

8. Noise and Vibration

Introduction

- 8.1 This chapter assesses the likely significant effects of noise and vibration impacts associated with the construction and operation of the Proposed Development. It describes the methods used to assess the likely significant effects, the existing baseline conditions on and around the site, the potential direct and indirect effects of the development arising from construction noise and changes in road traffic, and mitigation measures required to prevent, reduce, or offset the identified significant effects and the residual effects.
- 8.2 This chapter has been prepared by David Sproston, Principal Consultant at Noise Consultants Ltd (NCL) who is a full corporate member of the Institute of Acoustics (MIOA) and Chartered Institute of Environmental Health (MCIEH) and has over 16-years experience in the measurement, assessment and control of environmental noise and vibration.
- 8.3 This Chapter is supported by the following figures and appendices:
- Appendix 8.1: Glossary
 - Appendix 8.2: Baseline Noise Survey Methodology and Results
 - Appendix 8.3: Site Suitability Assessment
 - Figure 8.1: Construction Activity Areas and Noise Sensitive Receptors
 - Figure 8.2: Baseline Noise Monitoring Locations and Noise Sensitive Receptors

Legislation and Planning Policy Context

Legislation

Control of Pollution Act 1974 (COPA)

- 8.4 The Control of Pollution Act 1974 provides the definition of Best Practicable Means (BPM) to minimise noise (including vibration), the basis for defence against noise abatement action taken by a local authority (section 60). The Act also provides for i) persons responsible to seek prior

consent for works on construction sites including BPM steps to minimise noise and ii) the basis for defining codes of practice (applies to BS 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites, Part 1: Noise and Part 2: Vibration').

Environmental Protection Act (EPA) 1990

- 8.5 The Environmental Protection Act 1990 sets out the duty for local authorities to investigate and, where identified, take abatement action against noise nuisance. The Act provides the definition of Best Practicable Means (BPM) to minimise noise (including vibration), the basis for defence against noise abatement action taken by a local authority (section 80). The Act also provides for individuals to seek for abatement action to be taken by a magistrate's court against noise nuisance (section 82).

National Planning Policy and Guidance

National Planning Policy Framework (NPPF, 2023)

- 8.6 The National Planning Policy Framework (NPPF, 2023) sets out the Government's planning policies for England and how these should be applied. The NPPF provides a framework within which locally prepared plans for housing and other development can be produced.
- 8.7 In relation to noise, it states:

"174. Planning policies and decisions should contribute to and enhance the natural local environment by: ...

- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and..."*

The NPPF includes policy which makes reference to 'significant adverse impacts on health and quality of life', as per the NPSE. NPPF policy states:

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

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

8.8 The NPPF also includes a provision for the agent of change principle as follows:

“187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

Noise Policy Statement for England (NPSE, 2010)

8.9 The Noise Policy Statement for England (NPSE, 2010) sets out the Government’s Noise Policy Vision to:

“Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development”.

8.10 This long-term vision is supported by three Noise Policy Aims that can be delivered through effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development. These aims are to:

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

8.11 The explanatory note to the NPSE sets out ‘effect levels’ which are aligned with the Policy Aims. Drawing upon established concepts from toxicology, the NPSE defines the following noise effect levels:

- *NOEL - ‘No Observed Effect Level’;*

- *LOAEL - 'Lowest Observed Adverse Effect Level'; and*
- *SOAEL - 'Significant Observed Adverse Effect Level'.*

- 8.12 The explanatory note describes SOAEL as the effect level above which significant adverse effects on health and quality of life occur, aligning this level with the first policy aim.
- 8.13 LOAEL is described as the level at which adverse effects begin and the second aim of the NPSE refers to a situation where the effect lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8 of the NPSE) however this does not mean that such adverse effects cannot occur.
- 8.14 NOEL is described as a level of noise exposure below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life.
- 8.15 The third aim seeks, where possible, to positively improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society.
- 8.16 The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.
- 8.17 NPSE states that it is not possible have a single, numerical definition of the SOAEL that is applicable to all sources of noise in all situations, since the SOAEL is likely to be different for different noise sources, for different receptors and at different times.

Planning Practice Guidance – Noise (PPG(N), 2019)

- 8.18 The Planning Practice Guidance (PPG(N), 2019) provides further detail about how the effects of noise can be described in terms of perception and outcomes. It aligns this to increasing effect levels as defined in the NPSE. In addition, the PPG(N) adds a fourth term and corresponding effect level:
- *UAEL – 'Unacceptable Adverse Effect Level'.*

- 8.19 This effect level is higher than the significant adverse effect on health and quality of life (SOAEL) and requires that unacceptable adverse effects be prevented. In PPG(N), prevention is not in the context of Government policy on sustainable development. **Table 8.1** presents the noise exposure hierarchy described in PPG(N).

Table 8.1: Planning Practice Guidance – Noise, Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level (NOEL)			
Not Present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level (NOAEL)			
Present and Not Intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Present and Intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up the volume of the television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Present and Disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Unacceptable Adverse Effect Level (UAEL)			

Perception	Examples of Outcomes	Increasing Effect Level	Action
Present and Very Disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite; significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

8.20 This noise exposure hierarchy is based on the principle that once noise or vibration becomes perceptible, the effect on people and other receptors increases as the level increases. PPG(N) presents example outcomes to help characterise these effects using non-technical language. In general terms, an observed adverse effect is characterised as a perceived change in quality of life for occupants of a building or a perceived change in the acoustic character of an area, whereas a significant observed adverse effect disrupts activities.

8.21 PPG(N) also provides guidance in terms of what factors may influence whether noise could become a concern, and how adverse effects of noise can be mitigated. Examples of mitigation provided include:

- *“engineering: reducing the noise generated at source and/or containing the noise generated;*
- *layout: where possible, optimising the distance between the source and noise-sensitive receptors and/or incorporating good design to minimise noise transmission through the use of screening by natural or purpose built barriers, or other buildings;*
- *using planning conditions/obligations to restrict activities allowed on the site at certain times and/or specifying permissible noise levels differentiating as appropriate between different times of day, such as evenings and late at night, and;*
- *mitigating the impact on areas likely to be affected by noise including through noise insulation when the impact is on a building”.*

8.22 In the case of residential development, PPG-Noise also states that the impact of noise can be “partially off-set” if occupants have access to:

- *“a relatively quiet façade (containing windows to habitable rooms) as part of their dwelling, and/or;*

- *a relatively quiet external amenity space for their sole use, (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced with increasing noise exposure and could be such that significant adverse effects occur, and/or;*
- *a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings, and/or;*
- *a relatively quiet, protected, external publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within 5 minutes walking distance)".*

Local Planning Policy

Knowsley Local Plan Core Strategy

8.23 The Knowsley Local Plan Core Strategy was adopted in January 2016 and is a high-level document, with several statements pertinent to noise in the context of new development.

