



Proposed Residential Development Land off Worksop Road, Mastin Moor

Noise & Vibration Assessment

October 2020

Waterman Infrastructure & Environment Limited

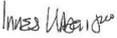
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Comments Issue 002, changes to planning policy, road traffic noise assessment and noise modelling.

Comments



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1. Introduction

It should be noted that Chapters 1 and 2 of this report are common to all the submitted reports, the author being Planning & Design Group UK Ltd. The Noise & Vibration Assessment of the proposed residential development is presented from Chapter 3 onwards which has been undertaken by Waterman Infrastructure & Environment Ltd.

1.1 Purpose

The purpose of this Report is to explain and support an outline planning application for residential development of land at Mastin Moor (Chesterfield) as submitted to Chesterfield Borough Council (CBC) as the local planning authority (LPA) concerned. It outlines the context within which the application is made and provides a detailed assessment of the main noise and vibration considerations, together with a reasoned justification in support of the development.

1.2 Structure of Report

This Report addresses the following:

- Context;
- The Site and surrounding area;
- Development proposal;
- Planning policy considerations;
- Key benefits;
- Assessment of Noise & Vibration;
- Summary and conclusion.

The Report concludes that predominantly the site is suitable for residential amenity without specific mitigation. Provided the required mitigation measures in respect of noise and vibration detailed within the report are implemented, there are no reasons why residential development should not be supported on the site.

1.3 Other Reports

The proposal has been informed by a range of technical evidence. As such, the planning application comprises a suite of information which includes:

- Supporting Planning Statement
- Design and Access Statement
- Landscape and Visual Impact Assessment
- Transport Assessment
- Flood Risk Assessment
- Ecology Surveys



- Archaeological Assessment
- Geo-Environmental Assessment
- Noise and Vibration Assessment
- Air Quality Assessment
- Topographical Survey

1.4 Author

This Report has been prepared by Waterman Infrastructure and Environment Ltd (WIE). WIE is leading provider of environmental, sustainability, transport and engineering services to private and public sector clients and has a wealth of experience in undertaking EIAs of proposed residential developments of greenfield sites. Our contact details are as follows:

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2. Context

2.1 Applicant

The land subject of this application is owned and managed by Devonshire Property (MM) Limited (DPMML). DPMML is part of the Devonshire Group.

The Devonshire Group, known technically as the Chatsworth Settlement Trustees (CST), owns the land and estates of the Dukedom of Devonshire. Its main estates are in the vicinity of Chatsworth in Derbyshire and Bolton Abbey in North Yorkshire. It also runs visitor and other businesses on these estates, including hotels; retail and catering outlets; forestry; livestock and arable farming. It employs over 600 full time employees. It is committed to quality in all its activities and takes a responsible approach to development; as such, it measures performance in social and environmental as well as financial terms.

Together with the Chatsworth House Trust (registered charity no.1511149), CST's Derbyshire Estate provides over 450 full time equivalent jobs and contributes c.£50m of enabled Gross Value Added to the local economy each year (Source: New Economics Foundation 2014). Its income funds socio-economic facilities (e.g. village shop/post office) and environmental management activities (e.g. architectural conservation) without grant support. CST thereby provides benefits far beyond "just the estate".

CST has a range of interests in the Borough of Chesterfield including: agricultural land supporting modern farming; commercial properties supporting local employment; farmsteads supporting smaller scale rural enterprises; and the majority of the former Staveley Works site (including both the Clocktower Business Centre (leased to CBC and providing flexible term offices and workspaces) and the Devonshire Building (home to a gym and other enterprises)).

Whilst maintaining a long-term perspective, CST manages a diverse range of landholdings to achieve corporate and wider social and environmental objectives. It has thereby identified that the best long-term use for the land subject to this application would be for residential development. This will help deliver its own objective to deliver 1,000 new homes over the next ten years, and also meet the needs and aspirations of the local community and wider Borough, subject to securing a planning permission that is both attractive to the development market and commercially viable.

2.2 The Site

This section provides a summary of key features of the site. The site is more fully described within the Design and Access Statement submitted as part of the application.

The site is located at Mastin Moor, to the south of Worksop Road (A619) to both the east and west of Bolsover Road, with part of the site extending southwards to Woodthorpe Road. It encompasses some 46.2 ha of mainly agricultural land. The overall site forms a shallow valley sloping from the ridge lines along Worksop Road and Woodthorpe Road towards a watercourse that runs in a westerly direction through the site. The highest part of the site is around 119m AOD in the north-east with the lowest part in the south-west at around 56m AOD.

The site is primarily comprised of undulating arable fields with limited features. The main features of note include:

- An unnamed watercourse which flows in a westerly direction through the site
- Bolsover Road which runs through the site on a north-south axis
- Pumphouse Farm (dwelling and curtilage) which is surrounded by the development proposal but does not form part of it
- Field boundaries which are a mixture of hedgerows, stone walls and woodland
- Isolated trees

The main part of the settlement of Mastin Moor is located to the north of the site, on the northern side of Worksop Road. The settlement of Woodthorpe is located generally to the west of the site. The site abuts a limited number of residential properties, as well as the Mastin Moor Community Garden.

Photo 1: View over site from South-Eastern corner (adjacent Woodthorpe Road) looking towards Woodthorpe



Photo 2: View over site from Bolsover Road (close to Community Garden) looking towards Woodthorpe



Photo 3: View over site from Bolsover Road looking North West towards Worksop Road)



Photo 4: View over site from near North Eastern boundary adjacent to Worksop Road looking towards Bolsover Road and Woodthorpe



2.3 Design Process

CST first considered residential development options for its land at Mastin Moor in 2011 when it was identified in the Strategic Housing Land Availability Assessment by Chesterfield Borough Council. This formed part of the evidence base for what was at the time the emerging Local Plan: Core Strategy. CST appointed planning and masterplan specialists to explore these options. Outputs from that process formed part of CST's response to consultation on the Local Plan: Core Strategy.

Following adoption of the Local Plan: Core Strategy in 2013 which confirmed Mastin Moor as a focus for regeneration and growth, CST appointed an expanded team of specialists. Resulting technical surveys and reports contributed to a detailed appreciation of the development opportunity and potential constraints. These informed a masterplan-led approach that fully explored design options. The process had regard to the wider setting of the site and existing development in the locality.

Draft proposals were subject to extensive consultation with Chesterfield Borough Council, Derbyshire County Council and Staveley Town Council. Meetings were held with groups representing local residents and interest groups including Friends of Mastin Moor, the Woodthorpe Village Community Group and Mastin Moor Gardens and Allotments (formerly Mastin Moor Allotments Association). The resulting proposals were presented at two community consultation events in July 2016, held at the Eventide Rest Room (Mastin Moor) and the Albert Inn (Woodthorpe), and were available to view at the same time on a website.

An outline planning application for 650 dwellings and other development was subsequently submitted to Chesterfield Borough Council (ref. CHE/17/00469/OUT) in June 2017. Contrary to the unequivocal recommendation of the Officer's report, and despite no objections being received from any statutory consultees, the application was refused by the Council's Planning Committee in October 2019. At the time of writing, an appeal against that refusal remains extant.

Feedback received during the course of the determination of the above application has informed the current proposals. The design process that has led to the proposals for which planning permission is now sought is more fully described within the Design and Access Statement.

2.4 Development Proposal

The proposed development seeks outline planning permission for residential development of up to 650 dwellings, a residential care facility with extra care, a Local Centre (including local retail, health facilities, leisure facilities, other local facilities and services, offices), open space, community garden extension, community building, parking and associated infrastructure and earthworks with all matters reserved except access. Details of scale, layout and landscaping are reserved for future consideration.

For illustrative purposes, an indicative layout has been prepared to show how the site could be developed. Further explanation of the design principles that have been incorporated into the proposals, and how the design has been informed and influenced by the comprehensive suite of technical information and analysis, is set out in the Design and Access Statement.

Key aspects of the proposal include:

- Up to 650 dwellings located on land to the south of Worksop Road (east and west of Bolsover Road) extending to Woodthorpe Road
- A residential care facility with extra care
- A Local Centre (including local retail, health facilities, leisure facilities, other local facilities and services, offices) located adjacent to Worksop Road
- A new signal-controlled junction on Worksop Road providing access to the new Local Centre and residential areas, incorporating pedestrian and cyclist crossing facilities
- New priority-controlled junctions on Bolsover Road and Woodthorpe Road
- An extension to the Community Garden (approximately doubling its existing size), including provision for a new community building and associated car park
- Significant new areas of parkland, play areas and other open space
- Retention of existing hedgerows and trees wherever possible
- Additional landscape planting and ecological enhancements
- New walking and cycling connections
- New drainage infrastructure including surface water storage ponds
- Financial contributions to allow the expansion of existing local services including Norbriggs Primary School.

The proposal therefore comprises a high quality development scheme designed to: address multiple deprivation issues at Mastin Moor; help regenerate the area in line with key related Local Plan policy; respect but integrate with the distinct communities of Woodthorpe and Mastin Moor; acknowledge and address the specific physical challenges and constraints of the site (e.g. topography, drainage).

2.5 Planning Policy

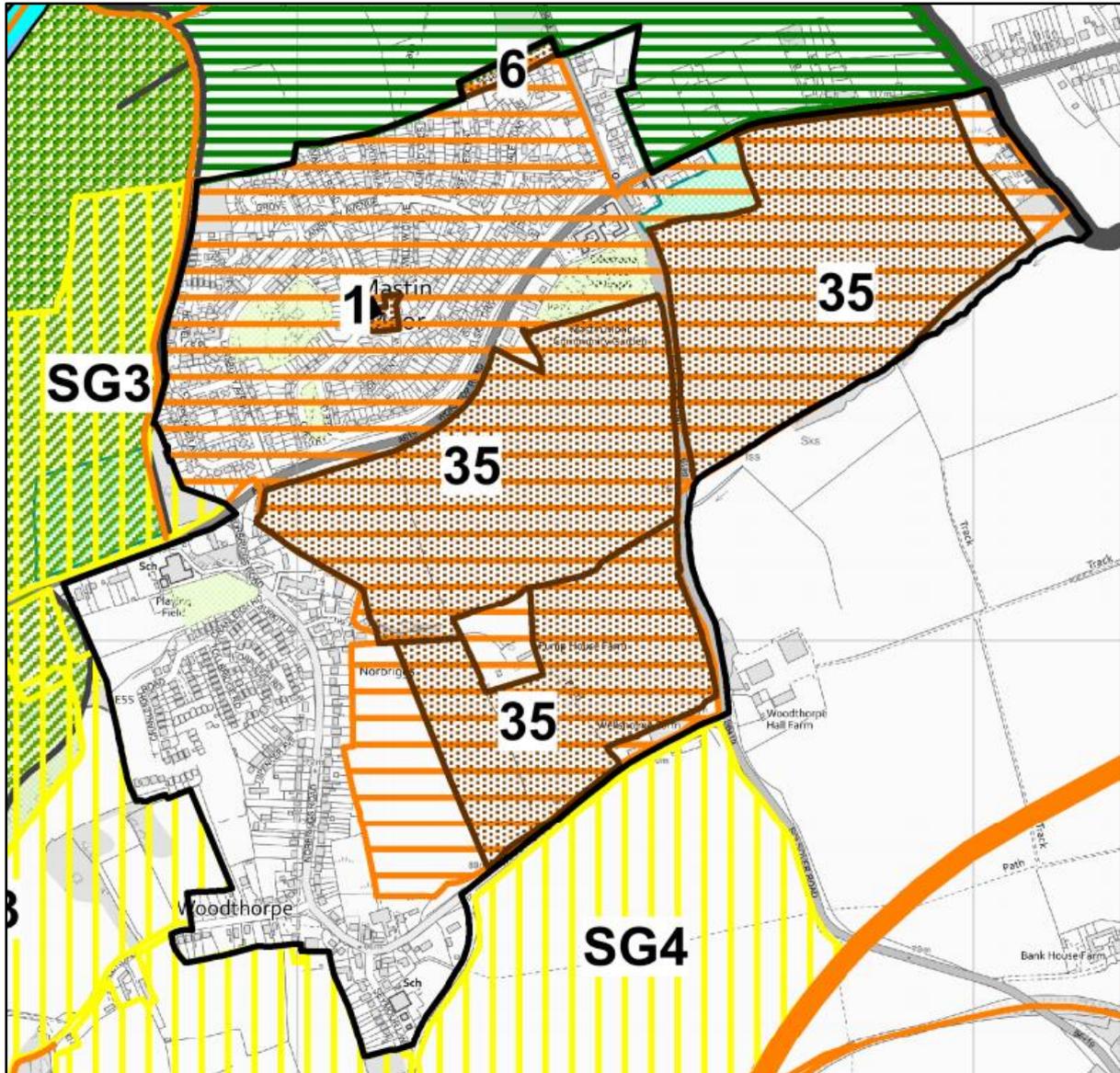
Section 38 (6) of the Planning and Compulsory Purchase Act 2004 requires that the determination of planning applications is undertaken in accordance with the development plan, unless material considerations indicate otherwise. The relevant document for this application is the Chesterfield Local Plan (2020) (the Local Plan).

The Local Plan allocates the site for development by way of Policy CLP3 Flexibility in Delivery of Housing. Table 4 within the Local Plan references the site as H35 (Land South of Worksop Road, and East and West of Bolsover Road, Mastin Moor), having a capacity of 650 dwellings, the extent of which is shown on the Local Plan Policies Map. Policy RP1 Regeneration Priority Areas sets out further specific requirements for any development within site H35.

