfy the lower 'desirable' guideline value of ≤ 50 dB $L_{Aeq,T}$ for external amenity areas, as recommended by BS8233 / ProPG. However, gardens associated with the following plots have been identified as areas where external noise levels are expected to exceed the guideline value:

- Plots 1 (59 dB $L_{Aeq,T}$)
- Plots 5 and 10 (57 dB $L_{Aeq,T}$)
- Plots 2 and 12 (55 dB $L_{Aeq,T}$)
- Plot 6 and 222 (54 dB $L_{Aeq,T}$)

13.4.77 With reference to the impact magnitude thresholds outlined in Table 13.14, the impact magnitude is considered to be:

- Medium for proposed gardens of Plots 1, 2, 5, 10 and 12
- Low for proposed gardens of Plots 6 and 222
- Negligible for all other proposed gardens in the Phase 1 area

13.4.78 The sensitivity of the proposed residential dwellings is considered to be high, therefore the effect is likely to be:

- Moderate for proposed gardens of Plots 1, 2, 5, 10 and 12

- Minor for proposed gardens of Plots 6 and 222
- No effects are expected at the remainder of the Phase 1 area

13.4.79 The moderate effects determined for the plots identified above are considered to be significant. All other effects are considered to be not significant.

Impact of Potential Future Noise (Due to Link Road) on Proposed School

13.4.80 The masterplan shows the position of the school at a distance of approximately 65 metres from the proposed site access / link road. On this basis, a road traffic noise level of 59 dB $L_{A10,18hr}$ has been calculated using the CRTN methodology. This equates to a daytime external noise level of 57 dB $L_{Aeq,16hr}$ which is assumed to be the typical ambient noise level, $L_{Aeq,30min}$, affecting the location of the proposed school. On this basis, IANLs in school teaching spaces with windows open have been calculated, as set out in Table 13.33.

Table 13.33 IANLs in Primary School Teaching Spaces – Windows Open (due to Proposed Site Access / Link Road)

Period	External Noise Level	Resultant Internal Noise Level	Criteria	Criteria Satisfied?
Typical School Day	57 dB L_{Aeq}	42 dB L_{Aeq}	≤ 40 dB L_{Aeq}	No

13.4.81 With reference to the impact magnitude thresholds outlined in Table 13.15, the impact magnitude is considered to be medium.

13.4.82 Since the sensitivity of the proposed school is considered to be high, there is likely to be a moderate effect. This is considered significant.

13.5 Mitigation and Residual Effects

Construction Phase

13.5.1 With regard to potential noise impacts associated with the construction of the Proposed Development, the assessment has determined that there is likely to be a temporary major effect at NSR3 when Area 1 is worked during the ground engineering / earthworks, road construction and building foundations phases). This is considered to be significant; therefore, mitigation works are required.

13.5.2 In terms of quantifiable mitigation measures, if the propagation of construction noise is interrupted by a barrier (in the form of 2m high close boarded timber hoarding with mass per unit area ≥ 10 kg/m^2) along the western boundary of the Phase 1 (identified as Area 1 in Appendix 13.1 Figure 4) i.e. separating the Site from existing residential dwellings, the effect would be reduced from major to moderate at NSR3 when this part of the site is worked.

13.5.3 A Construction Environmental Management Plan ('CEMP') will be implemented to minimise the potential impacts of construction noise. This will outline a number of best practice mitigation measures that will be implemented during the construction phase in order to reduce disruption and manage the likely significant effects of the Proposed Development. The measures to be included in the CEMP will include the following:

- All plant and machinery shall be regularly maintained to control noise emissions, with particular emphasis on lubrication of bearings and the integrity of silencers
- Site staff shall avoid all unnecessary noise due to misuse of tools and equipment, unnecessary shouting and radios
- As far as possible, avoid multiple simultaneous plant use in proximity to adjacent dwellings
- Adherence to any time limits imposed on noisy works by the local authority
- Implement set working hours during the week and at weekends
- Ensure engines are turned off when not in use
- Noise monitoring during the remediation and construction phases
- Compressor, generator and engine compartment doors are to be kept closed and plant turned off when not in use
- All pneumatic tools should be fitted with silencers/mufflers (where practicable)
- Care should be taken when unloading vehicles to avoid unnecessary noise
- The use of particularly noise plant should be limited, i.e. avoiding use of particularly noisy plant early in the morning
- Plant maintenance operations will be undertaken at the greatest possible distance from noise-sensitive receptors
- Minimise the speed of on-Site vehicle movements
- Ensure that operations are designed to be undertaken with any directional noise emissions pointing away from noise-sensitive receptors
- When replacing older plant, consider the quietest available plant as a substitute
- Drop heights are to be minimised when loading and unloading vehicles
- Vehicles should be prohibited from waiting within the Site with their engines running or alternatively, located in waiting areas away from sensitive receptors
- Occupiers of adjacent properties should be informed by the Contractor up to two weeks in advance of the works taking place, including the duration and likely noise effects. Potentially affected residents should also be notified of a helpline number for the Contractor
- Noise monitoring should be undertaken at the nearest noise sensitive receptors during remediation phase so that the Contractor can compare daily noise emission levels with the SOAEL (65 dB $L_{Aeq,T}$), increasing distances between sources and receivers (or limiting durations of exposure over the course of the working day) when the threshold is exceeded

13.5.4 Construction hours will also be controlled by a suitably worded planning condition. For example:

'No demolition or construction work (including deliveries to and from site) that causes noise to be audible outside the site boundaries at existing residential dwellings shall take place on site outside the hours of 0800 to 1800 hours Mondays to Fridays and 0800 to 1300 hours Saturdays and at no times on Sundays and Bank Holidays unless otherwise agreed with the Local Planning Authority.'

13.5.5 It is considered that, once the above mitigation measures have been implemented, the residual effect will be reduced from a moderate to minor effect.

Operational Phase

Road Traffic Impact

13.5.6 With regard to long term road traffic impacts, 1 no. dwelling (No. 29 Hermit Lane) is expected to experience a moderate impact. This is considered to be significant; therefore, mitigation works are required.

13.5.7 Where significant adverse effects occur, DMRB outlines example measures to mitigate and manage operational noise, including, but not limited to:

- Vertical or horizontal alignment of the road
- Earth bunds to act as a noise barrier
- Noise barriers
- Low noise road surfacing
- Speed limits
- Restrictions on noisy vehicle types

13.5.8 It is understood that, of the options listed above, mitigation via barrier screening is the only feasible mitigation strategy.

13.5.9 Appendix 13.1 Figure 8 presents the proposed barrier in terms of location plan and cross-section.

13.5.10 By implementing the mitigation measures, the effect will be reduced from moderate to minor.

Impact of Commercial / Industrial Use

13.5.11 Potential noise break-out from industrial units (and associated service yards areas) in the employment area has been considered. The assessment determined that low impacts are expected at the nearest noise sensitive receptors (proposed or existing). This is not considered to be a significant effect; therefore, no mitigation measures are required.

13.5.12 Providing that any fixed plant / commercial sources and activities associated with the Proposed Development can be designed, selected, located and/or configured such that Rating Levels do not exceed prevailing background noise levels, the potential noise impacts associated with the proposed commercial /

industrial use are considered to be negligible. It follows that there would be no effect; therefore, mitigation measures are not required.

13.5.13 Notwithstanding this, it is recommended that any fixed plant and equipment associated with the proposed commercial / industrial units (which will be subject to approval by the Council at reserved matters stage) are amenable to control by a suitably worded planning condition. For example:

'Prior to the operation of the proposed [commercial / industrial unit], a scheme of noise mitigation measures associated with any fixed plant and equipment shall be agreed with the Local Planning Authority and thereafter retained.'

Impact of School Sports Facilities

13.5.14 The assessment of noise impact associated with the school sports facilities, determined that there is likely to be a major effect; therefore, mitigation measures are required.