8.24 Policy CS2 of the Core Strategy sets out Development Principles. Principle 4 is to:

“Recognise environmental limits, protect and enhance environmental assets, enhance local character and promote quality of place by:

. j) Minimising negative impact upon flood risk, air quality, water quality, land quality, soil quality, and noise or vibration levels and ensuring any negative impacts are appropriately mitigated. Development that will have an unacceptable impact upon any of the above will only be permitted where the benefits of the proposal clearly outweigh the harm.”

8.25 Paragraph 9.6 of the subsection “Protecting Local Amenity” of the explanatory text for Policy CS19 “Design Quality and Accessibility in New Development”, states;

“The design of new development should avoid unacceptable impacts which affect the amenity and living conditions of occupiers of buildings. Such effects can include generation of noise, light and air pollution and harmful overbearing and loss of privacy through overlooking.”

Knowsley Replacement Unitary Development Plan Saved Policies

8.26 The Knowsley Unitary Development Plan [2006] has been superseded however a number of policies are “saved” and remain current. Saved Policy ENV 2 “Noise and Vibration” states:

“1. Development that will either cause an unacceptable increase in noise or vibration levels or itself be subject to unacceptable noise or vibration from an existing source will not be permitted.

2. Where developments are permitted, conditions may be attached to the planning permission to ensure effective noise insulation or other required mitigation measures are carried out.”

Other Relevant Policy, Standards and Guidance

Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014)

- 8.27 The IEMA Guidelines provide guidance on noise assessment in the Environmental Impact Assessment (EIA) context. The guidelines define key principles and methodological used within the noise impact assessment process, how to effectively integrate noise impacts into the consenting process of all types and scale of development. The guidelines are relevant to all scales of projects.
- 8.28 The IEMA Guidelines provide a table for the generic relationship between noise impact (magnitude) and the sensitivity of a receptor including the evaluation of significance. **Table 8.2** provides a reproduction of the IEMA Guidelines table.

Table 8.2: IEMA Guidelines Generic Relationship between Magnitude, Sensitivity and Significance

Magnitude (nature of impact)	Description of effect (on a specific sensitive receptor)	Significance
Negligible	No discernible effect on receptor	Not Significant
Slight	Receptor perception = non-intrusive Noise impact can be heard, but does not cause any change in behaviour or attitude, for example turning up the volume of the television, speaking more loudly, closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Less likely to be significant (greater justification needed based on impact magnitude and receptor sensitivity – to justify a significant effect) 
Moderate	Receptor perception = intrusive Noise impact can be heard and causes small changes in behaviour and/or attitude, for example turning up the volume of television, speaking more loudly, closing windows. Potential for non-awakening sleep disturbance. Affects the character of the area such that there is a perceived change in the quality of life.	
Substantial	Receptor perception = disruptive Causes a material change in behaviour and/or attitude for example avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty getting sleep, premature awakening and difficulty getting back to sleep. Quality of life diminished due to change in character of the area.	(greater justification needed – based on impact magnitude and receptor sensitivity = to justify a non-significant effect) More likely to be significant

BS 7445-1: 2003 Description and Measurement of Environmental Noise. Guide to Quantities and Procedures 2003

- 8.29 BS 7445-1 defines the basic quantities to be used for the description of noise in community environments and describes basic procedures for the determination of these quantities.
- 8.30 The baseline noise measurement surveys were carried out in general accordance with the procedures set out in this BS.

ISO 9613:1996 Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General method of calculation

- 8.31 Part 2 of ISO 9613 defines an engineering method for predicting the propagation of noise outdoors. It accounts for distance attenuation, air absorption, topography, ground cover and screening and reflections caused by buildings and other features.

BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 1 – Noise 2014

- 8.32 Part 1 of BS 5228 sets out methodologies for predicting noise levels from construction and related activities. It also sets out methodologies for determining the potential effects on existing noise sensitive human receptors as a result of noise arising from construction activities. This includes construction vehicles travelling on haulage routes to and from the construction site.
- 8.33 Data on sound levels is provided within Annex C and D the standard for a wide variety of site activities and mobile equipment used on construction and open sites. In addition, calculation procedures and methodology are provided to calculate construction noise levels at receptors in Annex F.
- 8.34 The ABC method is generally the preferred method to determine values which indicate the threshold above which a significant adverse effect occurs. The threshold values are generally easier to control during construction works than setting individual noise limits for each receptor such as would occur using the 5 dB(A) change method. The effect thresholds set out in the ABC method are presented in **Table 8.3**.

Table 8.3: ABC Method Construction Noise Thresholds

Period	Category A	Category B	Category C
Daytime (0700 hrs to 1900 hrs) Saturdays (0700 hrs to 1300 hrs)	65 dB	70 dB	75 dB
Evenings (1900 hrs 2300 hrs) Saturdays (1300 hrs to 2300 hrs) Sundays and Public Holidays (0700 hrs to 2300 hrs)	55 dB	60 dB	65 dB
Night-time (2300 hrs to 0700 hrs)	45 dB	50 dB	55 dB
Notes: Category A: Threshold level to use when ambient noise levels (rounded to the nearest 5 dB) are less than these levels Category B: Threshold level to use when ambient noise levels (rounded to the nearest 5 dB) are the same as Category A values Category C: Threshold level to use when ambient noise levels (rounded to the nearest 5 dB) are higher than the Category A values A potential significant effect is indicated if the $L_{Aeq, T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. 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 potential significant effect is indicated if the total $L_{Aeq, T}$ noise level for the period increases by more than 3 dB due to site noise..			

- 8.35 Ultimately, BS 5228-1 sets out a best practicable means approach to construction noise mitigation identifying measures that can be readily employed on a construction site to minimise adverse noise effects.

Design Manual for Roads and Bridges (DMRB), LA111 'Noise and Vibration' (2020)

- 8.36 LA111 'Noise and vibration' of the Design Manual for Roads and Bridges (DMRB) provides guidance on undertaking noise and vibration assessments to demonstrate the impact of road projects.
- 8.37 It provides a useful assessment methodology with respect to changes in road traffic noise levels, the principles of which can be adapted for the assessment of new development where changes in road traffic volume are likely to occur as a result. The magnitudes of impact for **short-term** and **long-term changes** in road traffic noise level have been used in this assessment or the

construction and completed development phases, respectively, along with consideration of context and local factors.

- 8.38 In addition, it provides a methodology for assessing the impact of construction traffic on the local road network using a similar change in noise level approach.