Other relevant policies of the Local Plan include: CLP1 Spatial Strategy, CLP2 Principles for Location of Development, CLP4 Range of Housing, CLP6 Economic Growth, CLP8 Vitality and Viability of Centres, CLP9 Retail, CLP10 Social Infrastructure, CLP11 Infrastructure Delivery, CLP13 Managing the Water Cycle, CLP14 A Healthy Environment, CLP15 Green Infrastructure, CLP16 Biodiversity, Geodiversity and the Ecological Network, CLP17 Open Space, Play Provision, Sports Facilities and Allotments, CLP20 Design, CLP21 Historic Environment, CLP22 Influencing the Demand for Travel.

An extract from the Local Plan Policies Map showing the extent of the allocation and the wider Mastin Moor Regeneration Priority Area is shown below.

Figure 2-1: Local Plan Policies Map (extract)



The National Planning Policy Framework (NPPF) ‘sets out the Government’s planning policies for England and how these are expected to be applied’. Paragraph 10 of the NPPF sets out that ‘at the heart of the [NPPF] is a presumption in favour of sustainable development’. Paragraph 11 states that ‘For decision-taking this means:

*c) approving development proposals that accord with an up-to-date development plan without delay; or
d) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:*

- i. the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or*
- ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole.’*

2.6 Planning Assessment

The proposal performs well against relevant Local Plan policies. In particular, it will deliver development in accordance with Policies CLP1 Spatial Strategy, CLP2 Principles for Location of Development, Policies CLP3 Flexibility in Delivery of Housing and Policy RP1 Regeneration Priority Areas.

It is also considered that there are no material considerations that indicate anything other than the fact that the LPA should determine the application in line with the extant plan as outlined above.

In addition, key benefits of the proposal would include:

- Provision of new, high quality housing
- New development in an area with acknowledged regeneration needs
- Greater variety of housing type and tenure (including Affordable Housing) to meet the diverse needs of the local community (including housing to buy and rent)
- Extension of the Community Garden (approximately doubling its existing size) including provision for a new community building and parking area
- Improved local services and facilities (including provision for retail, health and other local and community services within a new Local Centre)
- Significant new areas of parkland, play areas and other open greenspace available to existing and new residents
- New housing in a location where future residents will have a realistic choice of walking, cycling or using public transport, in preference to using private motor vehicles
- Additional capacity at local schools
- Opportunities for skills and learning through training programmes during construction and operational phases of the development
- New employment opportunities during construction and operational phases of the development
- Additional landscape planting and ecological enhancements

- New traffic signal-controlled junction on Worksop Road to include pedestrian and cyclist crossing facilities
- On-site water storage to help reduce existing off-site flood risk.

The proposal will therefore provide opportunities and benefits for all sections of the local community, including existing and future residents. Benefits will accrue in the short and longer term. It will help to overcome issues that can lead to deprivation and will contribute to regeneration in line with Local Plan objectives.

3. Noise & Vibration Assessment Introduction

The Noise & Vibration Assessment of the proposed Development prepared by Waterman Infrastructure & Environment Ltd (WIE), presents an assessment of the likely significant noise and vibration effects of the Development. Consideration is given in the assessment to the suitability of the Site for residential uses although this is not a direct effect of the Development.

A description of the relevant baseline conditions of the Site and surrounding area is presented. Mitigation measures are identified where appropriate to avoid, reduce or offset any significant adverse effects and / or enhance likely beneficial effects on existing off-Site and future on-Site sensitive receptors. Taking account of the mitigation measures, the nature and significance of the likely residual effects of the Development are described.

The report is supported by the following appendices:

- Appendix A: Glossary of Acoustic Terminology;
- Appendix B: Baseline Noise Survey;
- Appendix C: Construction Noise Assessment Methodology; and
- Appendix D: Road Traffic Noise Assessment.

4. Assessment Methodology & Significance Criteria

4.1 Assessment Methodology

The assessment of likely significant noise and vibration effects has involved the following:

- identifying potentially sensitive existing and future sensitive receptors (SRs), such as residential dwellings, on and within the surrounding area of the Application Site;
- establishing the baseline noise and vibration conditions currently existing at the Application Site and at existing SRs surrounding the Application Site using appropriate noise and vibration surveys;
- assessing the suitability of the Application Site for the residential Development in terms of the prevailing baseline noise conditions;
- assessing likely noise and vibration levels generated during the construction works associated with the Proposed Development;
- establishing design aims for plant and services associated with the Proposed Development;
- assessing likely noise levels from the completed and operational Development;
- formulating proposals for mitigation (where appropriate); and
- assessing the likely significance of any residual noise and vibration effects.

4.1.1 Predicting Effects

The level of effect has been assessed based on the magnitude of change or absolute level of noise or vibration due to all phases of the Proposed Development and then sensitivity of the affected receptor.

Table 4-1 presents the assigned receptor sensitivity:

Table 4-1: Receptor Sensitivity

Receptor Sensitivity	Receptor Type
High	Residential, school, hospital
Medium	Office, commercial
Low	Industrial
Negligible	No receptors within 800m ¹

Note: ¹This has been adopted from BREEAM POL 05 'Reduction of noise pollution' and is considered to be a conservative approach.

The magnitude of the predicted change in or absolute level of noise arising from the construction and operational phases of the Development are classified having regard to Noise Policy Statement for England's (NPSE)¹ 'Effect Levels' and the noise exposure levels presented within Planning Policy Guidance-Noise², and are presented as **Table 4-2**:

¹ Department for Environmental Food and Rural Affairs (March 2010). Noise Policy Statement for England (NPSE). Available at: <https://www.gov.uk/government/publications/noise-policy-statement-for-england>. [Accessed: 01/10/2020].

² https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/820957/noise_exposure_hierarchy.pdf [Accessed: 01/10/2020]

Table 4-2: Magnitude of Noise Change/Absolute Level

Magnitude	Description
Large	Significant Observed Adverse Effect Level (SOAEL)
Medium	Above LOAEL but below SOAEL
Small	Lowest Observed Adverse Effect Level (LOAEL)
Negligible	No Observed Adverse Effect Level (NOAEL)

Magnitude of change as a result of the Proposed Development, is considered within the range of large, medium, small and negligible. Consideration is given to the scale and duration (e.g. for construction, short-term for 1-2 years, medium-term for 3-5 years, long-term for 5 years and greater, and permanent, dependent upon project timeframes) and the extent of the Proposed Development.

The matrix outlined in **Table 4-3** coupled with the requirements of NPSE and relevant British Standards, guidance and policy, have been used to determine the level of the effect. The predicted level of effect is based upon the consideration of magnitude of change and sensitivity of the resource/receptor.

Table 4-3: Level of Effect

Receptor Sensitivity	Magnitude of Change			
	Large (SOAEL)	Medium (between LOAEL and SOAEL)	Small (LOAEL)	Negligible (NOAEL)
High	Major	Moderate to Major	Minor to Moderate	Negligible
Medium	Moderate to Major	Moderate	Minor	Negligible
Low	Minor to Moderate	Minor	Negligible to Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Whilst Table 4-3 provides ranges, the level of effect is confirmed as a single level and not a range, informed by professional judgement. For each effect, it has been concluded whether the effect is 'beneficial' or 'adverse'. A statement is also made as to whether the level of effect is 'Significant' or 'Insignificant', again based on professional judgement.

Further explanation of the significance criteria are presented below:

- Major effect: where the Proposed Scheme is likely to cause a considerable change from the baseline conditions or large exceedance of the threshold level and the receptor has limited adaptability, tolerance or recoverability or is of the highest sensitivity. This effect is considered to be 'Significant';
- Moderate effect: where the Proposed Scheme is likely to cause either a considerable change from the baseline conditions or medium exceedance of the threshold level at a receptor which has a degree of adaptability, tolerance or recoverability or a less than considerable change at a receptor that has limited adaptability, tolerance or recoverability. This effect is considered more likely to be 'Significant' but will be subject to professional judgement;
- Minor effect: where the Proposed Scheme is likely to cause a small, but noticeable change from the baseline conditions or small exceedance of the threshold level on a receptor which has limited adaptability, tolerance or recoverability or is of the highest sensitivity; or where the Proposed Scheme

is likely to cause a considerable change from the baseline conditions at a receptor which can adapt, is tolerant of the change or/and can recover from the change. This effect is considered less likely to be 'Significant' but will be subject to professional judgement; and

- Negligible: where the Proposed Scheme is unlikely to cause a noticeable change or threshold level is satisfied at a receptor, despite its level of sensitivity or there is a considerable change at a receptor which is not considered sensitive to a change. This effect is 'Insignificant'.

Generally, effects that are determined to be Moderate or greater are generally assessed as significant but is ultimately dependent on professional judgement which takes account of site specifics, duration as well as the magnitude of change and sensitivity of the receptor(s).

4.2 Construction Phase

4.2.1 Construction Noise & Vibration

Construction noise levels were calculated in accordance with the methodology prescribed within BS 5228-1:2009+A1:2014 for each of the major stages of construction, accounting for the typical type of plant and activities expected within the assumed major stages of work. The major stages are considered to be earthworks, piling, concreting and pavement works.

The 'ABC Method' provided in BS 5228:2009-1+A1:2014 has been used to determine the magnitude of the noise level. The ABC Method defines category threshold values, which are determined by the time of day and existing prevailing ambient noise levels. The noise generated by demolition and construction activities is compared with the threshold value and the prevailing noise level to determine the magnitude of the demolition and construction.

There are two aspects of vibration impact which need consideration according to BS5228-2:

- The impacts on people or equipment within buildings; and;
- The impacts on buildings (or other structures) themselves.

There are currently no British Standards that provide a methodology for predicting levels of vibration from demolition and construction activities other than BS 5228-2:2009+A1:2014, which relates to percussive or vibratory rolling and piling only. People are sensitive to low levels of vibration being just perceptible at 0.3 mm/s Peak Particle Velocity (PPV) in residential environments with potential for complaints at 1.0 mm/s PPV. The magnitude of vibration on people has been derived from BS 5228-2:2009+A1:2014.

The potential for damage to buildings from vibration occurs at significantly higher levels than human perceptibility, with the probability of damage tending towards zero at ≤ 12.5 mm/s PPV.

The magnitude of noise and vibration arising from the demolition and construction phase are presented in **Table 4-4**.

Table 4-4: Magnitude of Construction Noise & Vibration

Magnitude	Construction Noise Level dB $L_{Aeq,T}$	Level of Vibration mm/s PPV	Definition
Negligible	≤ Baseline (Prevailing) Noise Level	<0.3	The effect is not of concern
Small Adverse	≤ Threshold Noise Level	≥0.3 to <1	The effect is undesirable but of limited concern
Medium Adverse	> Threshold Noise Level to <Threshold +5dB (or ≤75dB $L_{Aeq,T}$, whichever is highest)	≥1 to <10	The effect gives rise to some concern but is likely to be tolerable depending on scale and duration
Large Adverse	>Threshold +5dB (or >75dB $L_{Aeq,T}$, whichever is highest.	≥10	The effect gives rise to serious concern and it should be considered unacceptable, exception for very brief exposure depending on the absolute level

4.2.2 Construction Traffic

CRTN methodology has been used to determine the potential change in road traffic noise as a result of Development construction traffic by determining the percentage change in traffic volume and HGVs over an hourly time period. The magnitude of change in noise level is presented as **Table 4-5** and is based on DMRB LA 111 criteria.

Table 4-5: Magnitude of Change in Construction Traffic Noise

Magnitude	Change in Road Traffic Noise With Construction Traffic (dB)	Definition
Negligible	<1.0	The effect is not of concern
Small Adverse	≥1.0 to ≤3.0	The effect is of limited concern
Medium Adverse	>3.0 to <5.0	The effect gives rise to some concern depending on absolute levels and duration
Large Adverse	≥ 5.0	The effect gives rise to serious concern and it should be considered unacceptable where it increases the prevailing noise levels by this amount, depending on absolute level and duration. Note: noise from another road link may be the dominant source so the predicted increase may not be realised

4.3 Operational Phase

4.3.1 Fixed External Plant

BS 4142:2014+A1:2019 'Methods for Rating and Assessing Industrial and Commercial Sound', provides an assessment and rating method to assess the potential impact from a range of commercial noise sources, including fixed building services plant.

The measured or predicted noise level from the source in question, the 'specific sound level ($L_{Aeq,T}$), immediately outside the dwellings is compared with the 'background sound level ($L_{A90,T}$). Where the sound contains certain acoustic features at the assessment location (e.g. tones, impulses, intermittency etc.), then a scaled character correction is added to the specific sound level to obtain the 'rating level ($L_{Ar,Tr}$). The greater the difference the greater the magnitude, not taking 'context' into account. Context partially overlaps with significance of effect as it takes account of the sensitivity of the receptor. Further to this, context also takes account of the level and nature of the sound and inherent design measures (such as façade insulation treatment and acoustic treatment).

Table 4-6 presents the magnitude of noise emissions from fixed external plant and building services when compared to background noise levels.

Table 4-6: Magnitude of Fixed Plant Noise Emissions

Magnitude	Rating Level dB $L_{Ar,Tr}$ (without context) Compared to Background Sound Level (L_{A90})	Definition
Negligible	Rating Level $\leq L_{A90}$	The effect is not of concern
Small	Rating Level $\leq L_{A90}+5\text{dB}$	The effect is undesirable but of limited concern
Medium	Rating Level $> L_{A90}+5\text{dB}$	The effect gives rise to some concern but is likely to be tolerable depending on scale and duration
Large	Rating Level $\geq L_{A90}+10\text{dB}$	The effect gives rise to serious concern and it should be considered unacceptable

Taking account of advice in BS4142 it is recommended that noise from any fixed plant or building services (as defined in BS4142) should be 5dB below the prevailing background noise level at the sensitive receptors, with a minimum value of 35dB $L_{Ar,Tr}$. This would be subject to agreement with CBC.