13.5.15 In order to avoid significant effects, the distance between proposed dwellings and the school sports field would be at least 35 metres and this would be detailed as part of the subsequent planning application for the residential dwellings in this part of the site. This would result in a sports field noise level of 50 dB $L_{Aeq,1hour}$ which:

- Satisfies the 50 dB L_{Aeq} threshold set out in the Sport England 'Absolute Assessment Method'
- Satisfies the criterion set out in the Sport England 'Comparative Assessment Method' (≤ 3 dB increase of cumulative above prevailing ambient noise levels) as the logarithmic sum of existing average daytime level (51 dB $L_{Aeq,T}$) plus the additional sports pitch contribution (50 dB $L_{Aeq,T}$) would result in a total ambient noise level of 53 dB $L_{Aeq,T}$; thus raising the ambient noise level by 2 dB.

Impact of Extant Environmental Noise on Proposed Residential Development

Internal Noise Levels

13.5.16 The assessment of internal noise levels, due to extant environmental noise, in proposed dwellings with open windows has determined moderate effects for proposed habitable areas at the northern boundary and central area. Therefore, mitigation measures are required.

13.5.17 Based on the calculated external noise levels, it can be seen that internal noise criteria (as recommended by BS8233/ProPG) cannot be achieved if open windows are relied upon as the primary source of background ventilation for proposed habitable areas at the northern boundary and central area. Windows will therefore be closed, as part of the noise mitigation strategy for these areas, with open windows used temporarily for purge or discretionary ventilation only.

13.5.18 A standard double-glazed window with standard trickle vents in a building façade will typically provide circa 27 dB(A) sound insulation from a free-field external noise level. On this basis, internal noise levels with dwelling windows closed (and ventilation provided via standard trickle vents) have been calculated, as set out in Table 10.24.

13.5.19 Based on the above, internal noise levels in dwellings with windows closed have been calculated, as set out in Table 13.34.

Table 13.34 Internal Noise Levels in Residential Units – Windows Closed

Location	Period	External Noise Level	Resultant Internal Noise Level	Criteria	Criteria Satisfied?
Northern Boundary	Day (07:00–23:00)	59 dB L_{Aeq}	33 dB L_{Aeq}	35 dB L_{Aeq}	Yes
	Night (23:00–07:00)	51 dB L_{Aeq}	29 dB L_{Aeq}	30 dB L_{Aeq}	No
		79 dB L_{AFmax}	52 dB L_{AFmax}	45 dB L_{AFmax}	
South-Eastern Boundary	Day (07:00–23:00)	52 dB L_{Aeq}	25 dB L_{Aeq}	35 dB L_{Aeq}	Yes
	Night (23:00–07:00)	49 dB L_{Aeq}	22 dB L_{Aeq}	30 dB L_{Aeq}	Yes
		67 dB L_{AFmax}	40 dB L_{AFmax}	45 dB L_{AFmax}	
North-Western Boundary	Day (07:00–23:00)	53 dB L_{Aeq}	26 dB L_{Aeq}	35 dB L_{Aeq}	Yes
	Night (23:00–07:00)	48 dB L_{Aeq}	21 dB L_{Aeq}	30 dB L_{Aeq}	Yes
		61 dB L_{AFmax}	34 dB L_{AFmax}	45 dB L_{AFmax}	
Central Area	Day (07:00–23:00)	60 dB L_{Aeq}	33 dB L_{Aeq}	35 dB L_{Aeq}	Yes
	Night (23:00–07:00)	51 dB L_{Aeq}	24 dB L_{Aeq}	30 dB L_{Aeq}	No
		73 dB L_{AFmax}	46 dB L_{AFmax}	45 dB L_{AFmax}	

13.5.20 It can be seen that, in most instances, internal noise levels would satisfy the criteria with closed windows (and a basic configuration of standard double glazing and trickle ventilation).

13.5.21 At the northern boundary and in the central area, the anticipated non-compliances (due to L_{AFmax} levels at night) occur where proposed dwellings would be in close proximity to passing vehicles on a local road (e.g. Barugh Green Road on the northern boundary and Hermit Lane in the central area of the site). Acoustic trickle vents (coupled with standard double glazing) would therefore be required for the most exposed dwelling facades in those areas.

13.5.22 Implementation of the above mitigation measures would be undertaken in order to reduce the noise impact to a negligible level. This would be detailed as part of the subsequent planning application for the residential dwellings in this part of the site.

External Amenity

13.5.23 Moderate effects were determined for dwellings proposed along the northern boundary and those adjacent to Hermit Lane in the centre of the site. Mitigation is therefore required.