Department of Transport (1988), Calculation of Road Traffic Noise (CRTN)

- 8.39 CRTN provides a methodology for the measurement and prediction of road traffic noise. CRTN was prepared to determine entitlement under the Noise Insulation Regulations 1975, but it is stated in the document that the guidance is equally appropriate to the calculation of traffic noise for land use planning purposes.
- 8.40 In the UK, operational road traffic noise is predicted using CRTN, and provides methodologies for the calculation of road noise emissions, based on the traffic data, through the calculation of a Basic Noise Level (BNL) which is the noise level at 10m from the kerb. The BNL calculation methodology utilises detailed information on two-way traffic flows, percentage of HGV movements, and enables a direct comparison to be made of the change in noise level associated with particular sections of road.
- 8.41 Whilst CRTN is predominantly a prediction methodology, it also provides guidance on how to undertake road traffic noise measurements which includes the "*shortened measurement procedure*", where $L_{A10,1\text{-hour}}$ measurements are undertaken in any three consecutive hours between 10:00 and 17:00hrs. These hourly measurements can then be converted to the $L_{A10,18\text{-hour}}$ noise metric.

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

- 8.42 BS 8233:2014 provides guidance for the control of noise in and around buildings. It is applicable to the design of new buildings, or refurbished buildings undergoing a change of use.
- 8.43 BS 8233:2014 provides noise guidance for buildings of different uses, however in respect to dwellings and habitable residential spaces, Table 4 of BS 8233:2014 provides guideline values that

it is desirable not to exceed during daytime and night-time periods within habitable rooms. These guideline values are reproduced in **Table 8.4**.

Table 8.4: Indoor Ambient Sound Levels for Residential Dwellings (BS 82323:2014)

Activity	Location	Daytime Guideline (07:00-23:00hrs)	Night-time Guideline (23:00-07:00hrs)
Resting	Living Room	≤ 35 dB $L_{Aeq, 16hr}$	-
Dining	Dining Room / Area	≤ 40 dB $L_{Aeq, 16hr}$	-
Sleeping (Daytime Resting)	Bedroom	≤ 35 dB $L_{Aeq, 16hr}$	≤ 30 dB $L_{Aeq, 8hr}$

8.44 The internal noise requirements are not intended to be met with open windows, although BS 8223:2014 states that the internal noise levels should take account of the proposed ventilation strategy.

8.45 BS 8233:2014 also notes the following:

“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved”.

8.46 BS 8233:2014 does not provide specific guidance on noise levels for regular individual noise events, such as passing trains, which can cause sleep disturbance. Guidance on suitable noise levels for individual events is provided in ProPG, which states:

“In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45 dB $L_{Amax, F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as source, number, distribution, predictability and regularity of noise events”.

8.47 On this basis, it is considered appropriate to adopt the 10th highest $L_{Amax, F}$ noise event occurring in the night time period for the purposes of the site suitability assessment.

8.48 With respect to external amenity spaces, BS 8233:2014 states that:

"it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments."

- 8.49 BS 8233:2014 also states that it will not always be possible to achieve these guideline values for all circumstances where development may be desirable, and that development in higher noise areas, such as urban areas adjoining the strategic transport network or city centres, may warrant a compromise between elevated noise levels and other factors (for example the convenience of living in these locations). In these situations, BS 8233:2014 states that *"development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."* This approach is also advocated in PPG-Noise.

BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

- 8.50 BS 4142:2014 is used to rate and assess sound of an industrial nature including but not limited to assessing sound from proposed, new, modified, or additional sources of industrial sound. It contains guidance on the monitoring and assessment of industrial and commercial sound sources (including fixed installations comprising mechanical and electrical plant and equipment) affecting sensitive receptors.
- 8.51 The methodology relies on comparing the operational rating level ($L_{Ar,Tr}$) with the background sound level ($L_{A90,T}$) (i.e. the level that would be present without the development) over a representative time period. BS 4142:2014 provides guidance on the measurement of background sound, the determination of specific sound and calculation of the rating level.
- 8.52 Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. A character correction should be added to the specific sound level to obtain the rating level, where such features are present at the assessment location. It states that the specific sound level should be corrected if a tone, impulse or other characteristic occurs, or is expected to be present for new sound sources.
- 8.53 BS 4142:2014+A1:2019 assessment methodology also states that:

"Typically, the higher the rating level is above the background sound level the greater the magnitude of impact;

A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;

A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

World Health Organization Guidelines for Community Noise, 1999 (WHO GCN)

- 8.54 The WHO Guidelines for Community Noise (WHO GCN) are partially superseded by the WHO Environmental Noise Guidelines for the European Region, 2018. However, the guideline values for internal noise levels remain relevant in the 1999 WHO.

Consultation

- 8.55 **Table 8.5** provides an overview of the consultation with the Knowsley Metropolitan Borough Council (KMBC) that has been undertaken to inform the assessment methodology in noise terms, including the consideration of likely significant effects and the methodology for assessment.
- 8.56 The approach to the assessment, including baseline noise monitoring locations and the location of sensitive receptors was agreed upon in outline terms on 15 September 2022, as a full inspection of the site to determine the baseline noise monitoring constraints and identification of all existing nearby noise-sensitive receptors had not yet been completed.
- 8.57 The Scoping Opinion received from KC in October 2022, does not make clear whether the consideration of vibration is needed to be scoped in or out of this chapter. However, vibration was scoped out during the consultation with KC's Environmental Protection and has therefore been excluded from the assessment.
- 8.58 An EIA Scoping Report was submitted to Knowsley Council on 16 September 2022, as presented in Appendix 2.1. An EIA Scoping and Screening Opinion was provided on 20 October 2022 (Appendix 2.1), within which the scoping opinion for noise was deemed acceptable.

Table 8.5: Knowsley Council Consultation

Consultee	Date and Time	Comments	Actions
Knowsley Council: Senior Officer, Environmental Protection	12-15 September 2022	Agreement with the majority of proposed scope and methodology. Some additional potential noise issues were raised.	Undertake details analysis of noise from sports pitches
Knowsley Council:	20 October 2022	Agreed Noise is to be included with the ES.	-
		Consideration given to the effect on the setting of St Chad's and the ES should make recommendations in respect of the design and height of development, noise mitigation works.	Addition of St Chad's as a receptor.
		Advised that a pre-commencement condition requiring a noise mitigation strategy to protect dwellings from Cherryfield Drive,	-

Consultee	Date and Time	Comments	Actions
		Kirkby Town Centre and Kirkby Leisure Centre would be acceptable.	