4.3.2 Non-Residential Uses and Servicing Noise

Noise from commercial uses and servicing noise would be assessed using BS4142, as discussed in Section 4.3.1, having regard to context such as the prevailing noise levels and how these may change with the non-residential and servicing noise.

4.3.3 Road Traffic Noise

Road traffic noise has been calculated using the calculation methodology of Calculation of Road Traffic Noise. This has been used to predict the dB $L_{A10,18 \text{ hour}}$ Basic Noise Levels (BNL) for the year of completion 2026, with and without Development.

The calculations use the 18-hr Average Annual Weekday Traffic (AAWT) flow, % HGV composition and average vehicle speed for each road link. The magnitude of the change in road traffic noise were evaluated by considering the estimated change in the $L_{A10,18 \text{ hour}}$ road traffic noise level on the local highway network as a result of the operation of the completed Development. The Design Manual for Roads and Bridges (DMRB) LA 111 provides magnitude criteria for short-term changes in operational road traffic noise levels which are reproduced in **Table 4-7**.

Table 4-7: Magnitude of Change in Road Traffic Noise

Magnitude	Short-Term Change Road Traffic Noise Level (dB)
Negligible	<1.0
Small	1.0 to 2.9
Medium	3.0 to 4.9
Large	≥5.0

5. Residential Amenity

Assessment of residential amenity is not a direct effect of the proposed development and therefore it has been assessed separately in accordance with planning policy, legislation, British Standards and current guidance.

5.1 Planning Policy & Guidance – Residential Amenity

This section presents the key planning policy and guidance documents pertaining to noise within England relevant to residential developments. These documents set out the aims, many of which are comparable, without providing details on specific noise levels, the latter of which are transposed into British Standards or sector specific guidance which are presented within Section 5.2 of this report.

5.1.1 National Planning Policy Framework

The National Planning Policy Framework³ (NPPF) was revised and published 19th February 2019. With regard to noise the NPPF promotes ‘good design’ as part of ‘sustainable development’ and advocates ‘preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels ofnoise pollution...’

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

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;’

Paragraph 182 of the NPPF introduces the ‘Agent of change principle’. ‘Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.’

5.1.2 Noise Policy Statement For England

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development the Noise Policy Statement For England⁴ (NPSE) aims to:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.

It introduces the concept of noise “effect levels” although it does not equate these to a specific level of noise as this is likely to be different for different noise sources, receptors and time of day. The effect levels are as follows:

³ Ministry of housing, Communities and Local Government. (February 2019) National Planning Policy Framework. HMSO.

⁴ Defra. (2010) Noise Policy Statement For England (NPSE).

- **NOEL – Noise Observed Effect Level:** Level below which no effect on health and quality of life due to noise can be detected;
- **LOAEL – Lowest Observed Adverse Effect Level:** Level above which adverse effects on health and quality of life can be detected;
- **SOAEL – Significant Observed Adverse Effect Level:** Level above which significant adverse effects on health and quality of life occur.

Predominantly, guidance is drawn from the World Health Organisation (WHO) when setting specific noise levels to the above effect levels, which essentially have been transposed into various British Standards, Policy and Guidance.

5.2 Noise Criteria for Assessment of Residential Amenity

Compliance with the noise assessment criteria presented within Section 5.2 of this report allows the Planning Policy requirements discussed within Section 5.1 to be satisfied.

5.2.1 Suitability of Site For Residential Use

The most relevant and credited guidance covering desirable levels of environmental noise for indoor and outdoor environments are the World Health Organisation (WHO), 1999 ‘Guidelines for Community Noise’⁵, BS 8233:2014⁶ and ProPG 2017⁷.

These documents set out guideline internal and external noise limits which should be met by all residential developments to ensure the critical effects of noise on sleep, annoyance and speech interference are guarded against. Further to this, ProPG advocates a holistic approach with good acoustic design being a key consideration which is not just reliant on achieving the required guideline noise limits.

A summary of the recommended noise criteria within these documents and relevant to the proposed Development is provided in **Table 5-1**.

Table 5-1: Summary of Recommended Noise Criteria for Residential Amenity

Activity	Location	Noise Level	
		Day time	Night-time
Resting	Living room	35 dB L _{Aeq,16h}	-
Dining	Dining room/area	40 dB L _{Aeq,16h}	-
Sleeping (daytime resting)	Bedrooms	35 dB L _{Aeq,16h}	30 dB L _{Aeq,8h} 45 dB L _{Amax,F} (note 4)
Relaxing, Enjoyment	Private gardens	50-55dB L _{Aeq,16h}	-

When considering external amenity spaces such as gardens, balconies and terraces, the guidance provided in BS 8233 and reproduced in ProPG states:

“the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50-55 dB L_{Aeq,16h}. These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these

⁵ World Health Organisation (WHO) (1999); ‘Guidelines for Community Noise’, WHO, Geneva.

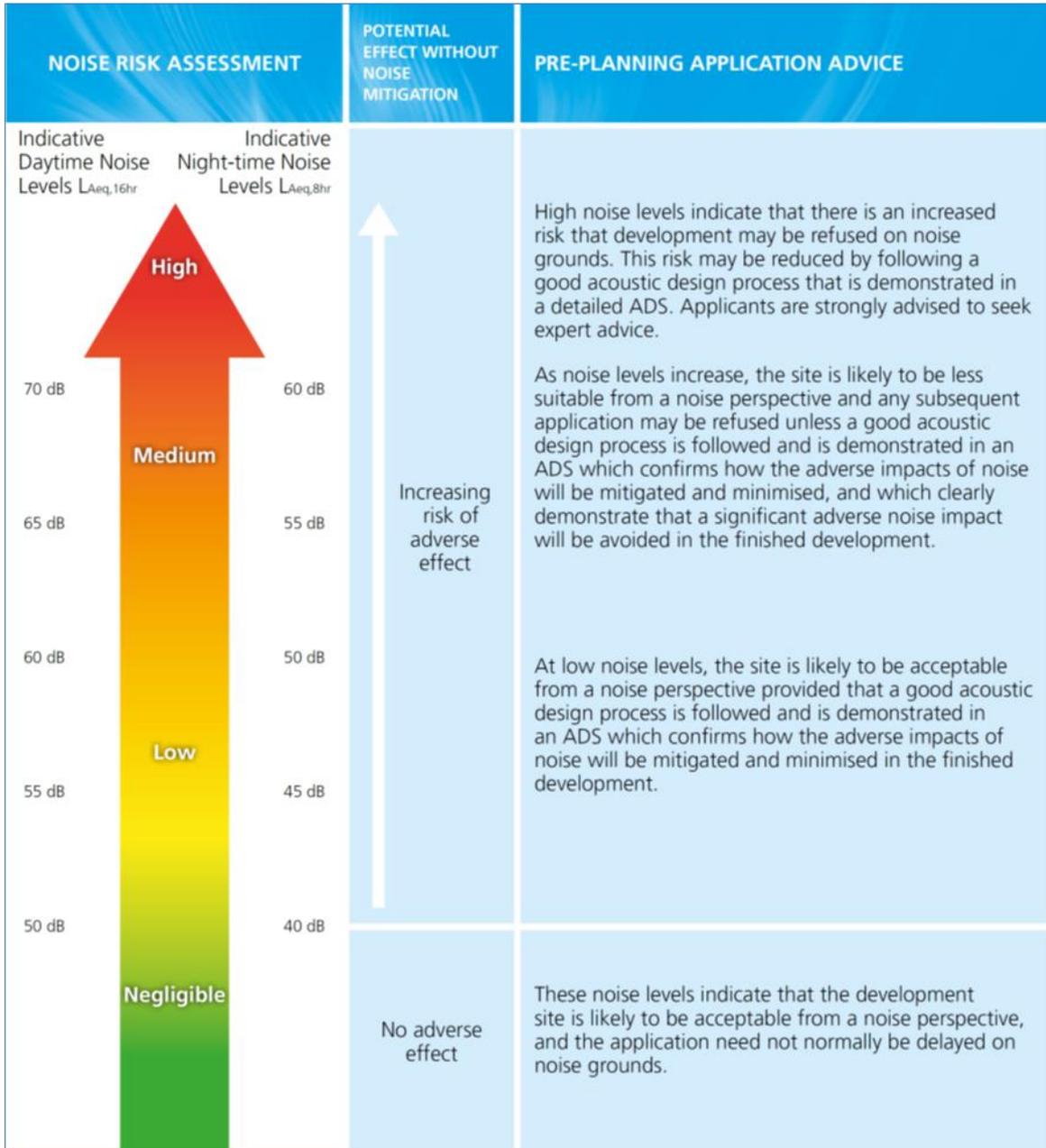
⁶ BSI (2014) BS8233 ‘Guidance on sound insulation and noise reduction in buildings’. BSI.

⁷ ProPG: (May 2017); Professional Practice Guidance on Planning & Noise. New Residential Development.

external amenity spaces but should not be prohibited.”

Figure 5.1 has been reproduced from ProPG illustrating the associated noise risks based on the prevailing noise levels. It is important to note that the assessment of noise risk serves to provide an indication as to the initial suitability of the site for residential development and as to what the acoustic issues are likely to be.

Figure 5-1 ProPG Stage 1 Initial Site Noise Risk Assessment



Note:

a). Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation

measures.

b). Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is “not dominant”.

c) $L_{Aeq,16h}$ is for daytime 0700-2300, $L_{Aeq,8hr}$ is for night-time 2300-0700.

d. An indication that there may be more than 10 noise events at night (2300-0700) with $L_{Amax,F}>60dB$ means the site should not be regarded as negligible

The assessment of residential amenity also has regard to the overarching guidance detailed within the National Planning Policy Framework⁸ (NPPF) which states in paragraph 180 that “*the 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.*” Further to this NPPF state that the development 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 quality of life.*”

Paragraph 182 of the NPPF introduces the ‘agent of change’ principle, in that “*Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.*”

⁸ Ministry of Housing, Communities and Local Government. (Feb 2019) National Planning Policy Framework. HMSO.

6. Baseline Conditions

6.1 Sensitive Receptors

The area surrounding the Site is predominantly rural in nature with the residential area of Mastin Moor to the north and Woodthorpe to the west. Within the Development Site itself is the residential property of Pumphouse Farm. Immediately to the south of the Development Site adjacent to Woodthorpe Road is the isolated dwelling of 22 Woodthorpe Road. Existing sensitive receptors that may be adversely affected by the Development are presented as **Table 6-1** and illustrated in **Figure 3**.

Table 6-1: Sensitive Receptors

Sensitive Receptors Ref. (Figure 6-1)	Receptor Type	Address/Name	Distance from Site Boundary (m)	Sensitivity
A	Residential	Mastin Moor Residential Area (North of A619)	40	High
B	Residential	Woodthorpe Residential Area (East of Norbriggs Road)	20	High
C	Residential	The Paddocks	10	High
D	Residential	Pumphouse Farm	10	High
E	Residential	22 Woodthorpe Road	15	High
F	Residential	Woodthorpe Hall Farm	55	High
G	Residential	Mastin Moor Residential (South of A619)	20	High
H	Residential	Castle View	15	High
J	Health	Cambian Acer Clinic	30	High

6.2 Current Baseline

A baseline noise survey was undertaken from Thursday 2nd July 2015 to Friday 3rd July 2015. The baseline strategy, which was agreed in advance with Environmental Health of CBC, consisted of three un-attended long-term noise monitoring locations at site boundaries supplemented with short-term attended noise measurements. **Figure 6-1** presents the noise monitoring locations.

Table 6-2 provides a description of the noise monitoring locations with a summary of results presented as **Table 6-3**.

Table 6-2: Noise Monitoring Locations

Ref	Location Description	Observations
LT1	Worksop Road northern site boundary near Mastin Moor	Dominant noise source road traffic noise.
LT2	Woodthorpe Road southern site boundary	Dominant noise source road traffic. Noise from Seymour Colliery discernible.

Ref	Location Description	Observations
LT3	Bolsover Road eastern site boundary	Dominant noise source road traffic noise.
ST1	Within the vicinity of Pumphouse Farm	Distant road traffic noise. Infrequent bird scarer noise.
ST2	Woodthorpe residential area (rear of houses) western site boundary	Distant road traffic noise. Infrequent bird scarer noise.
ST3	Castle View road eastern site boundary	Dominant noise source road traffic noise
ST4	Bolsover Road/Woodthorpe Road south-east corner.	Dominant noise source road traffic noise.
ST5	Southern site boundary mid-field location.	Distant road traffic noise.
ST6	Worksop Road northern site boundary east of Bolsover Road.	Dominant noise source road traffic noise.

Table 6-3: Summary of Baseline Noise Measurements

Location (Figure 6-1)	Period	Period	L _{Aeq,T} dB	L _{A10,T} dB	L _{A90,T} dB		L _{AFmax,5min} dB
			Ave ¹	Ave ²	Ave ²	Mode	90 th Percentile ³
LT1	Day	07:00-23:00	61	64	50	50	70
	Night	23:00-07:00	55	55	38	32	66
LT2	Day	07:00-23:00	54	54	42	43	67
	Night	23:00-07:00	48	45	38	34	56
LT3	Day	07:00-23:00	64	64	39	38	80
	Night	23:00-07:00	56	46	35	31	66
ST1	Day	12:55 - 14:00	42	44	37	37	52
ST2	Day	14:30 - 15:35	44	46	37	39	57
		10:15 - 10:50	52	51	37	37	63
ST3	Day	16:22 - 16:57	52	54	47	48	63
ST4	Day	11:05 - 11:40	55	60	44	43	72
ST5	Day	11:50 - 12:10	44	47	37	36	59
ST6	Day	12:40 - 15:40	61	64	47	47	72

Notes: ¹Logarithmic average. ²Arithmetic average. ³ The 90th percentile L_{AFmax} value (equivalent to the 10th highest measured L_{AFmax} level) has been used in the assessment and is considered representative of typical L_{AFmax} levels experienced. All figures rounded to nearest whole decibel.