13.5.24 In order to mitigate external noise levels, to satisfy the criteria for external amenity areas as recommended by BS8233 / ProPG, it is recommended that proposed gardens at the northern boundary are either self-screened from Barugh Green Road (by positioning houses between the road and the gardens) or are protected with a solid acoustic barrier (e.g. imperforate close-boarded timber fencing or solid masonry wall with a mass per unit area ≥ 10kg/m^2). The height of the barrier should be at least 1.8m above ground level in order to interrupt propagation of noise from the road to the gardens.

13.5.25 The above mitigation strategy is also recommended for proposed dwellings adjacent to Hermit Lane in the centre of the site.

13.5.26 For the rest of the site, external noise levels are just above the desirable threshold of 50 dB $L_{Aeq,T}$, as recommended by BS8233/ProPG and are therefore expected to satisfy the criteria once the scheme is complete due to shielding from the built form of the development, therefore no additional mitigation works would be expected for these areas.

13.5.27 Implementation of the above mitigation measures would be undertaken in order to reduce the noise impact to a negligible level. This would be detailed as part of the subsequent planning application for the residential dwellings in this part of the site.

Impact of Potential Future Noise (Due to Link Road) on Proposed Residential Development (General)

Internal Noise Levels

13.5.28 The assessment of internal noise levels, due to the proposed site access / link road, determined major and moderate effects for proposed habitable areas with open windows within 100 metres of (and with direct exposure to) the proposed site access / link road. Therefore, mitigation measures are required.

13.5.29 Based on the calculated external noise levels, it can be seen that internal noise criteria (as recommended by BS8233/ProPG) cannot be achieved if open windows are relied upon as the primary source of background ventilation for proposed habitable areas (with direct exposure to the road) within 300 metres of the proposed site access / link road. Windows will therefore be closed, as part of the noise mitigation strategy for these areas, with open windows used temporarily for purge or discretionary ventilation only.

13.5.30 A standard double-glazed window with standard trickle vents in a building façade will typically provide circa 27 dB(A) sound insulation from a free-field external noise level. On this basis, internal noise levels with dwelling windows closed (and ventilation provided via standard trickle vents) have been calculated, as set out in Table 13.35.

Table 13.35 Internal Noise Levels in Habitable Rooms Facing Site Access Road – Windows Closed

Distance from Road (m)	Period	External Noise Levels (dB $L_{Aeq,T}$)	Resultant Internal Noise Level (dB $L_{Aeq,T}$)	Criteria (dB L_{Aeq})	Criteria Satisfied?
10	Day (07:00–23:00)	65	38	35	No
	Night (23:00–07:00)	57	30	30	Yes
20	Day (07:00–23:00)	63	36	35	No
	Night (23:00–07:00)	54	27	30	Yes
30	Day (07:00–23:00)	61	34	35	Yes
	Night (23:00–07:00)	53	26	30	Yes
40	Day (07:00–23:00)	60	33	35	Yes
	Night (23:00–07:00)	52	25	30	Yes
50	Day (07:00–23:00)	59	32	35	Yes
	Night (23:00–07:00)	51	24	30	Yes
100	Day (07:00–23:00)	56	29	35	Yes
	Night (23:00–07:00)	49	22	30	Yes
200	Day (07:00–23:00)	53	26	35	Yes
	Night (23:00–07:00)	46	19	30	Yes
300	Day (07:00–23:00)	52	25	35	Yes
	Night (23:00–07:00)	44	17	30	Yes

13.5.31 It can be seen that internal day and night noise criteria would be satisfied, in habitable rooms with direct exposure to the site access road and with windows closed (and ventilation provided by standard trickle vents), for dwellings beyond 30m distance from the new access road.

13.5.32 Acoustic trickle vents (coupled with standard double glazing) would therefore be required for habitable rooms with direct exposure to the site access road, at 10 - 30 metre distance.

13.5.33 Implementation of the above mitigation measures would be undertaken in order to reduce the noise impact to a negligible level.

External Amenity

13.5.34 The assessment of external amenity due to contributions from the proposed site access / link road determined major and moderate effects for proposed gardens within 100 metres of the proposed site access / link road. Therefore, mitigation measures are required.