Scope

Effects Scoped Out and Not Significant Effects

- 8.59 No existing construction sites are present in close proximity to the site, and therefore a cumulative assessment of noise from future construction activities has been scoped out of the EIA.
- 8.60 Some piling works may be required, but the type, location and duration are not known at this stage. Continuous flight-auger piling generates significantly lower ground-borne vibration. Nevertheless, adherence to appropriate mitigation measures will be set out in a site site-specific Construction and Environmental Management Plan (CEMP) to ensure that the type of piling is appropriate for the proximity of the works to the nearest key receptors and therefore has been scoped out of the EIA. The need for a site-specific CEMP can be secured by a suitable worded planning condition.
- 8.61 Roads are assumed to have a well-maintained surface and would not be a significant source of vibration during the construction phase or upon completion of the development. Therefore, vibration from road traffic in the construction and operational phases should not result in any significant effects and has been scoped out of the EIA.
- 8.62 Full details of any new items of fixed plant and equipment that might come forward with the Development, such as air source heat pumps (ASHPs) are not known at this stage. If necessary, the need to secure adequate protection from noise from any such sources at existing or introduced receptors would be secured by a suitably worded planning condition, pursuant to planning approval, and will likely have regards to the assessment methodology set out in BS 4142:2014. Therefore, the assessment of potentially significant effects associated with any new fixed plant and equipment associated with the completed Development has been excluded from the assessment.

- 8.63 The Development would not include any significant sources of operational vibration. Therefore, the vibration associated with the completed Development has been scoped out of the EIA.

Potentially Significant Effects

- 8.64 The following sources of noise that have the potential to give rise to Significant Effects during the construction and operational phases of the Development have been included in this assessment;
- Construction Activity Noise (non-cumulative)
 - Construction Road Traffic Noise
 - Operational Road Traffic Noise

Study Area

- 8.65 The study and assessment areas are as follows:
- **Construction activity noise effects** - key Noise Sensitive Receptors (NSRs) within 300m of the Site boundary, generally consistent with the guidelines set out in the DMRB LA 111.
 - **Construction and Completed Development road traffic noise effects** - the study area for the assessment of road traffic noise during the Construction phase and for the Completed Development have included all link roads identified in the transport assessment.

Identifying Sensitive Receptors

- 8.66 A sample of NSRs have been considered for Construction activity noise only, which have been selected based on their proximity to the site boundary and their sensitivity. NSRs were initially agreed upon in outline terms with Knowsley Council, and now also includes St Chad's church to the north of the Site, and two additional NSRs to the south-eastern corner of the Site.
- 8.67 The receptor(s) sensitivity has a bearing on the judgement of 'significance' of predicted noise effects. The sensitivity of receptors that may be affected by the Project, is based on the professional expertise of NCL and is defined on a scale of high, medium, low or negligible, as described in **Table 8.6**Table 8.7.

Table 8.6: Definition of Receptor Sensitivities

Sensitivity	Definition
High	Dwellings, residential accommodation, Hospitals (e.g., operating theatres or high dependency units), private gardens, hospital wards, care homes, research facilities, hotels, churches.
Medium	Schools, universities, national parks, museums and art centres during the day; and temporary holiday accommodation at all times
Low	Offices, shops, outdoor public amenity areas, long distance footpaths, doctors' surgeries, sports facilities and places of worship
Negligible	Warehouses, light industry, car parks, agricultural land

8.68 A description of the NSRs and their sensitivity that are included in this assessment are presented in **Table 8.7**, and their locations shown in **Figure 8.1**.

Table 8.7: Description of Construction Activity NSRs

NSR Ref	NSR Type	NSR Definition	Sensitivity
NSR1	Residential	Dwelling	High
NSR2		Dwelling	High
NSR3		Dwelling	High
NSR4	Healthcare- Millbrook Medical Centre	Doctors' surgeries	Low
NSR5	Residential	Dwelling	High
NSR6	Leisure - Kirkby Leisure Centre	Sports Facility	Low
NSR7	Commercial	Offices	Low
NSR8	Leisure - Kirkby Gallery and Council Offices	Art Centre / Offices	Medium / Low
NSR9	Residential - Kirkby House Care Home	Residential Accommodation	High
NSR10	Residential	Dwelling	High
NSR11	Church - St Chad's Church	Church	High
NSR12	Residential	Dwelling	High
NSR13	Residential	Dwelling	High

Baseline Conditions

8.69 The Site is located within a semi-suburban area which has noise environment predominantly influenced by road traffic on surrounding roads. The contribution of noise from existing environmental noise sources at any given NSR is dependent upon their proximity to the source and acoustic screening provided by any intervening structures.

- 8.70 Existing baseline noise levels have been established by noise surveys undertaken in 2022, with noise levels measured at discrete locations around the site that are broadly representative of the NSRs.
- 8.71 The methodology and results from the noise monitoring undertaken are provided in **Appendix 8.2**. The baseline noise survey locations are shown in **Figure 8.2**.

Site Preparation and Construction Assessment Methodology

Enabling and Construction Activities

- 8.72 Enabling and construction noise effects will be short-term, and temporary, and have been determined based upon the principles of BS 5228-1 which provides a method for predicting noise from construction activity or equipment. It is the accepted Standard employed for the assessment of construction noise.
- 8.73 Potential adverse effect thresholds in Government policy and EIA terms have been established based upon the ABC Method described in BS 5228-1.
- 8.74 For the purposes of this assessment, the LOAEL is represented by the baseline noise level over the relevant time period. The SOAEL is represented by the relevant BS 5228-1 ABC threshold noise level which is derived from the baseline noise level. This approach aligns with the construction noise assessment methodology set out in the DMRB LA111 guidance.
- 8.75 This assessment assumes that works will be carried out during the daytime construction):
- All types of work permitted between:
 - 08:00-18:00 hrs Monday to Friday
 - 08:00-13:00 hrs Saturday
 - No other work permitted outside the above times without the written permission of the Local Planning Authority.

Table 8.8: Thresholds of Potential Significant Effects of Construction Activity Noise

Assessment Period	LOAEL	SOAEL Threshold Values (dB L _{Aeq,T})		
		Category A	Category B	Category C
Weekday Daytime (08:00-18:00 hrs)	Baseline Noise Level	65	70	75

Assessment Period	LOAEL	SOAEL Threshold Values (dB L _{Aeq,T})		
		Category A	Category B	Category C
Saturdays (0700 hrs to 1300 hrs)				
Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values. If the ambient noise levels exceed the category C levels, then the LOAEL and SOAEL are both equal to the ambient noise level.				

- 8.76 The magnitude of impact at the receptors is then determined using the approach summarised in **Table 8.9**.

Table 8.9: Construction Noise Assessment LOAEL and SOAEL and Magnitude of Impact

Magnitude of Impact	Construction Noise Level
Major	Above or equal to SOAEL +5 dB
Moderate	Above or equal to SOAEL and below SOAEL +5 dB
Minor	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

Calculation of Enabling and Construction Activity Noise

- 8.77 To determine potential construction noise levels at the NSRs, a sound propagation model has been developed using Softnoise Predictor™ (v2022) computational sound modelling software, configured to calculate sound levels in accordance with the methodologies in Annex F of BS 5228-1, and the input parameters summarised in **Table 8.10**.