The main noise source affecting the Development Site is road traffic noise, predominantly Worksop Road (A619) to the north with contributions from Bolsover Road to the east, Woodthorpe Road to the south and Norbriggs Road to the west. Further details of the baseline noise survey are presented in **Appendix B**.

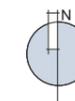
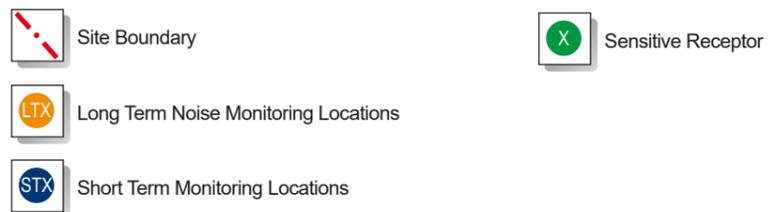
6.2.1 Vibration

There are no existing sources of vibration proximate to the Site, such as a railway line or industrial drop forge press, nor was tactile vibration observed during the baseline survey. On this basis baseline vibration conditions are taken as zero and it is against this that potential vibration effects during the construction phase have been assessed.

6.2.2 Covid-19

At the time of undertaking this assessment and writing the report, Covid-19 is having a direct effect on baseline environmental noise levels due to changes in transport, industrial, commercial and human activity. In light of this conducting a baseline noise survey at the present time may not provide a robust basis for assessment.

The dominant noise source incident on the Site is road traffic noise. It is understood from the transport planners (Arup) that baseline conditions in 2014 are considered representative of 2019 base flows (for the local network based on review of historical ATC data, and as agreed with DCC). The results of the 2015 survey are therefore considered to be representative of pre-Covid conditions and are the basis for the EIA, which is considered to be a conservative approach.



Project Details	WIE13188-100: Mastin Moor
Figure Title	Figure 6-1: Sensitive Receptor & Noise Monitoring Locations.
Figure Ref	WIE13188-100_GR_ES_6-1A
Date	October 2020
File Location	\\s-inc\wiel\projects\wie13188\100\graphics\es\issued figures

6.3 Future Baseline

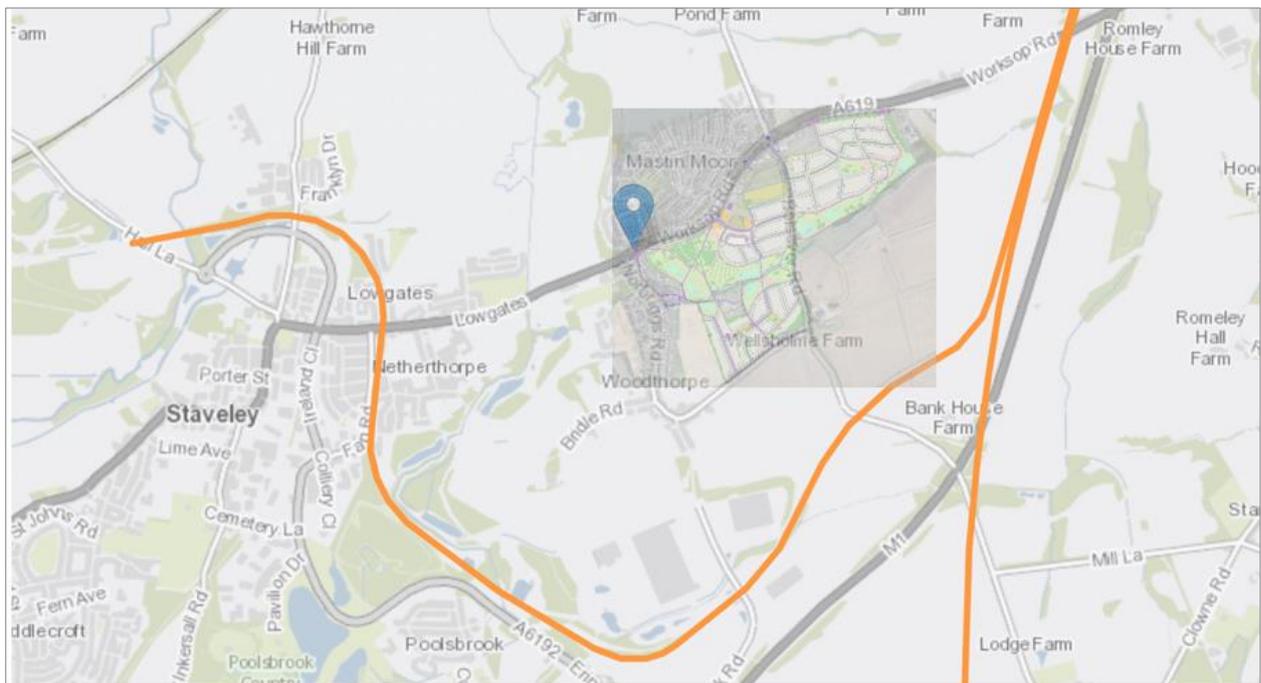
The baseline noise level at the Site is determined predominantly by road traffic noise. This will increase gradually over time due to natural increase in the number of vehicles. Based on forecast traffic data provided by Arup this would result in up to +2dB increase in noise from Worksop Road and Bolsover Road adjacent to the Site, +2.4dB increase from Norbriggs Road and +1.9dB increase from Woodhouse Road compared to 2019 baseline levels. Regard to future baseline noise levels will be considered in the assessment of residential amenity. It should be noted that the overall future baseline as a result of the Development is not significantly different to that without Development.

6.3.1 HS2 Phase 2b

The route for HS2 Phase 2b hasn't been confirmed yet and may change. Currently the proposed route of the eastern leg (West Midlands to Leeds) has the Staveley spur to the south of the Site (approximately 380m at the shortest point) and the HS2 main line approximately 540m to the east at the shortest point proximate to the M1. **Figure 6-2** presents the proposed route for section LA11 Staveley to Aston.

Noise contour data is currently not available for the proposed HS2 Phase 2b route therefore it is not possible to report how this may affect future noise levels incident on the Site. It should be noted however that the HS2 Phase 2b scheme will incorporate mitigation measures^{9,10} where required to reduce noise emissions, such as through provision of absorptive barriers, earth bunds etc. The assumption is that the HS2 scheme will provide adequate measures to safeguard residential areas.

Figure 6-2: Proposed HS2 Route – Section LA11 Staveley to Aston



Source for basemap: <https://www.hs2.org.uk/where/route-map/#15/53.2633/-1.3279>

⁹ AECOM, ARUP et al. (October 2018). HS2 High Speed Rail (Crewe to Manchester and West Midlands to Leeds). Working Draft Environmental Statement. Volume 2: Community Area Report LA11: Staveley to Aston. Department for Transport.

¹⁰ <https://assets.hs2.org.uk/wp-content/uploads/2018/10/19140011/Control-of-Airborne-Noise.pdf> [accessed 5/10/2020].

6.3.2 Vibration

There are no future potential vibration sources that would alter baseline conditions. The future baseline vibration level is therefore unchanged from the current baseline condition of zero.

7. Mitigation

7.1 Construction Phase

A Construction Environmental Management Plan (CEMP) would be formulated in consultation with CBC, incorporating relevant legislation and other relevant guidance. The CEMP would set out a range of mitigation measures and environmental controls which would include the management of construction related noise and vibration. The Site would also be registered for the Considerate Constructors Scheme. Control measures to minimise noise would include:

- use of hoarding to the required height and density appropriate to the noise sensitivity of the Site;
- use of modern, quiet and well maintained machinery such as electric powered plant;
- vehicles and mechanical plant would be fitted with exhaust silencers, which would be maintained and operated in such a manner as to minimise noise emissions in accordance with the relevant EU / UK noise limits applicable to that equipment or no noisier than would be expected based the noise levels quoted in BS5228. Plant should also be properly maintained and operated in accordance with manufacturers' recommendations. Electrically powered plant would be preferred, where practicable, to mechanically powered alternatives;
- if considered necessary, establish noise and vibration target levels (a Section 61 agreement under the Control of Pollution Act 1974 (COPA)) to reduce noise and vibration to a minimum in accordance with best practicable means, as defined in Section 72 of COPA. If required, monitoring of noise and vibration would be undertaken;
- positioning plant as far away from residential properties as physically possible;
- vibration isolation of plant/equipment within vicinity of receptors;
- cut-off trenches for piling activities (if considered necessary);
- works would be limited to the specified hours, which would be agreed with CBC; and
- liaison with the occupants of adjacent residential properties most likely to be affected by noise or vibration. The occupants should be informed of the nature of the works, proposed hours of work and anticipated duration prior to the commencement of activities.

Based on information within BS5228-1:2009+A1:2014, the above mitigation measures should afford 10dB(A) attenuation.

The potential effects from construction traffic on the surrounding road network could be reduced through implementation of a Construction Traffic Management Plan (CTMP). The CTMP should include such measures as follows:

- limiting the number of deliveries within any one-hour period or the total number over a working day;
- scheduling deliveries outside of peak AM or PM periods, where possible;
- designating Site access / egress routes for HGV's and deliveries to avoid residential properties where possible; and
- scheduling delivery in working hours to ensure delivery vehicles are not waiting outside the Site.

7.2 Operational Phase

7.2.1 Fixed External Plant

Fixed external plant and building services are likely to be present in the Local Centre (which includes local retail, health facilities, leisure facilities and offices). Although location, type and number are not known, at this stage plant specification is sufficiently flexible as to ensure that suitably quiet, non-tonal plant can be procured and / or mitigation options such as screening (e.g. acoustic louvres) can be installed as necessary to ensure that guideline noise criteria are satisfied.

Measures to control noise from fixed mechanical plant to the required level as agreed with CBC, would be inherent in the detailed design of the development and may include:

- Procurement of 'quiet' non-tonal plant;
- Locate plant and air vents away from sensitive receptors;
- Acoustic enclosures;
- In-duct attenuators;
- Acoustic louvres; and
- Isolation of plant from building structures

7.2.2 Non-Residential Uses and Servicing Noise

During the detailed design stages of the Development, the sound insulation performance requirements of the external building fabric would be appropriately specified to control noise break-out, having regard to the nature of future uses. Noise from non-residential uses would be subject to standard controls that could be secured through planning conditions.

Development of a Servicing Management Plan (SMP) would mitigate noise from this source and may include:

- Managing the deliveries (including by courier) and servicing requirements of retail, office and leisure tenants;
- Hours of operation of the for any servicing areas and loading bays; and
- Refuse and recycling collections.

7.2.3 Road Traffic Noise

No mitigation is proposed to mitigate against changes in road traffic noise.

8. Residual Effects

8.1 Construction

8.1.1 Noise

Table 8-1 presents the predicted construction noise levels at the SRs taking account of CEMP measures. The effect level takes account of prevailing noise level and the construction threshold level. Further details are presented within Appendix C.

Should the build out be phased then there is the potential for part of the site to be occupied whilst construction works are on-going. To take account of this potential scenario, calculations for future receptors which form part of the Development were based on a minimum distance of 15m from construction works to determine the likely residual effects. This is considered to be a reasonable conservative approach as in most cases it is likely that works would be undertaken at greater distance.

Table 8-1: Construction Noise & Effect Level With CEMP

SR (refer to Figure 3)	Description	Activity and Noise Level (dB(A))			
		Earth Moving	CFA Piling	Concreting	Road Paving
SR - A	Mastin Moor Residential Area (North of A619)	62 Minor Adverse	63 Minor Adverse	61 Minor Adverse	59 Negligible
SR - B	Woodthorpe Residential Area (East of Norbriggs Road)	68 Moderate Adverse	53 Minor Adverse	67 Moderate Adverse	65 Minor Adverse
SR - C	The Paddocks	74 Moderate Adverse	54 Minor Adverse	73 Moderate Adverse	71 Moderate Adverse
SR - D	Pumphouse Farm	74 Moderate Adverse	66 Moderate Adverse	73 Moderate Adverse	71 Moderate Adverse
SR - E	22 Woodthorpe Road	71 Moderate Adverse	72 Moderate Adverse	70 Moderate Adverse	68 Moderate Adverse
SR - F	Woodthorpe Hall Farm	59 Minor Adverse	60 Minor Adverse	58 Minor Adverse	56 Minor Adverse
SR - G	Mastin Moor Residential (South of A619)	68 Moderate Adverse	69 Moderate Adverse	67 Moderate Adverse	65 Minor Adverse

SR (refer to Figure 3)	Description	Activity and Noise Level (dB(A))			
		Earth Moving	CFA Piling	Concreting	Road Paving
SR - H	Castle View	71 Moderate Adverse	61 Minor Adverse	70 Moderate Adverse	68 Moderate Adverse
SR - I	Cambian Acer Clinic	64 Minor Adverse	60 Negligible	64 Minor Adverse	62 Minor Adverse
SR - J	Future SR	71 Moderate Adverse	72 Moderate Adverse	70 Moderate Adverse	68 Moderate Adverse

All residual effect levels identified in Table 8-1 are adverse, temporary and local and are when works are undertaken at the shortest distance to the receptor.

Table 8-2 presents the significance of the effect level based on site specifics and absolute noise level.