13.5.35 In order to mitigate external noise levels, to satisfy the lower 'desirable' criterion of ≤ 50 dB $L_{Aeq,T}$ for external amenity areas, it is recommended that either:

- Proposed gardens are self-screened from the site access road (by positioning houses between the road and the gardens); or

- Proposed gardens that back on to the site access / link road are protected with a solid acoustic barrier (e.g. imperforate close-boarded timber fencing or solid masonry wall with a mass per unit area ≥ 10kg/m^2). The height of the barrier should be at least 1.8m above ground level in order to interrupt propagation from the new road to the proposed gardens.

13.5.36 Implementation of the above mitigation measures would be undertaken in order to reduce the noise impact to a negligible level.

Impact of Potential Future Noise (Due to Link Road) on Proposed School

13.5.37 The assessment of noise impact to the proposed school due to the proposed site access / link road determined a moderate effect if school windows are open. Therefore, mitigation measures are required.

13.5.38 A typical standard double-glazed unit will offer around 29 dB R_w (or 28 dB R_w + C). Annex G.1 of BS8233:2014 suggests one method for determining indoor ambient noise levels using a basic approach of subtracting the sound reduction value from the external ambient noise levels whilst allowing for a potential underestimation of around 5 dB. On this basis, internal noise levels with windows closed have been calculated for teaching spaces, as set out in Table 13.36.

Table 13.36 IANLs in Primary School Teaching Spaces – Windows Closed

Period	External Noise Level	Resultant Internal Noise Level	Criteria	Criteria Satisfied?
Typical School Day	57 dB L_{Aeq}	34 dB L_{Aeq}	≤ 40 dB L_{Aeq}	Yes

13.5.39 Table 13.36 shows that IANL criteria will be achieved if windows are closed using a basic configuration of standard double glazing and this would therefore be undertaken. However, the following should be noted:

- The criterion assumes passive ventilation as a preference. Therefore, the passive ventilation system must be designed such that the overall sound insulation performance (assumed to be dictated by the window) is not compromised by the passive ventilation system. Where this is not possible, a mechanical ventilation system may be required

- Where a mechanical ventilation system is used, the criterion shown in Table 1.36 would be reduced by 5 dB (i.e. 35 dB L_{Aeq})

- If the proposed school is to cater for students with special hearing and communication needs, a lower IANL requirement of 30 dB $L_{Aeq,30min}$ (or 35 dB $L_{Aeq,30min}$ if naturally ventilated) may be required. In such circumstances, a higher specification of glazing / ventilation may be required in specific areas of the school

Impact of Potential Future Noise (Including Site Access / Link Road) on Phase 1 of Proposed Residential Development

13.5.40 The assessment of noise impact upon Phase 1 of the Proposed Development determined that, for habitable rooms and gardens with direct exposure to the site access / link road or Barugh Green Road, major to moderate effects are expected in the most exposed areas of the site. Therefore, mitigation measures are required.

13.5.41 Mitigation measures are detailed in ENS report ref: NIA-8576-21-9800-v1 Barnsley West provided in Appendix 13.4. Implementation of the mitigation measures would be undertaken and would reduce the noise impact to a negligible level.

13.6 Summary

Construction Phase

13.6.1 With regard to potential noise impacts associated with the construction of the Proposed Development, the assessment has determined that there is likely to be a temporary major effect at dwellings to the west of the site when the Phase 1 area is worked.

13.6.2 In order to mitigate the effects, the following is required:

- An acoustic barrier along the western boundary of the Phase 1 area

- Implementation of best practice mitigation measures in the form of a Construction Environmental Management Plan ('CEMP')

- Control of construction hours

13.6.3 By implementing the mitigation measures, the effect will be reduced from major to minor. Effects during the construction phase are temporary.

Operational Phase

Road Traffic Impact

13.6.4 The assessment of road traffic impact, due to the Proposed Development, upon existing nearby noise sensitive receptors, determined a moderate effect at a dwelling on Hermit Lane. In order to mitigate the effect, a noise barrier has been proposed.