Table 8.10: Construction Noise Modelling Input Parameters

Modelling Parameter	Input Parameter
Topography	Obtained from Environment Agency's National LIDAR Programme ¹ , 1.0m intervals
Order of reflections	1
Ground absorption, G	0.5
Temperature / Humidity	10 °C / 70%
Adverse weather conditions	No

¹ LIDAR DSM and DTM data for the site and wider area was obtained from the Defra Data Services Platform

Modelling Parameter	Input Parameter
Existing building heights	Determined from Environment Agency's National LIDAR Programme (DTM and DSM data) and on site observations
Fetching Radius	800m

- 8.78 Where construction works are carried out at >800m, no prediction has been undertaken as construction noise is expected to be well below the LOAEL and therefore not significant.
- 8.79 The assessment scenarios, the assumptions which underpin the assessment, and the predicted results are presented in **Table 8.11**. At this stage, detailed information on the construction plant and activities has not been established. Therefore a number of assumptions have been made with regards to the number, type, and plant deployed during the construction phase. The estimated quantity and percentage on-time of each item of plant has been determined by NCL based on experience of similar projects.
- 8.80 The modelling assumes the activities for each phase will be carried out non-concurrently in the areas identified in **Figure 8.1**, with heavy demolition work (hardstanding removal) only taking place in Areas 7 and 8. Whilst some temporal overlap might be expected between different phases, this is only expected to occur for relatively short periods of time and has therefore not been accounted for.
- 8.81 The sound power level for each item of plant considered has been derived from BS 5228-1, and are summarised **Table 8.11**. The number of plant items, their modelled source height, and on-time as a percentage of the 10-hour working day (08:00-18:00 hrs) is also summarised, based on NCL experience of comparable projects.
- 8.82 No noise barrier mitigation has been accounted for in the calculations. Notably, construction works would be managed in accordance with the principles of best practicable means (BPM) as required by the Control of Pollution Act (COPA). Therefore, additional screening may be provided for noisy activities, which has not been accounted for in the calculations.
- 8.83 Naturally, there will be some temporal variation in construction noise levels during the day and for different locations, depending on variations in distance and the amount of screening present.

Table 8.11: Construction Phase, Activity and Plant Assumptions

Phase	Activity	Area	Plant Item	Quant .	% on-time	L _w dBA	Height (m)	BS5228 Source reference
Demolition	Building Demolition	At Existing College Building Area 8 Only	Dump Truck (Empty)	1	50	115	1.5	Table C 2-31
			Backhoe Mounted Hydraulic Breaker	2	20	117	1.5	Table C 5-1
			Tracked Excavator	2	80	114	1.5	Table C 1-13
			Tracked Crusher	1	50	118	1.5	Table C 1-14
	Hardstanding removal	Areas 7 and 8	Dump Truck (Empty)	1	50	115	1.5	Table C 2-31
			Backhoe Mounted Hydraulic Breaker	2	60	116	1.5	Table C 5-1
			Tracked Excavator	2	80	114	1.5	Table C 1-13
			Tracked Crusher	1	50	110	1.5	Table C 1-14
Enabling Work	Ground excavation & earthworks	All Areas	Dozer	1	40	106	1.5	Table C 2-13
			Tracked Excavator	2	40	103	1.5	Table C 2-19
			Wheeled Loader	1	40	102	1.5	Table C 2-28
Transport	Road Construction	All Areas on new roads closest to NSR	Tracked Excavator	1	50	108	1.5	Table C 5-18
			Vibratory Roller	1	20	101	1.5	Table C 5-20
			Asphalt Paver (+Tipper Lorry)	1	60	103	1.5	Table C 5-30
Construction	Dwellings	All areas - around nearest proposed dwelling	Cutters, drills and small tools	4	10	107	1	Table C 4-72
			Cement mixer truck (discharging)	1	10	108	1.5	Table C 4-18
			Telescopic Handler	2	20	98	1.5	Table C 4-55

Construction Traffic

- 8.84 The assessment of noise from construction traffic has regard to the principles of the DMRB LA111. Construction traffic noise impacts will be short-term and temporary.
- 8.85 The following construction year scenarios have been considered with regards to impacts on existing receptors. Note that a cumulative and therefore a worst-case assessment has been carried out and that significance of impacts will be reduced.

- **2022** – Do Minimum (Baseline year)

- Something (Assessment Year) - with construction traffic and including committed development.

- 8.86 Road traffic noise impacts along the existing highways in the assessment year has been assessed in terms of the change in Basic Noise Level (BNL), as suggested in DMRB LA111, which is the nominal noise level at 10 metres perpendicular to the kerb. The BNL for a road link are calculated using the methodology set out in the CRTN which includes factors such as traffic flow, percentage of heavy goods vehicles (HGV) and speed.
- 8.87 The calculated BNLs in the Do Something (assessment year, 2025) scenario are compared against the Do Minimum (baseline year, 2022) scenario to establish the short-term change in road traffic noise level in the construction traffic assessment year.
- 8.88 The traffic data for link roads used in the assessment of construction traffic noise has been provided by the Traffic and Transport consultant and is shown in **Table 8.12**.

Table 8.12: Construction Traffic Flow Data

Link Road	Traffic Speed (km/h)	2022 – Do Minimum (Baseline Year)		2025- Do Something (Construction Year)	
		18hr AAWT	% HGV	18hr AAWT	% HGV
M57 NB Off	113	13127	8.0	14305	7.9
M57 NB On	113	5734	8.0	6317	7.9
M57 SB Off	113	5122	8.0	5638	7.9
M57 SB On	113	14108	8.0	15417	7.9
A506 Valley Road S	64	38480	8.0	41530	7.9
A506 Valley Road	64	34793	8.0	38432	7.8
A506 Valley Road	64	20876	8.0	22906	7.9
Whitefield Drive	48	12034	8.0	14112	7.3
Kirkby Row	64	12699	8.0	13615	8.0
A506	64	19665	8.0	21478	7.8
A5208	64	19039	8.0	23820	7.9
A5208 County Road	64	15287	8.0	19702	8.0
A5208 County Road	64	15517	8.0	19949	8.0
A5208 County Road	64	17736	8.0	21062	8.0
A5208	64	20007	8.0	23452	8.0
Cherryfield Drive	48	10013	8.0	10918	8.0
Cherryfield Drive	48	9671	8.0	10456	8.0
Cherryfield Drive	48	7492	8.0	8026	4.7
Cherryfield Drive	48	4352	8.0	4710	8.0

Link Road	Traffic Speed (km/h)	2022 – Do Minimum (Baseline Year)		2025- Do Something (Construction Year)	
		18hr AAWT	% HGV	18hr AAWT	% HGV
Bewley Drive	48	8822	8.0	9451	8.0
Bewley Drive	48	8822	8.0	9451	8.0
Old Rough Lane	32	11942	8.0	12801	8.0
Webster Drive	48	6913	8.2	7406	7.6
Moorgate Road North	64	16081	13.4	17229	13.4
M57	113	61882	9.9	66840	9.8
M57	113	57673	9.5	62016	9.5
J6 M57 Circulatory (SB on)	64	15589	8.0	17054	7.9
J6 M57 Circulatory (NB on)	64	20474	8.0	22302	7.9
J6 M57 Circulatory (NG off)	64	8223	8.0	9224	7.8
J6 M57 Circulatory (SB off)	64	10191	8.0	10918	8

- 8.89 The magnitude of impact of construction road traffic is then determined in the short-term using the approach summarised in **Table 8.13**.