Table 8-2: Significance of Effect From Construction Noise

SR	Description	Significance
SR A) Mastin Moor Residential Area (North of A619)	All of the predicted noise levels are below the construction threshold noise level of 65dB $L_{Aeq,T}$	Insignificant
SR B) Woodthorpe Residential Area (East of Norbriggs Road)	All of the predicted noise levels are below the threshold limit of 75dB $L_{Aeq,T}$.	Insignificant
SR C) The Paddocks	All of the predicted noise levels are below the threshold limit of 75dB $L_{Aeq,T}$.	Insignificant
SR D) Pumphouse Farm	All of the predicted noise levels are below the threshold limit of 75dB $L_{Aeq,T}$.	Insignificant
SR E) 22 Woodthorpe Road	All of the predicted noise levels are below the threshold limit of 75dB $L_{Aeq,T}$.	Insignificant
SR F) Woodthorpe Hall Farm	All of the predicted noise levels are below the construction threshold noise level of 65dB $L_{Aeq,T}$	Insignificant

SR	Description	Significance
SR G) Mastin Moor Residential (South of A619)	All of the predicted noise levels are below the threshold limit of 75dB $L_{Aeq,T}$.	Insignificant
SR H) Castle View	All of the predicted noise levels are below the threshold limit of 75dB $L_{Aeq,T}$.	Insignificant
SR I) Cambian Acer Clinic	All of the predicted noise levels are below the construction threshold noise level of 65dB $L_{Aeq,T}$.	Insignificant
SR J) Future SR	All of the predicted noise levels are below the threshold limit of 75dB $L_{Aeq,T}$.	Insignificant

All of the significance of effects resultant from construction noise is considered to be insignificant as all of the predicted noise levels with CEMP provisions are below the threshold limit of 75dB $L_{Aeq,T}$.

8.1.2 Vibration

Table 8-3 presents typical distances for various construction operations which give rise to just perceptible vibration.

Table 8-3: Distance at Which Vibration Just Perceptible

Construction Activity	Distance from Activity when Vibration may Just be Perceptible (metres) ¹
Heavy Vehicles	5 – 10
Excavation	10 – 15
CFA Piling	15 – 20
Rotary Bored Piling	20 – 30
Vibratory Piling	40 - 60

Note: ¹Distances for perceptibility are only indicative and dependent upon a number of factors such as the radial distance between source and receiver, ground conditions and underlying geology.

Table 8-4 presents typical vibration levels for rotary bored and driven piling, extracted from BS5228-2.

Table 8-4: Typical Piling Vibration Levels With Distance (PPV mm/s) BS5228-2¹

Distance (m)	Rotary Bored Piling PPV mm/s	Driven Cast In Place Piling (drop hammer) PPV mm/s
5	0.22 – 0.54	3.2 – 10.7
10	0.30 – 1.10	2.2 – 7.7
20	0.05 – 0.55	2.7 – 5.0

Distance (m)	Rotary Bored Piling PPV mm/s	Driven Cast In Place Piling (drop hammer) PPV mm/s
30	0.03	<1 – 2.6

Note: ¹Dependent on ground conditions and underlying geology.

Table 8-5 presents the residual effects and significance of these. Based on distance of existing receptors to the Site, piling works and CEMP measures, residual vibration effects range from negligible to minor adverse and are therefore insignificant. This is when works are undertaken at the shortest distance and based on either CFA or rotary bored piling. This would need to be reassessed should impact piling be employed.

Table 8-5: Vibration Qualitative Assessment Results

SR	Distance from Site Boundary (m)	Distance From Piling (m)	Potential Effect Level	Significance to Disturbance	Significance Damage to Buildings
SR A) Mastin Moor Residential Area (North of A619)	40	40	Negligible	Insignificant	Insignificant
SR B) Woodthorpe Residential Area (East of Norbriggs Road)	20	125	Negligible	Insignificant	Insignificant
SR C) The Paddocks	10	115	Minor Adverse	Insignificant	Insignificant
SR D) Pumphouse Farm	10	30	Minor Adverse	Insignificant	Insignificant
SR E) 22 Woodthorpe Road	15	25	Minor Adverse	Insignificant	Insignificant
SR F) Woodthorpe Hall Farm	55	60	Negligible	Insignificant	Insignificant
SR G) Mastin Moor Residential (South of A619)	20	20	Minor Adverse	Insignificant	Insignificant
SR H) Castle View	15	50	Minor Adverse	Insignificant	Insignificant
SR I) Cambian Acer Clinic	30	60	Negligible	Insignificant	Insignificant
SR J) Future SR	15 from works		Minor Adverse	Insignificant	Insignificant

Due to distance separation between works and the receptors, the level of vibration arising from construction works are not anticipated to result in damage to buildings. Generally, where PPVs are less than 10mm/s the risk of damage to building tends towards zero. On this basis the effect of vibration damage to buildings is insignificant.

8.1.3 Construction Traffic

At this stage in the development the potential daily movements of construction traffic is not known. Based on CRTN calculation methodology and DMRB assessment criteria, a 25% increase in traffic volume would be required to result in a 1dB increase in road traffic noise levels which is just minor adverse effect on high sensitive receptors and considered insignificant.

During the 2019 AM/PM peak periods on Worksop Road (A619), the transport consultant estimated hourly flows ranging from 1291-1797 vehicles with 158-310 HGVs. Due to the high volumes of traffic on Worksop

Road and percentage HGVs it is considered that increases in traffic volume due to construction traffic on Worksop Road is likely to give rise to negligible effects and therefore insignificant.

On Bolsover Road and Woodthorpe Road the hourly AM/PM peak traffic flow is much lower than Worksop Road with 352-438 vehicles and 41-102 HGVs and 204-216 vehicles and 11-15 HGVs respectively. On Norbriggs Road the traffic flow is comparable to Woodthorpe Road ranging from 207-249, but the number of HGVs is much lower, 2-5 HGVs. Depending on the volume of construction traffic associated with the Development, qualitatively it is considered that there is the potential for some short-term, temporary, local, minor adverse effects at properties of Woodthorpe adjacent to Norbriggs Road and The Paddocks. Overall with the implementation of a CTMP the effect is considered to be insignificant. It is recommended this is reassessed once more detail is known such as routing of construction vehicle and number of daily vehicles movements.

8.2 Completed Development

8.2.1 Fixed Plant & Building Service Noise

Should fixed plant and building services form part of the development then there is the potential for adverse effects on existing and future residents. At this outline stage of the Development it is not possible to quantitatively assess the significance of potential noise emissions from fixed plant and building services. Qualitatively however it is considered that through implementation of mitigation measures where required to satisfy the recommended plant noise limits this would result in negligible residual effects.

Recommended plant noise limits are presented in **Table 8-6**, which has regard to the advice in BS4142 but would be subject to agreement with CBC, and are set 5dB below the prevailing background noise level with a minimum value of 35dB $L_{Ar,Tr}$ which would adequately safeguard residents from disturbance.

Table 8-6: Recommended Plant Noise Limits

SR (Figure 1)	Logarithmic Average		Arithmetic Average (Modal Value)		Plant Noise Limit Levels $L_{Ar,Tr}$	
	$L_{Aeq,T}$		$L_{A90,T}$		Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
	Day	Night	Day	Night		
A Mastin Moor (North of A619)	61	55	50 (50)	38 (32)	≤45	≤35 ^[1]
B Woodthorpe	52	-	37 (37)	-	≤35 ^[1]	≤35 ^[1]
C The Paddocks	52	-	37 (37)	-	≤35 ^[1]	≤35 ^[1]
D Pumphouse Farm	42	-	37 (37)	-	≤35 ^[1]	≤35 ^[1]
E 22 Woodthorpe Road	54	48	42 (43)	38 (34)	≤37	≤35 ^[1]

SR (Figure 1)	Logarithmic Average		Arithmetic Average (Modal Value)		Plant Noise Limit Levels $L_{Ar,Tr}$	
	$L_{Aeq,T}$		$L_{A90,T}$		Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
	Day	Night	Day	Night		
F Woodthorpe Hall Farm	64	56	39 (38)	35 (31)	$\leq 35^{[1]}$	$\leq 35^{[1]}$
G Mastin Moor (South of A619)	61	55	50 (50)	38 (32)	≤ 45	$\leq 35^{[1]}$
H Castle View	52	-	47 (48)	-	≤ 42	$\leq 35^{[1]}$
I Cambian Acer Clinic	61	55	50 (50)	38 (32)	≤ 45	n/a

Note: [1] Minimum value of 35dB $L_{Ar,Tr}$ recommended where 5dB below the background noise level is lower than this value.

With regard to residential uses which form part of the Development, it is recommended that plant noise levels should not exceed 40dB $L_{Ar,Tr}$ at 1 metre from the façade of the nearest property during the daytime period and 35dB $L_{Ar,Tr}$ during the night-time period. This would adequately safeguard future residents from adverse effects from these sources.

Provided the plant noise limits are satisfied, residual effects would be negligible and therefore insignificant.

8.2.2 Non-Residential Uses and Servicing Noise

The Development would include retail and other local service elements with the potential for residential use above. At this outline stage tenant details are not known as are the details of fit out and servicing associated with these elements. Noise break out from the structural elements is expected to be insignificant due to the façade insulation that would be provided by the buildings. This would attenuate internally generated noise to below existing ambient noise levels.

Standard controls secured through planning conditions relating to opening hours and use of outside space would be used to minimise the likely noise effects. This, together with provision of engineered mitigation where required and implementation of a servicing management plan (SMP), would also act to mitigate against potential noise effects from servicing noise. Therefore qualitatively, residual noise effects associated with non-residential uses and servicing noise is expected to be negligible but with the potential for intermittent, local minor adverse effects and therefore insignificant.

8.2.3 Road Traffic Noise

Based upon traffic data provided by the Applicant's transport consultant (Arup), the likely change in road traffic noise on the local road network due to traffic generated by the completed and operational Proposed Development is presented in **Table 8.7**. Full details of the road traffic noise assessment are provided within **Appendix D**. The short-term (2026 DM v DS) assessments indicate that potential effects from changes in

road traffic noise are negligible, with the exception of Bolsover Road (03 link) where minor adverse effects are predicted and are therefore insignificant.

Table 8-7: Predicted Change in Short-Term Road Traffic Noise Levels

Ref	Road Link	Predicted BNLs		Difference in dB
		2026 No Development (DM)	2026 With Development (DS)	LA10,18hr BNL Short-Term 2026 DM v 2026 DS
1	Worksop Road 01	74.8	75.0	0.2
2	Worksop Road 02	74.6	74.9	0.2
3	Worksop Road 03	74.6	75.0	0.4
4	Worksop Road 04	74.6	74.5	0.0
5	Worksop Road 05	74.5	74.6	0.1
6	Bolsover Road 01	69.1	69.7	0.6
7	Bolsover Road 02	71.3	72.1	0.9
8	Bolsover Road 03	71.3	72.3	1.0
9	Bolsover Road 04	71.1	71.4	0.3
10	Bolsover Road 05	70.9	71.4	0.5
11	Norbriggs Road 01	61.5	62.0	0.5
12	Norbriggs Road 02	61.2	61.9	0.7
13	Woodthorpe Road 01	66.5	66.8	0.3
14	Woodthorpe Road 02	62.7	62.5	-0.1
15	Woodthorpe Road 03	62.7	62.9	0.2
16	Lowgates 01	73.3	73.4	0.1
17	Duke Street 01	70.3	69.9	-0.4
18	Renishaw Road 01	69.4	69.7	0.3

The predicted change in road traffic noise levels based on forecast traffic data provided by Arup, indicate that specific mitigation is not required.

9. Residential Amenity

An assessment of residential amenity has been undertaken by making comparison between baseline noise levels and criteria presented within ProPG New Residential Development, which is drawn from BS8233 and WHO. The predicted baseline daytime and night-time noise levels across the site have been determined using the noise modelling software package Cadna-A® which has input the 2019 baseline traffic data on the surrounding road network, calibrated against the baseline survey data.

The noise model is 3-dimensional based on the topographic information provided by Idom Merebrook. The dominant noise source affecting the site is road traffic noise from the surrounding road network.

Figures 9.1 and **9.2** present the day and night-time contour plots across the Development Site respectively.

9.1 ProPG Initial Site Noise Risk Assessment

During both the day and night-time periods the majority of the Site is exposed to noise levels regarded as negligible to low risk increasing to medium risk proximate to Worksop Road and Bolsover Road, refer to Figures 9.1 and 9.2. This indicates that for the majority of the Site (green colour) noise is not a material consideration to residential development. For areas exposed to low (yellow) to medium (orange) noise risk, such as proximate to Worksop Road and Bolsover Road, the Site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed to minimise the adverse effects of road traffic noise from the surrounding road network.

9.2 External Amenity

During the daytime period the majority of the un-occupied (undeveloped) site is exposed to noise levels below 55dB $L_{Aeq,16h}$. A noise level of ≤ 55 dB $L_{Aeq,16h}$ is regarded by WHO to protect the majority of people from serious annoyance and is frequently taken as an acceptable level of external residential amenity. Depending on the intervening topography and screening, the stand-off distance to the 55dB $L_{Aeq,16h}$ contour is approximately 65 metres from Worksop Road (A169), and approximately 50 metres from Bolsover Road (B4169). On this basis mitigation may be required depending on the location of external amenity areas in relation to both Worksop Road and Bolsover Road.

The majority of the Application Site is however suitable for residential external amenity without specific mitigation measures.