13.6.5 By implementing the mitigation measures, the effect will be reduced from moderate to minor.

Impact of Commercial / Industrial Use

13.6.6 Potential noise break-out from industrial units (and associated service yards areas) in the employment area has been considered. The assessment determined that low impacts are expected at the nearest noise sensitive receptors (proposed or existing); therefore, no mitigation measures are required.

13.6.7 Providing that any fixed plant / commercial sources and activities associated with the Proposed Development can be designed, selected, located and/or configured such that Rating Levels do not exceed prevailing background noise levels, the potential noise impacts associated with the proposed commercial / industrial use are considered to be negligible. It follows that there would be no effect; therefore, mitigation measures are not required.

13.6.8 Notwithstanding this, it is recommended that any fixed plant and equipment associated with the proposed commercial / industrial units (which will be subject to approval by the Council at reserved matters stage) are amenable to control by a suitably worded planning condition.

Impact of School Sports Facilities

13.6.9 The assessment of noise impact associated with the school sports facilities, determined that there is likely to be a major effect; therefore, mitigation measures are required.

13.6.10 Mitigation measures will be in the form of ensuring an appropriate distance between the proposed dwellings and the school sports field. Implementation of the mitigation measures would reduce the noise impact to a negligible level.

Impact of Extant Environmental Noise on Proposed Residential Development

13.6.11 The assessment of internal noise levels, due to extant environmental noise, in proposed dwellings with open windows has determined moderate effects for proposed habitable areas at the most exposed parts of the site. Therefore, mitigation measures are required.

13.6.12 Mitigation measures will be in the form of appropriate glazing and ventilation to the dwellings. Implementation of the mitigation measures would reduce the noise impact to a negligible level.

13.6.13 The assessment of external amenity, due to extant environmental noise, has determined moderate effects for proposed gardens in certain areas of the site. Therefore, mitigation measures are required.

13.6.14 Mitigation measures will be in the form of appropriate design (by positioning houses between the road and the gardens) or by protecting gardens with acoustic barriers. Implementation of the mitigation measures would reduce the noise impact to a negligible level.

Impact of Potential Future Noise (Due to Link Road) on Proposed Residential Development (General)

13.6.15 The assessment of internal noise levels, due to the proposed site access / link road, in proposed dwellings with open windows has determined moderate to major effects for proposed habitable areas at the most exposed parts of the site. Therefore, mitigation measures are required.

13.6.16 Mitigation measures will be in the form of appropriate glazing and ventilation to the dwellings. Implementation of the mitigation measures would reduce the noise impact to a negligible level.

13.6.17 The assessment of external amenity, due to extant environmental noise, has determined moderate effects for proposed gardens in certain areas of the site. Therefore, mitigation measures are required.

13.6.18 Mitigation measures will be in the form of appropriate design (by positioning houses between the road and the gardens) or by protecting gardens with acoustic barriers. Implementation of the mitigation measures would reduce the noise impact to a negligible level.

Impact of Potential Future Noise (Due to Link Road) on Proposed School

13.6.19 The assessment of noise impact to the proposed school due to the proposed site access / link road determined a moderate effect if school windows are open. Therefore, mitigation measures are required.

13.6.20 Mitigation measures will be in the form of appropriate glazing and ventilation to the school. Implementation of the mitigation measures would reduce the noise impact to a negligible level.

Impact of Potential Future Noise (Including Site Access / Link Road) on Phase 1 of Proposed Residential Development

13.6.21 The assessment of noise impact upon Phase 1 of the Proposed Development determined that, for habitable rooms with direct exposure to the site access / link road or Barugh Green Road, major to moderate effects are expected in the most exposed areas of the site. Therefore, mitigation measures are required.

13.6.22 Mitigation measures will be in the form of appropriate glazing and ventilation to the dwellings. Implementation of the mitigation measures would reduce the noise impact to a negligible level.

13.6.23 The assessment of external amenity in Phase 1 of the Proposed Development determined that, has determined moderate effects for proposed gardens in certain areas of the site. Therefore, mitigation measures are required.

13.6.24 Mitigation measures will be in the form of protecting gardens with acoustic barriers. Implementation of the mitigation measures would reduce the noise impact to a negligible level.