Table 8.13: Magnitude of Impact - Construction Road Traffic Noise

Short-term Magnitude of Impact	Short-term Change in BNL (dB $L_{A10,18hr}$)
Major	Greater than or equal to 5.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Minor	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0

Completed Development Assessment

- 8.90 The assessment of traffic noise from the completed development on existing receptors has adopted the same approach as the assessment of construction traffic, where noise impacts along the existing highways have been assessed in terms of the change in Basic Noise Level (BNL), calculated using the methodology set out in the CRTN to enables a relative comparison to be made of the change in noise level associated with link roads. These traffic noise impacts will be long-term and permanent.
- 8.91 The following assessment years have been considered. Note that a cumulative and therefore a worst-case assessment has again been carried out.

- **2022** – Do Minimum (Baseline year) - without proposed or committed development or construction traffic
- **2028** – Do Something (Assessment Year) - with road traffic from the completed development and committed development.

8.92 The calculated BNLs in the Do Something (assessment year, 2028) scenario are compared against the Do Minimum (baseline year, 2022) scenario to demonstrate the long-term change in road traffic noise level in the assessment year.

8.93 The traffic data for link roads used in the assessment of traffic noise for the completed development has been provided by the Project Transport consultant and is provided in **Table 8.14**.

Table 8.14: Completed Development Traffic Flow Data

Link Road	Traffic Speed (km/h)	2022 – Do Minimum (Baseline Year)		2028 - Do Something (Completed Year)	
		18hr AAWT	% HGV	18hr AAWT	% HGV
M57 NB Off	113	13127	8.0	15191	7.6
M57 NB On	113	5734	8.0	6608	7.6
M57 SB Off	113	5122	8.0	5927	7.6
M57 SB On	113	14108	8.0	16292	7.6
A506 Valley Road S	64	38480	8.0	43666	7.7
A506 Valley Road	64	34793	8.0	41764	7.3
A506 Valley Road	64	20876	8.0	24767	7.4
Whitefield Drive	48	12034	8.0	14489	7.3
Kirkby Row	64	12699	8.0	13990	8.0
A506	64	19665	8.0	22345	7.7
A5208	64	19039	8.0	24509	7.9
A5208 County Road	64	15287	8.0	20267	7.9
A5208 County Road	64	15517	8.0	21062	7.7
A5208 County Road	64	17736	8.0	22237	7.8
A5208	64	20007	8.0	24658	7.8
Cherryfield Drive	48	10013	8.0	12648	7.0
Cherryfield Drive	48	9671	8.0	11781	8.8
Cherryfield Drive	48	7492	8.0	8254	4.6
Cherryfield Drive	48	4352	8.0	5539	6.9
Bewley Drive	48	8822	8.0	9969	7.8
Bewley Drive	48	8822	8.0	9995	7.8
Old Rough Lane	32	11942	8.0	13170	8.0
Webster Drive	48	6913	8.2	8440	6.7
Moorgate Road North	64	16081	13.4	17974	13.2

Link Road	Traffic Speed (km/h)	2022 – Do Minimum (Baseline Year)		2028 - Do Something (Completed Year)	
		18hr AAWT	% HGV	18hr AAWT	% HGV
M57	113	61882	9.9	69564	9.7
M57	113	57673	9.5	63896	9.4
J6 M57 Circulatory (SB on)	64	15589	8.0	18135	7.6
J6 M57 Circulatory (NB on)	64	20474	8.0	23942	7.5
J6 M57 Circulatory (NG off)	64	8223	8.0	10106	7.2
J6 M57 Circulatory (SB off)	64	10191	8.0	11201	8.0

- 8.94 The magnitude of impact of road traffic associated with the completed development is then determined in the long-term using the approach summarised in **Table 8.15**.

Table 8.15: Magnitude of Impact – Completed Development Road Traffic Noise

Long-term Magnitude of Impact	Long-term Change in BNL (dB $L_{A10,18hr}$)
Major	Greater than or equal to 10.0
Moderate	Greater than or equal to 5.0 and less than 9.9
Minor	Greater than or equal to 3.0 and less than 4.9
Negligible	Less than 3.0

Characterisation of Effect

- 8.95 The noise effects can be categorised as follows:
- Negative – an increase of noise will occur due to the Project, and result in a negative effect
 - Extent – the extent of effect will be local
 - Magnitude – the magnitude of effect will vary, depending on various factors
 - Duration – either short-term (temporary) or long-term (permanent).
 - Timing – daytime/night-time; and,
 - Reversibility – whether the effect will have a long-term impact.

Determination and Assessment of Significant Effects

- 8.96 The significance of construction activity, construction road traffic, and road traffic noise associated with the completed Development have been determined by evaluating the sensitivity of the selected NSRs (**Table 8.6** and **Table 8.7**), and the magnitude of impacts (**Table 8.9**, **Table 8.13** and

Table 8.15). For road traffic in the construction and completed development phases, a high receptor sensitivity has been assumed as dwellings are located in close proximity to all link roads included in this assessment.

- 8.97 The determination of significance of the effect has then been based on professional judgement, taking and Table 8.16 has been a tool that has assisted with this process.

Table 8.16: Determining the Significance of Effect

		Receptor Sensitivity			
		High	Medium	Low	Negligible
Magnitude of Impact	Major	Major	Moderate	Minor	Negligible
	Moderate	Moderate	Moderate	Minor	Negligible
	Minor	Minor	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

- 8.98 Likely significant effects can be beneficial (where a noise reduction occurs) or adverse (where a noise increase is calculated).
- 8.99 A Minor Adverse effect, Negligible effect and any Beneficial effects are considered not Significant. A Moderate Adverse or Major Adverse effect is considered Significant.

Assessment of Likely Significant Effects

- 8.100 Finally, the significance of effect is assessed by consideration of other factors and characteristic such as those noted above.