9.3 Internal Amenity

It is generally accepted that where daytime façade noise levels are ≤ 50 dB $L_{Aeq,16h}$ the internal ambient noise level (IANL) with windows open (based on 50% glazing) would be ≤ 35 dB $L_{Aeq,16h}$ thereby satisfying the criteria of BS8233:2014 and WHO. Similarly, night-time façade noise levels of ≤ 45 dB $L_{Aeq,8h}$ and ≤ 60 dB L_{Amax} would result in IANLs of ≤ 30 dB $L_{Aeq,8h}$ and ≤ 45 dB L_{Amax} with windows open, again satisfying the criteria of BS8233 and WHO. Where a natural ventilation strategy is adopted then guidance is that reasonable IANLs can be achieved at levels up to 5dB higher.

The daytime and night-time noise contour plots presented as **Figure 9.1** and **Figure 9.2** respectively, indicate that for the unoccupied (undeveloped) Site the above conditions would be predominantly satisfied where residential uses are proposed and therefore specific mitigation measures would not be required. Where these levels are exceeded, such as proximate to Worksop Road and Bolsover Road then mitigation

in the form of suitable glazing and ventilation strategy would need to be considered. It should be noted that this is for an unoccupied Site and therefore representative of worst-case scenario. When the site is built out the first row of houses adjacent to the road will act to screen the road traffic noise to the houses behind thereby reducing noise levels further into the Site.

9.4 Residential Amenity – Future Noise Levels

As previously stated in Section 3.6.1, the route for HS2 Phase 2b hasn't been confirmed yet and may change. Currently the proposed route of the eastern leg (West Midlands to Leeds) has the Staveley spur to the south of the Site (approximately 380m at the shortest point) and the HS2 main line approximately 540m to the east at the shortest point proximate to the M1.

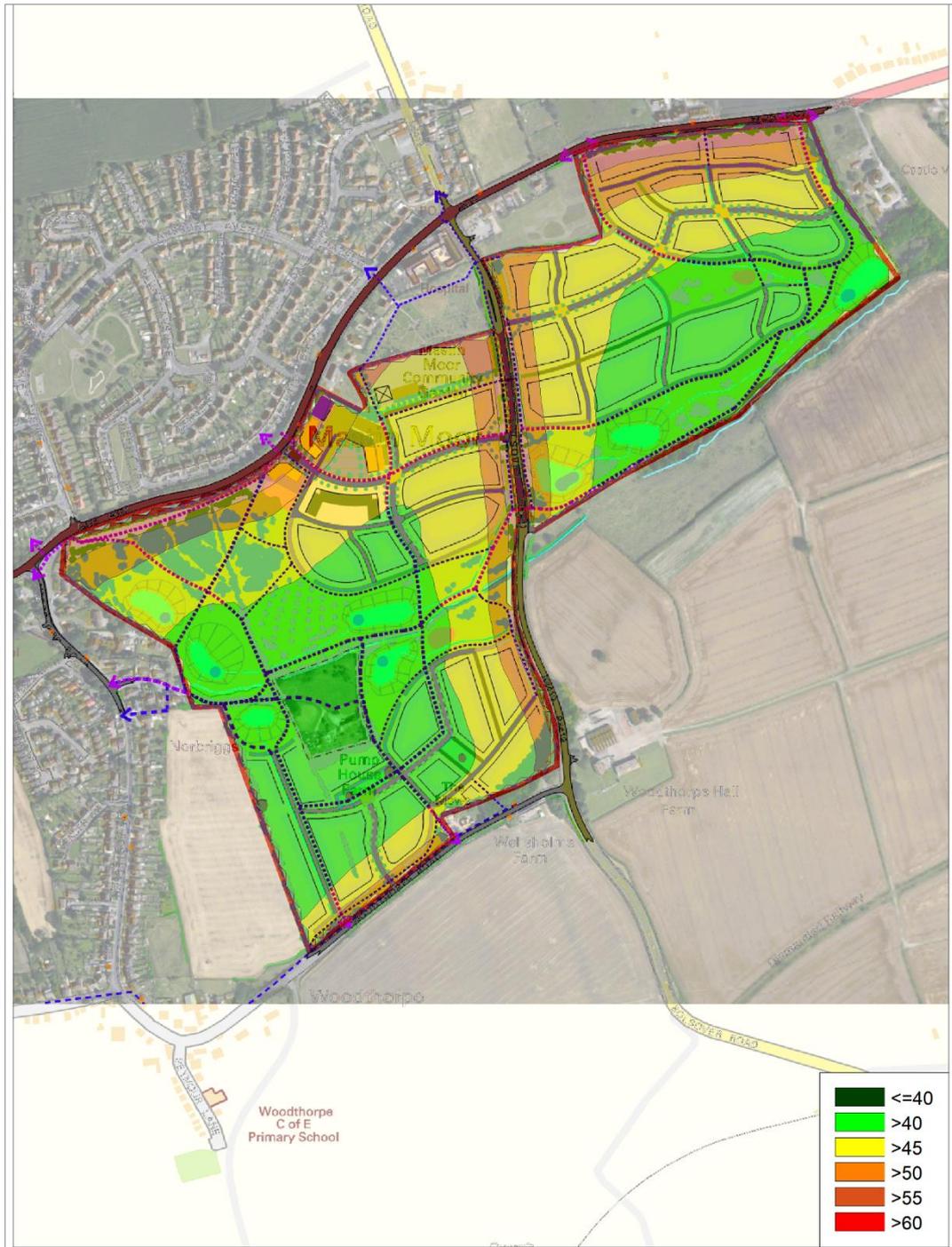
Noise contour data or impact assessment is currently not available for the current proposed route and therefore it is not possible at this stage to determine what additional mitigation measures, if any, may be required for the proposed Development. As part of the EIA process HS2 will identify what mitigation measures it will need to provide to safeguard residential amenity. Should permission for this Development be granted then this will need to a consideration for the finalised HS2 routing, in addition to the potential impact on Woodthorpe and Mastin Moor.

The future noise levels incident on the Site are predicted to increase by approximately 2dB due to increase in road traffic on the surrounding road network. This could be incorporated into the glazing and ventilation strategy for dwellings proximate to Worksop and Bolsover Road once layouts and massing are finalised.

9.5 Open Spaces

Figure 9.1 presents the predicted daytime noise levels within the designated open spaces, namely: play spaces, community garden and allotment, community orchard and naturalistic parkland. In all of these designated areas, excepting some areas of the naturalistic parkland adjacent to Worksop Road and Bolsover Road, together with the community gardens and allotments, are predicted to be exposed to WHO guideline noise levels of $\leq 55\text{dB } L_{Aeq,16h}$ and therefore suitable for their designated use without specific mitigation measures. Presence of higher noise levels within areas of the naturalistic parkland adjacent to Worksop Road and Bolsover Road is considered acceptable given the majority of the naturalistic parkland area is predicted to be exposed to noise levels of $\leq 55\text{dB } L_{Aeq,16h}$. With regard to the community gardens and allotments the predicted daytime noise levels are predominantly $56\text{dB } L_{Aeq,16h}$ and therefore considered acceptable.

Figure 9-2: Night-Time Noise Contour Plot (4m above ground level) dB LAeq,8h



9.6 Residential Amenity Mitigation

Based on prevailing noise levels across the Site, mitigation is only likely to be required at the Site boundaries within the vicinity of the surrounding roads (namely Worksop Road and Bolsover Road) in order to provide suitable residential amenity. The provision of suitable glazing in combination with an appropriate ventilation strategy would allow the IANLs of BS8233 to be satisfied.

The type of mitigation required would be developed at detailed design stage when stand-off distances from dwelling location to Worksop Road and Bolsover Road, together with layout, massing and screening are known. Based on the current information illustrated in the Indicative Masterplan (Drawing M5328-100 Rev D06), this is likely to consist of standard double glazing of the appropriate specification in combination with passive attenuating ventilation. **Table 9.1** presents recommended glazing and ventilation requirements based on prevailing noise levels.

Table 9-1: Indicative Glazing & Ventilation Requirements Based on External Noise Levels

External Noise Level Not Exceeding		Acoustic Performance Requirement	
Day dB L _{Aeq}	Night dB L _{Aeq} (dB L _{AFmax})	Windows dB R _w +C _{tr}	Ventilators dB D _{n,ew} +C _{tr}
<50	<45 (<60)	No requirement	
57	52 (67)	26 (Standard Thermal Glazing)	32 (Standard Window Mounted Trickle Ventilator)
60	55 (70)		
63	58 (73)	29	35
66	61 (76)	32	38
69	64 (79)	35	41
72	67 (82)	38	44

The noise levels within external residential amenity areas within the vicinity of Worksop Road and Bolsover Road could be lowered through strategic Masterplan layout with main garden areas located at the rear of the residential dwellings thereby maximising screening afforded by the building structure itself.

With strategic Masterplan layout within the vicinity of Worksop Road and Bolsover Road together with provision of appropriate glazing and ventilation strategic for those dwellings within the vicinity of Worksop Road and Bolsover Road, suitable residential amenity could be provided. Predominantly however, specific mitigation measures are not required.

Future Noise Levels

Details of HS2 are not yet finalised and therefore it is not possible at this stage to provide advice regarding required mitigation to reduce the noise effects from this source on the proposed Development. It is considered however that the EIA of HS2 once the route is finalised would include mitigation measures, if required, to reduce the potential impact from HS2 on the area of land which is proposed for residential development.

9.7 Open Spaces Mitigation

Due to the location of proposed Open Spaces, mitigation is not proposed as prevailing noise levels are suitable for their intended use, excepting areas of the Naturalistic Park Land adjacent to the surrounding road network together with slight exceedance of the guideline value within the community gardens and allotments. Given this is a small proportion of the total area of Naturalistic Park Land being provided, and that the guideline value is only slightly exceeded within the main area of the community gardens and allotments, this is considered acceptable and therefore specific mitigation is not proposed.

10. Conclusions

The existing noise environment across the Site is currently dominated by road traffic noise, namely from Worksop Road and Bolsover Road.

During the construction works, temporary noise and vibration would be generated from the construction activities and traffic. However, a number of mitigation measures would be implemented throughout the works to minimise noise and vibration levels at existing and future residential properties on and surrounding the Site.

Once completed, noise generated from sources such as fixed plant and services would be controlled through planning conditions as would that from non-residential uses. A summary of the likely significant and residual impacts of the Development are set out in **Table 10.1**.

Following completion of the Development, new sensitive uses would be introduced into the Site, namely residential uses. The prevailing noise levels established across the Site through baseline noise survey and subsequent 3-dimensional noise modelling, indicate the Site is predominantly suitable for residential amenity without specific mitigation measures. For residential areas adjacent to Worksop Road and Bolsover Road suitable residential amenity could be provided through mitigation in the form of suitable glazing and ventilation together with location of garden (external amenity areas) at the rear of buildings.

Table 10-1: Summary of Mitigation Measures and Likely Residual Impacts for the Development

Issue	Mitigation Measures	Likely Residual Effects	Significance
Construction Phase			
Noise	CEMP	Negligible to Moderate Adverse (temporary, short-term, local)	Insignificant
Vibration (Residents)	CEMP	Negligible to Minor Adverse (temporary, short-term, local)	Insignificant
Vibration (Buildings)	CEMP	Negligible	Insignificant
Traffic	Construction Traffic Management Plan	Negligible to Minor Adverse (temporary, short-term, local)	Insignificant
Operational Phase			
Residential Amenity	Glazing and ventilation strategy.	Satisfy BS8233 and WHO guideline values.	Not applicable
External Residential Amenity	Strategic Masterplan layout	Satisfy BS8233 and WHO guideline values.	Not applicable
Open Space	None proposed.	Predominantly areas of this designated use satisfy WHO guideline value. Areas adjacent to transportation noise sources exceed the WHO guideline value	Not applicable
Fixed Mechanical Plant & Building Services	Plant noise limit recommended and generic mitigation measures.	Negligible	Insignificant
Non-Residential Land-Uses	Planning condition. Building design and	Negligible	Insignificant

Issue	Mitigation Measures	Likely Residual Effects	Significance
	implementation of Servicing Management Plan (if required)		
Road Traffic Noise	None.	Negligible to Minor Adverse	Insignificant

APPENDICES

A. Glossary of Acoustic Terminology

Ambient sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.																		
Assessment period	The period in a day over which assessments are made.																		
A-weighting	A frequency weighting applied to measured or predicted sounds levels in order to compensate for the non-linearity of human hearing.																		
Background noise	Background noise is the term used to describe the noise measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L_{90} noise level (see below).																		
Broadband	Containing the full range of frequencies.																		
C_{TR}	An adjustment to the R_w scale to take account of the lower performance against a typical spectrum of road traffic noise dominated by low frequencies.																		
$D_{ne,W}$	Weighted element normalised level difference.																		
Decibel [dB]	<p>The level of noise is measured objectively using a Sound Level Meter. This instrument has been specifically developed to mimic the operation of the human ear. The human ear responds to minute pressure variations in the air. These pressure variations can be likened to the ripples on the surface of water but of course cannot be seen. The pressure variations in the air cause the eardrum to vibrate and this is heard as sound in the brain. The stronger the pressure variations, the louder the sound that is heard.</p> <p>The range of pressure variations associated with everyday living may span over a range of a million to one. On the top range may be the sound of a jet engine and on the bottom of the range may be the sound of a pin dropping.</p> <p>Instead of expressing pressure in units ranging from a million to one, it is found convenient to condense this range to a scale 0 to 120 and give it the units of decibels. The following are examples of the decibel readings of every day sounds:</p> <table border="0" style="margin-left: 20px;"> <tr> <td>Four engine jet aircraft at 100m</td> <td>120 dB</td> </tr> <tr> <td>Riveting of steel plate at 10m</td> <td>105 dB</td> </tr> <tr> <td>Pneumatic drill at 10m</td> <td>90 dB</td> </tr> <tr> <td>Circular wood saw at 10m</td> <td>80 dB</td> </tr> <tr> <td>Heavy road traffic at 10m</td> <td>75 dB</td> </tr> <tr> <td>Telephone bell at 10m</td> <td>65 dB</td> </tr> <tr> <td>Male speech, average at 10m</td> <td>50 dB</td> </tr> <tr> <td>Whisper at 10m</td> <td>25 dB</td> </tr> <tr> <td>Threshold of hearing, 1000 Hz</td> <td>0 dB</td> </tr> </table>	Four engine jet aircraft at 100m	120 dB	Riveting of steel plate at 10m	105 dB	Pneumatic drill at 10m	90 dB	Circular wood saw at 10m	80 dB	Heavy road traffic at 10m	75 dB	Telephone bell at 10m	65 dB	Male speech, average at 10m	50 dB	Whisper at 10m	25 dB	Threshold of hearing, 1000 Hz	0 dB
Four engine jet aircraft at 100m	120 dB																		
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Heavy road traffic at 10m	75 dB																		
Telephone bell at 10m	65 dB																		
Male speech, average at 10m	50 dB																		
Whisper at 10m	25 dB																		
Threshold of hearing, 1000 Hz	0 dB																		
dB(A): A-weighted decibels	The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the 'A' filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.																		
Façade Noise Level	A noise level measured or predicted at the façade of a building, typically at a distance of 1m, containing a contribution made up of reflections from the façade itself (+3 dB).																		
L_{Amax} noise level	This is the maximum noise level recorded over the measurement period.																		
L_{Amin} noise level	This is the lowest level during the measurement period.																		