Assumptions/Limitations

- 8.101 The predicted level of noise from construction and operational activities depends on the assumptions relating to the items of plant used, the number of items, and the duration of the activities. The assumptions made regarding construction noise are based on the reasonable worst-case plant assumptions presented in **Table 8.11**. The assumptions regarding road traffic generation are based on data provided by the Project's Transport consultant and are considered to present a reasonably robust assessment.

Embedded Mitigation

Construction Activities

- 8.102 Enabling and construction activities and associated traffic will be restricted to the daytime period, as defined in **paragraph 8.75** to minimise and limit the significance of noise effects at nearby receptors.

The Completed and Operational Development

- 8.103 The Project does not include any embedded mitigation for road traffic after completion of the Development.
- 8.104 The potential impact of any new building services plant that might come forward with the proposed development (such as air source heat pumps) is to be controlled by condition such that effects would be not significant.

Assessment of Likely Significant Effects

Construction Road Traffic

- 8.105 The calculated BNLs for the baseline and construction years are presented in **Table 8.17**

Table 8.17: Construction Traffic BNLs and Magnitude of Impact

Link Road	2022 – Do Minimum (Baseline Year)	2025- Do Something (Construction Year)	Change in BNL (dB $L_{A10,18hr}$)	Magnitude of Impact
M57 NB Off	75.5	75.7	0.2	Negligible
M57 NB On	71.9	72.1	0.2	Negligible
M57 SB Off	71.4	71.6	0.2	Negligible
M57 SB On	75.8	76.0	0.2	Negligible
A506 Valley Road S	76.0	76.2	0.1	Negligible
A506 Valley Road	75.6	75.8	0.2	Negligible
A506 Valley Road	73.4	73.6	0.2	Negligible
Whitefield Drive	69.7	70.0	0.3	Negligible
Kirkby Row	71.2	71.3	0.1	Negligible
A506	73.1	73.3	0.2	Negligible
A5208	73.0	73.8	0.8	Negligible
A5208 County Road	72.0	73.0	0.9	Negligible
A5208 County Road	72.1	73.0	0.9	Negligible
A5208 County Road	72.7	73.2	0.6	Negligible
A5208	73.2	73.7	0.5	Negligible
Cherryfield Drive	68.9	69.1	0.2	Negligible
Cherryfield Drive	68.7	68.9	0.2	Negligible
Cherryfield Drive	66.7	66.8	0.1	Negligible
Cherryfield Drive	65.3	65.4	0.2	Negligible
Bewley Drive	68.3	68.5	0.1	Negligible
Bewley Drive	68.3	68.5	0.1	Negligible

Link Road	2022 – Do Minimum (Baseline Year)	2025- Do Something (Construction Year)	Change in BNL (dB L _{A10,18hr})	Magnitude of Impact
Old Rough Lane	68.9	69.0	0.1	Negligible
Webster Drive	67.2	67.3	0.1	Negligible
Moorgate Road North	73.2	73.4	0.1	Negligible
M57	82.5	82.6	0.1	Negligible
M57	82.1	82.3	0.1	Negligible
J6 M57 Circulatory (SB on)	72.1	72.3	0.2	Negligible
J6 M57 Circulatory (NB on)	73.3	73.5	0.2	Negligible
J6 M57 Circulatory (NG off)	69.3	69.6	0.3	Negligible
J6 M57 Circulatory (SB off)	70.3	70.4	0.1	Negligible

8.106 **Table 8.17** shows that the increase in the BNL on all link roads will be less than 1dB. The associated magnitude of impact is negligible. The effect will be short-term, and reversible, and at the local level and therefore, the likelihood of significant effects is negligible, and therefore not significant.

Construction Activities

8.107 **Table 8.18** summarises the baseline noise level at each adopted for each NSR, the associated BS 5228-1:2014 threshold Category, and the LOAEL and SOAEL upon which the assessment of significant effects of construction activity noise is based.

8.108 The predicted free-field construction activity noise levels are shown at each NSR for each phase and area used in the assessment of construction activities. Exceedance of the SOAEL (an indication of the magnitude of impact) are highlighted in the table, with the worst-case quantified. The worst-case magnitude of impact (based on **Table 8.9**) and significance of effect (based on **Table 8.16** and the receptor sensitivities assumed in **Table 8.7**) are also summarised.

Table 8.18: Baseline, Assessment and Construction Activity Noise Levels

Baseline and Assessment Levels			NSR1	NSR2	NSR3	NSR4	NSR5	NSR6	NSR7	NSR8	NSR9	NSR10	NSR11	NSR12	NSR13
Baseline Noise	Noise Measurement Location		CRTN3	ST1	CRTN3	CRTN3	LT1	LT1	CRTN4	LT4 ²	CRTN1	CRTN1	LT3	LT1	CRTN3
	Adopted Noise Level, L _{Aeq,T}		58	47	58	58	60	60	64	62	59	59	57	60	58
	BS 5228 threshold Category		A	A	A	A	A	A	B	A	A	A	A	A	A
	LOAEL		58	47	58	58	60	60	64	62	59	59	57	60	58
	SOAEL		65	65	65	65	65	65	70	65	65	65	65	65	65
Phase	Activity	Area	NSR1	NSR2	NSR3	NSR4	NSR5	NSR6	NSR7	NSR8	NSR9	NSR10	NSR11	NSR12	NSR13
Demolition	Existing College Building	Area 8 Only	46	53	27	--	--	52	53	63	65	61	56	--	--
	Hardstanding Removal	Area 7	49	53	27	--	--	53	55	74	53	51	57	--	--
		Area 8	50	53	27	--	--	52	54	66	63	59	56	--	--
Enabling Work	Ground excavation & earthworks	Area 1	66	25	21	29	24	25	25	32	29	32	--	27	16
		Area 2	25	67	26	31	42	44	41	34	28	29	28	41	30
		Area 3	21	27	69	56	46	46	43	33	22	23	--	48	50
		Area 4	19	21	55	62	48	46	42	33	--	23	--	53	56
		Area 5	15	43	48	47	61	35	28	37	--	24	--	49	47
		Area 6	14	42	44	42	27	53	68	41	27	30	22	41	41
		Area 7	31	40	15	38	37	40	42	61	39	37	44	36	37
		Area 8	33	40	14	27	37	39	40	48	51	49	43	35	36
		Area 9	17	19	50	54	50	47	42	34	--	25	--	63	59
Transport	Road Construction	Area 1	65	25	21	31	25	26	25	32	29	32	--	27	17
		Area 2	25	67	26	31	44	45	43	35	29	29	29	44	30
		Area 3	22	28	66	58	47	47	44	34	26	22	--	50	52
		Area 4	20	22	57	63	48	47	43	34	17	23	--	53	56
		Area 5	16	45	48	48	66	31	29	36	--	23	--	51	49
		Area 6	15	41	44	42	25	53	71	43	28	30	22	43	42
		Area 7	25	41	15	39	39	41	43	61	40	38	43	38	38
		Area 8	33	40	14	26	37	39	41	48	53	50	45	31	37
		Area 9	17	24	50	55	52	48	44	35	--	25	--	64	59
Construction	Dwellings, to roof level	Area 1	65	23	19	27	19	21	20	28	25	28	--	22	14
		Area 2	23	66	25	26	40	42	38	31	25	25	24	40	25
		Area 3	19	44	67	54	45	45	41	29	21	19	--	47	48
		Area 4	17	19	53	62	46	44	41	29	--	19	--	52	55
		Area 5	13	41	46	45	61	49	40	32	--	20	--	47	45
		Area 6	11	38	42	40	23	51	68	39	24	25	18	40	39
		Area 7	30	37	11	34	35	38	40	60	36	34	38	34	34
		Area 8	29	38	11	23	34	37	38	45	50	48	41	32	34
		Area 9	15	18	48	53	48	45	41	31	--	20	--	61	59
Worst Case Construction Noise Level			66	67	69	63	66	53	71	74	65	61	57	64	59
Exceedance over SOAEL			1	2	4	-2	1	-12	1	9	0	-4	-8	-1	-6
Worst-Case Significance of Effect			Moderate	Moderate	Moderate	Minor	Moderate	Negligible	Minor	Moderate	Minor	Minor	Minor	Minor	Minor