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L_{Aeq,T} noise level	<p>This is the 'equivalent continuous A-weighted sound pressure level, in decibels' and is defined in British Standard 7445 as the 'value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time'.</p> <p>It is a unit commonly used to describe construction noise, noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise.</p>
L_{A90} noise level	<p>This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.</p>
L_{A10} noise level	<p>This is the noise level which is achieved for 10% of the monitoring period and is often used to describe road traffic noise.</p>
PPV	<p>Peak Particle Velocity (PPV) is the greatest instantaneous particle velocity during a given time interval normally measured in terms of mm/s.</p>
Sound Reduction Index (R)	<p>The sound reduction index is a single-number rating of the sound reduction through a wall or other building element. Since the sound reduction may be different at different frequencies, test measurements are subjected to a standard procedure which yields a single number that is about equal to the average sound reduction in the middle of the human hearing range.</p>
Weighted Sound Reduction Index (R_w)	<p>Single number rating used to describe the laboratory airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.</p>
VDV	<p>This is the vibration dose value, a measure of vibration exposure; the fourth root of the integral, over the measurement period, of the fourth power of the frequency-weighted and time-varying acceleration.</p>

Appendices

B. Baseline Noise Survey

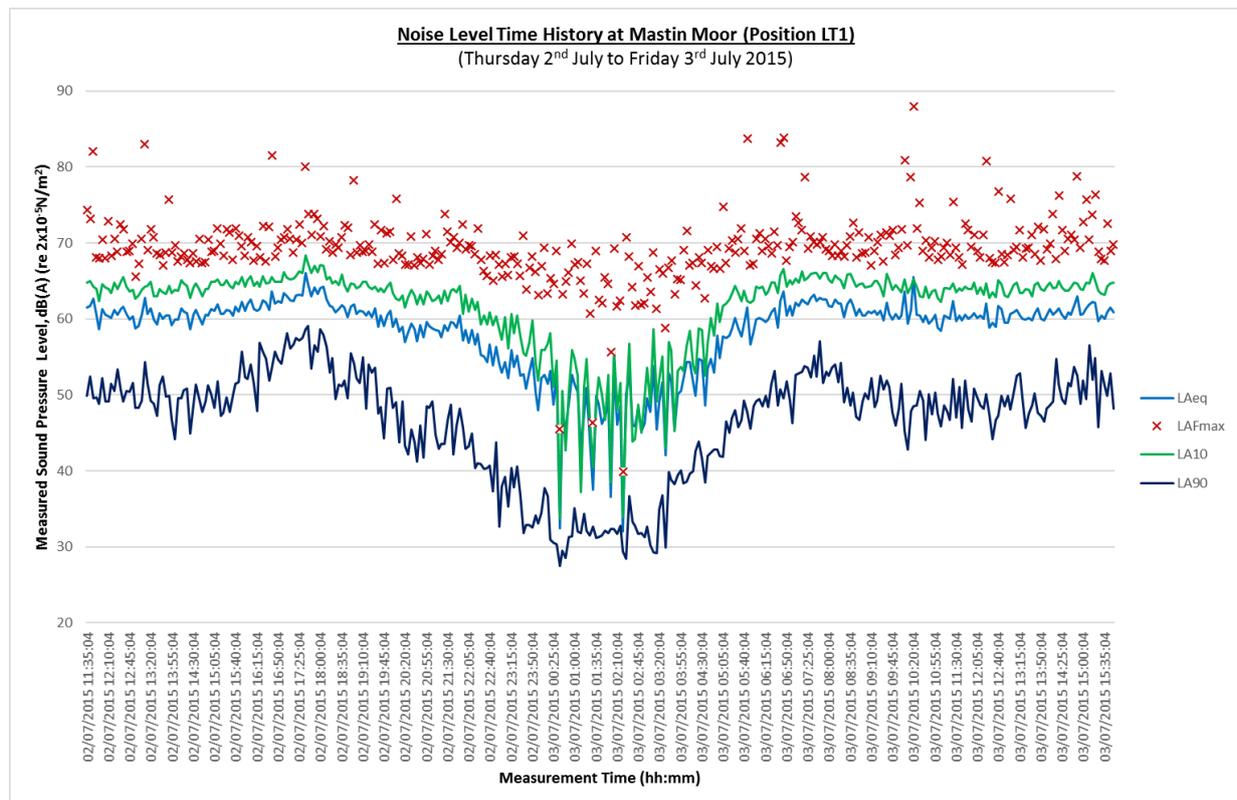
A baseline noise survey was undertaken from Thursday 2nd July 2015 to Friday 3rd July 2015. The baseline strategy, which was agreed in advance with Environmental Health of Chesterfield Borough Council, consisted of three un-attended long-term noise monitoring locations at site boundaries supplemented with short-term attended noise measurements. Figure 1 presents the noise monitoring locations.

All noise equipment was field calibrated before and on completion of the surveys with no significant drift detected. All noise measurements were taken between 1.5-1.5m above ground levels. All equipment held a valid calibration certificate at the time of the noise survey.

The weather conditions during the baseline and attended noise surveys was dry with gentle SW to E breeze ranging from 1 to 2 m/s, and therefore suitable conditions from noise monitoring.

Figures B1 to B3 present the time history plots for noise monitoring locations LT1 (Worksop Road), LT2 (Woodthorpe Road) and LT3 (Bolsover Road).

Figure B1: LT1 (Worksop Road) Time History Plot



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Figure B2: LT2 (Woodthorpe Road) Time History Plot

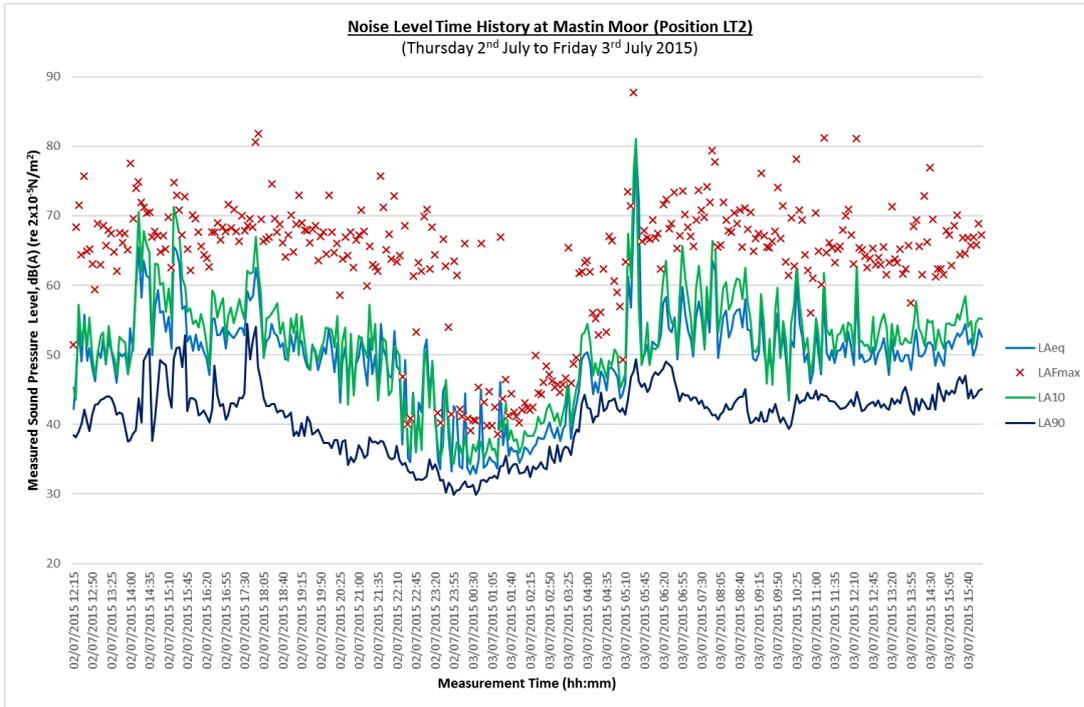
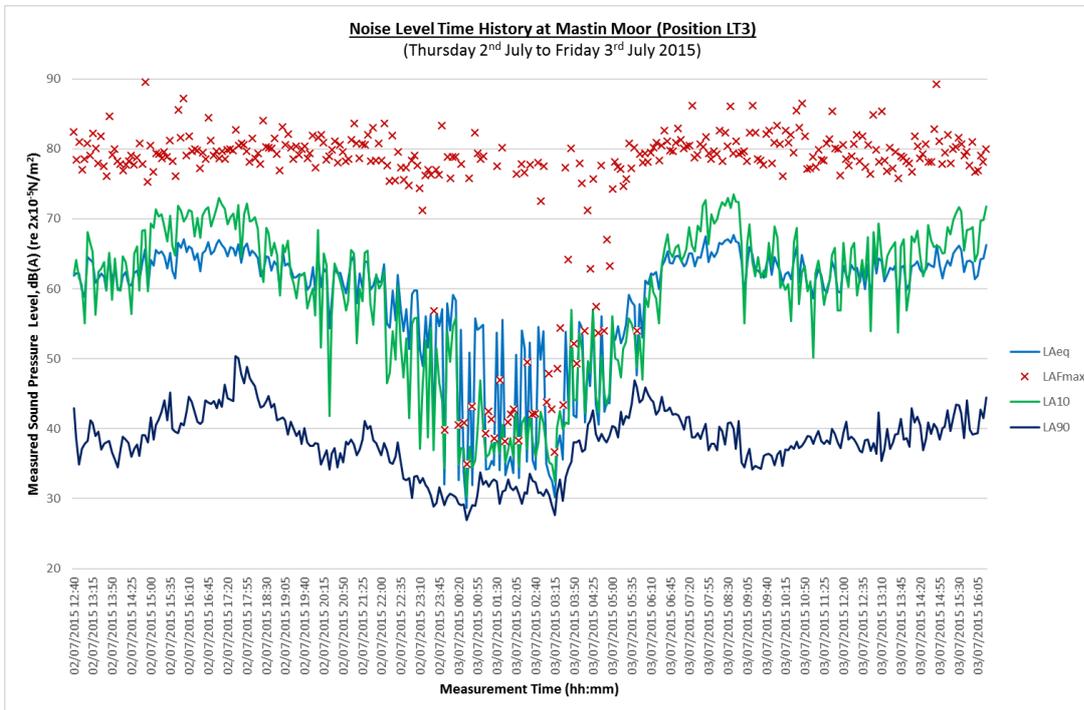


Figure B3: LT3 (Bolsover Road) Time History Plot



Tables B1 to B6 present the measured short-term data.

Table B1: ST1 Pumphouse Farm Noise Survey Data

Start Time	LAeq	LAFmax	LA10	LA90
02/07/2015 12:55	43.0	60.9	45.8	38.6
02/07/2015 13:00	43.6	53.1	47.6	37.4
02/07/2015 13:05	45.8	61.9	49.8	37.0
02/07/2015 13:10	41.0	47.4	42.8	38.9
02/07/2015 13:15	40.8	49.0	42.3	39.2
02/07/2015 13:20	41.6	46.4	43.5	39.7
02/07/2015 13:25	43.0	50.2	45.3	39.5
02/07/2015 13:30	41.4	51.4	43.4	38.7
02/07/2015 13:35	40.2	48.3	42.6	37.0
02/07/2015 13:40	44.8	60.7	50.1	35.8
02/07/2015 13:45	38.2	48.2	40.7	34.8
02/07/2015 13:50	40.0	56.2	42.9	35.8
02/07/2015 13:55	37.4	50.4	38.6	35.2
02/07/2015 14:00	36.1	50.2	36.3	34.8

Table B2: ST2 The Paddocks Noise Survey Data

Start Time	LAeq	LAFmax	LA10	LA90
02/07/2015 14:30	38.7	51.7	40.7	35.7
02/07/2015 14:35	38.9	55.3	40.6	35.6
02/07/2015 14:40	38.1	49.9	42.2	34
02/07/2015 14:45	40.8	54.8	43.6	35.9
02/07/2015 14:55	40.1	51.7	42.8	36.6
02/07/2015 15:00	42.5	55.4	46.2	37.7
02/07/2015 15:05	42.7	55.6	46.7	35.7
02/07/2015 15:15	43.9	55.9	49	37.8
02/07/2015 15:20	43.6	59.3	48.4	37.4
02/07/2015 15:25	48.6	64.4	53.7	39.2
02/07/2015 15:30	49.5	66.2	53.4	38.7
02/07/2015 15:35	43	62.2	43.9	38.8
Start Time	LAeq	LAFmax	LA10	LA90
03/07/2015 10:15	47.90	62.40	52.00	35.90
03/07/2015 10:20	55.00	74.30	59.80	35.60
03/07/2015 10:25	52.60	64.90	58.20	36.20
03/07/2015 10:30	47.80	65.80	43.70	37.40
03/07/2015 10:35	42.80	55.80	46.00	38.40
03/07/2015 10:40	57.10	71.60	64.00	36.60
03/07/2015 10:45	47.70	67.30	44.60	37.40
03/07/2015 10:50	42.10	45.50	42.90	42.10

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Table B3: ST3 Castle View Noise Survey Data

Start Time	LAeq	LAFmax	LA10	LA90
02/07/2015 15:52	51.8	67	55.1	46.6
02/07/2015 15:57	48.9	59.2	51.3	44.6
02/07/2015 16:02	49.8	64.2	52.5	44.5
02/07/2015 16:07	49.8	57.7	52.5	45.5
02/07/2015 16:12	49.4	58.0	52.0	44.8
02/07/2015 16:17	51.8	66.8	53.5	46.6
02/07/2015 16:22	51.3	66.6	54.0	46.6
02/07/2015 16:27	51.4	61.8	54.4	46.9
02/07/2015 16:32	52.2	65.1	54.6	48.3
02/07/2015 16:37	52.3	62.2	55.1	48.4
02/07/2015 16:42	52.5	60.9	54.8	49.3
02/07/2015 16:47	52.2	70	54.1	49.1
02/07/2015 16:52	52.0	59.4	54.4	47.7
02/07/2015 16:57	53.3	61.0	55.5	49.5

Table B4: ST4 Bolsover Road/Woodthorpe Road Junction

Start Time	LAeq	LAFmax	LA10	LA90
03/07/2015 11:05	58.6	76.8	61.8	44.5
03/07/2015 11:10	53.1	68.7	56.2	43.7
03/07/2015 11:15	55.8	68	60.8	42.4
03/07/2015 11:20	56.4	71.3	60.9	42.6
03/07/2015 11:25	-	-	-	-
03/07/2015 11:30	54.8	70.4	58.6	42.8
03/07/2015 11:35	56.4	68.9	61.2	45.8
03/07/2015 11:40	53.6	66.5	56.1	48.9

Table B5: ST5 Approximately 90m set-back from Bolsover Road

Start Time	LAeq	LAFmax	LA10	LA90
03/07/2015 11:50	42.7	55.7	46.4	36.3
03/07/2015 11:55	45.5	62.6	47.7	36.2
03/07/2015 12:00	42.0	54.5	44.9	36.9
03/07/2015 12:05	46.7	63.4	50.7	38.2
03/07/2015 12:10	42.7	58.9	47.2	36.6

Appendices

Table B6: ST6 CRTN Worksop Road

Start Time	LAeq	LAFmax	LA10	LA90
03/07/2015 12:40	58.7	68.9	63.3	41.2
03/07/2015 12:45	63.9	84.6	65.2	43.8
03/07/2015 12:50	60.3	73.7	64.0	44.4
03/07/2015 12:55	58.5	69.2	63.0	42.7
03/07/2015 13:00	61.5	76.3	64.2	48.0
03/07/2015 13:05	61.0	71.1	64.8	47.2
03/07/2015 13:10	60.3	70.7	64.6	45.2
03/07/2015 13:15	59.7	69.7	63.7	45.2
03/07/2015 13:20	59.6	71.8	63.1	49.3
03/07/2015 13:25	60.5	73.1	64.3	44.2
03/07/2015 13:30	59.6	70.3	63.5	43.8
03/07/2015 13:35	59.5	70.8	63.0	46.8
03/07/2015 13:40	60.8	73.4	64.2	44.8
03/07/2015 13:45	59.4	71.7	62.6	49.4
03/07/2015 13:50	60.8	71.5	64.7	48.8
03/07/2015 13:55	58.8	68.2	63.4	44.7
03/07/2015 14:00	59.7	74.0	63.4	43.1
03/07/2015 14:05	61.5	73.7	64.9	46.7
03/07/2015 14:10	60.6	77.0	64.7	44.3
03/07/2015 14:15	60.6	69.4	63.9	53.5
03/07/2015 14:20	60.9	73.2	63.9	48.1
03/07/2015 14:25	59.5	70.6	63.8	46.7
03/07/2015 14:30	60.2	71.1	64.3	47.0
03/07/2015 14:35	59.6	69.5	63.1	46.7
03/07/2015 14:40	58.8	68.2	62.7	47.2
03/07/2015 14:45	60.9	69.8	64.7	48.3
03/07/2015 14:50	61.2	74.0	65.1	47.5
03/07/2015 14:55	59.9	68.7	63.7	47.4
03/07/2015 15:00	60.7	73.5	64.3	50.7
03/07/2015 15:05	62.1	73.7	65.1	50.6
03/07/2015 15:10	61.3	71.0	64.6	53.2
03/07/2015 15:15	61.2	72.1	64.3	50.7
03/07/2015 15:20	61.1	70.4	64.9	50.3
03/07/2015 15:25	60.4	72.2	63.9	50.8
03/07/2015 15:30	61.2	72.2	64.6	53.2
03/07/2015 15:35	61.6	71.0	64.8	49.7

Appendices

C. Construction Noise Assessment Methodology

The significance criteria for the construction noise assessment are based on 'The ABC Method' from BS 5228-1:2009+A1:2014. An extract describing this method is provided below.

Example Method 1 – The ABC Method

Table E.1 shows an example of the threshold of likely significant effect at dwellings when the Site_noise level rounded to the nearest decibel, exceeds the listed value. The table can be used as follows: for the appropriate period (night, evening / weekends or day), the ambient noise level is determined and rounded to the nearest 5 dB. This is then compared with the site noise level. If the site noise level exceeds the appropriate category value, then a significance effect is deemed to occur.

Table E.1 **Example threshold of significant effect at dwellings**

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (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

NOTE1 A likely significant effect is indicated if the site L_{AeqT} noise level, exceeds the threshold level for the Category appropriate to the ambient noise level.

NOTE 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a likely significant effect is indicated if the total L_{Aeq} noise level for the period increases by more than 3 dB due to site noise.

NOTE 3 Applied to residential receptors only.

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

B) Category B: threshold values to use when the 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 the ambient noise levels (when rounded to the 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.

Source: BS 5228-1:2009+A1:2014, Page119)

For this assessment, the threshold of significance of the likely impacts were determined using the ABC Method of BS5228-1:2009+A1:2014. Above the threshold, construction noise impacts are deemed to occur. Calculations were not undertaken for the evening or night-time periods as it is assumed that evening and night-time construction work would only be undertaken under exceptional circumstances and not without prior approval from Chesterfield Borough Council. Exceptional circumstances may include concreting operations where the pumping of concrete to foundations has to be a continuous process which may require operations outside the daytime period.

Appendices

At all sensitive receptors within the vicinity of the Application Site, the daytime threshold level was 65dB $L_{Aeq,T}$.

Generic calculations were undertaken using the data and procedures set out in BS5228-1:2009+A1:2014 for the noisiest construction activities to derive indicative noise levels at selected sensitive receptors (SRs). The highest noise levels tend to be associated with plant associated with, piling, earthmoving and construction of the substructure and superstructure. During the fit-out, construction noise would be significantly lower. The calculations assume that plant would be operating at the closest point to the SR, such as the Site boundary (hoarding location) or proposed location of buildings for piling activities, and do not take into account any existing or proposed screening. The noisiest construction activities and associated noise levels are as follows:

- Earthworks 84 dB $L_{Aeq,1h}$ at 10m
- CFA Piling 85 dB $L_{Aeq,1h}$ at 10m
- Concreting 83 dB $L_{Aeq,1h}$ at 10m
- Pavement 81 dB $L_{Aeq,1h}$ at 10m

Table C1 presents the generic plant and on-time used in the calculation of the construction noise levels.

A maximum worst case noise level over a one-hour period was calculated, assuming that plant would be operating at the closest point to the nearest SRs in the absence of mitigation. In practice, noise levels would tend to be lower owing to greater separation distance as the works progress. Noise would also tend to reduce over a working day owing to periods of plant inactivity.

Appendices

Table C1: Generic Plant & Activity Data

Phase / Plant	BS5228-1:1997+A1:2014	L _{Aeq} @10m	Kh	(t/T)*100	Partial Exposure	Barrier Attenuation	Noise Level @ NSR L _{Aeq,1h} (dB)	Overall L _{Aeq,1h} (dB)
Earthworks								84
Tracked Excavator (14t)	Table C2 ref 7	70	0	1	0	0	70.0	
Tracked Excavator (14t)	Table C2 ref 7	70	0	1	0	0	70.0	
Wheeled Backhoe Loader (8t)	Table C2 ref 8	68	0	1	0	0	68.0	
Hydraulic Vibratory Compactor (Tracked Excavator)	Table C2 ref 42	78	0	1	0	0	78.0	
Dozer (11t)	Table C2 ref 13	78	0	1	0	0	78.0	
Lorry (4-axle wagon)	Table C2 ref 34	80	0	1	0	0	80.0	
CFA								85
Crawler mounted rig - Continuous Flight Auger Piling Cast In-Situ	Table C3 ref 21	79	0	1	0	0	79.0	
Tracked Excavator	Table C3 Ref 23	68	0	1	0	0	68.0	
Tracked Excavator Inserting Cylindrical Metal Cage	Table C3 Ref 24	74	0	1	0	0	74.0	
Truck Mounted Concrete Pump + Boom Arm	Table C4 ref 29	80	0	1	0	0	80.0	
Concrete Mixer Truck	Table C4 Ref 20	80	0	1	0	0	80.0	
Pump Boom + Vibrating Poker	Table C4 ref 36	71	0	1	0	0	71.0	

Appendices

Phase / Plant	BS5228-1:1997+A1:2014	LAeq @10m	Kh	(t/T)*100	Partial Exposure	Barrier Attenuation	Noise Level @ NSR LAeq,1h (dB)	Overall LAeq,1h (dB)
Concreting								83
Truck Mounted Concrete Pump + Boom Arm	Table C4 ref 29	80	0	1	0	0	80.0	
Concrete Mixer Truck	Table C4 Ref 20	80	0	1	0	0	80.0	
Pump Boom + Vibrating Poker	Table C4 ref 36	71	0	1	0	0	71.0	
Pavement								81
Road planer	Table C5 ref 7	82	0	0.25	-6	0	76.0	
Spreading chip and fill	Table C5 ref 12	77	0	0.25	-6	0	71.0	
Vibratory roller	Table C5 ref 20	75	0	0.25	-6	0	69.0	
Asphalt paver (+ tipper lorry)	Table C5 ref 30	75	0	0.25	-6	0	69.0	
Vibratory compactor (asphalt)	Table C5 ref 29	82	0	0.25	-6	0	76.0	
Lorry (4-axle wagon)	Table C2 ref 34	80	0	0.25	-6	0	74.0	

Appendices



D. Road Traffic Noise Assessment

Table D1: Operational Development Traffic Noise Assessment 2026 With & Without Development (Short-Term Assessment)

Mastin Moor		Assessment of L _{A10} 18-hour Basic Noise Levels at 10m from Road									
		2026 No Development (DM)			2026+ Development (DS)			% Flow Change	DM 2026	DS 2026	Change
Road	% HGV	Speed kph	Flow	% HGV	Speed kph	Flow					
1	Worksop Road 01	17	64	26482	16	64	28295	6.8	74.8	75.0	0.2
2	Worksop Road 02	20	64	23038	18	64	25754	11.8	74.6	74.9	0.2
3	Worksop Road 03	21	64	22384	19	64	25627	14.5	74.6	75.0	0.4
4	Worksop Road 04	21	64	22384	22	64	21691	-3.1	74.6	74.5	0.0
5	Worksop Road 05	22	64	21089	21	64	22103	4.8	74.5	74.6	0.1
6	Bolsover Road 01	23	64	6053	20	64	7520	24.2	69.1	69.7	0.6
7	Bolsover Road 02	23	80	6053	20	80	7974	31.7	71.3	72.1	0.9
8	Bolsover Road 03	23	80	6053	17	80	8833	45.9	71.3	72.3	1.0
9	Bolsover Road 04	22	80	5987	19	80	6890	15.1	71.1	71.4	0.3
10	Bolsover Road 05	17	80	6628	16	80	7597	14.6	70.9	71.4	0.5
11	Norbriggs Road 01	3	48	3474	4	48	3541	1.9	61.5	62.0	0.5
12	Norbriggs Road 02	1	48	3759	2	48	3856	2.6	61.2	61.9	0.7
13	Woodthorpe Road 01	7	80	3444	10	80	3283	-4.7	66.5	66.8	0.3
14	Woodthorpe Road 02	7	48	3450	9	48	2948	-14.6	62.7	62.5	-0.1
15	Woodthorpe Road 03	7	48	3450	10	48	3087	-10.5	62.7	62.9	0.2
16	Lowgates 01	16	48	24763	16	48	25817	4.3	73.3	73.4	0.1
17	Duke Street 01	31	48	7784	29	48	7554	-3.0	70.3	69.9	-0.4
18	Renishaw Road 01	19	64	7131	20	64	7515	5.4	69.4	69.7	0.3

Appendices

Proposed Residential Development
Land off Worksop Road, Mastin Moor

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UK and Ireland Office Locations