² A free-field correction of -3dB has been applied to the measured façade noise level at LT4.

Demolition Phase

- 8.109 Potentially direct significant adverse effects are predicted during the demolition phase at NSR8 (Kirby Gallery and Council Offices) only, which are not residential receptors. This phase is necessary for any redevelopment of the site, will likely be short in duration, carried out in the daytime and impacts will be localised.
- 8.110 It is therefore assessed that noise from demolition activities has a not significant effect.

Enabling works

- 8.111 The potential significance of effect at NSR1-3 (dwellings) is Moderate Adverse during enabling works, which are expected to be relatively short-term. These local activities whilst necessary and direct, are also commonplace around existing residential areas and are regularly carried out successfully, with appropriate management and control of noise-generating activities, included in a CEMP, and secured by condition.
- 8.112 It is therefore assessed that noise from enabling works has a not significant effect.

Transport (Road Construction)

- 8.113 The potential significance of effect at NSR2, NSR3 and NSR5 (dwellings) and NSR7 (offices) is Moderate Adverse during road construction which is expected to be completed relatively quickly, and is therefore short-term. These local activities whilst necessary, are again commonplace around existing receptors, and can be successfully completed with appropriate noise management and control, prescribed via a CEMP, and secured by condition.
- 8.114 The significance of effect of road construction at these receptors is therefore assessed as not significant. The potential significance of effect at all other NSRs is assessed as not significant. It is therefore assessed that noise from road construction has a not significant effect.

Construction

- 8.115 The potential significance of effect at NSR2 and NSR3 is Moderate Adverse dwelling construction, being 1-2dB above the SOAEL under reasonably worst-case conditions. Noise levels are, however, expected to be lower and below the SOAEL as sources of dwelling construction noise move around

the site and will therefore result in a Minor Adverse or Negligible effect for the majority of the time and remainder of the construction phase. These local activities whilst necessary, are again commonplace around existing receptors and are regularly carried out successfully with appropriate management and control of noise-generating activities, included in a CEMP, and secured by condition.

- 8.116 The significance of effect of dwelling construction at these and all other receptors is therefore assessed as not significant.

The Completed and Operational Development

Construction Road Traffic

8.117 The calculated BNLs for the baseline and completed development years are presented in **Table 8.19**.

Table 8.19: Completed Development Traffic BNLs and Magnitude of Impact

Link Road	2022 - Do Minimum (Baseline Year)	2028 - Do Something (Completed Development)	Change in BNL (dB L _{A10,18hr})	Magnitude of Impact
M57 NB Off	75.5	75.9	0.4	Negligible
M57 NB On	71.9	72.3	0.4	Negligible
M57 SB Off	71.4	71.8	0.4	Negligible
M57 SB On	75.8	76.2	0.4	Negligible
A506 Valley Road S	76.0	76.3	0.3	Negligible
A506 Valley Road	75.6	76.1	0.5	Negligible
A506 Valley Road	73.4	73.8	0.4	Negligible
Whitefield Drive	69.7	70.1	0.5	Negligible
Kirkby Row	71.2	71.5	0.2	Negligible
A506	73.1	73.4	0.3	Negligible
A5208	73.0	73.9	0.9	Negligible
A5208 County Road	72.0	73.1	1.0	Negligible
A5208 County Road	72.1	73.2	1.1	Negligible
A5208 County Road	72.7	73.4	0.8	Negligible
A5208	73.2	73.9	0.7	Negligible
Cherryfield Drive	68.9	69.5	0.6	Negligible
Cherryfield Drive	68.7	69.6	0.9	Negligible
Cherryfield Drive	66.7	66.9	0.2	Negligible
Cherryfield Drive	65.3	65.9	0.6	Negligible
Bewley Drive	68.3	68.6	0.3	Negligible
Bewley Drive	68.3	68.7	0.3	Negligible
Old Rough Lane	68.9	69.1	0.3	Negligible
Webster Drive	67.2	67.6	0.4	Negligible
Moorgate Road North	73.2	73.5	0.3	Negligible
M57	82.5	82.8	0.3	Negligible
M57	82.1	82.4	0.3	Negligible
J6 M57 Circulatory (SB on)	72.1	72.5	0.4	Negligible
J6 M57 Circulatory (NB on)	73.3	73.7	0.4	Negligible
J6 M57 Circulatory (NG off)	69.3	69.9	0.6	Negligible

Link Road	2022 – Do Minimum (Baseline Year)	2028 - Do Something (Completed Development)	Change in BNL (dB L _{A10,18hr})	Magnitude of Impact
J6 M57 Circulatory (SB off)	70.3	70.5	0.2	Negligible

8.118 **Table 8.19** shows that the increase in the BNL on all link roads will be no more than 1.1 dB. The associated magnitude of impact is negligible. The effect will be long-term, temporary, direct at the local level and therefore, the likelihood of significant effects is negligible.

8.119 It is therefore assessed that noise from operational road traffic noise has a not significant effect.

Additional Mitigation / Enhancement Measures

Demolition and Construction Phase

8.120 Demolition and construction noise and vibration effects will be controlled through measures set out in an Construction Environmental Management Plan (CEMP), which will be secured by a planning condition. General steps for the reduction of construction noise and vibration effects, as advocated in BS 5228-1:2009+A1:2014, include:

- **Substitution** – where practicable, one or more of the proposed construction plant items are substituted for a quieter option; e.g., use of rotary bored piling / continuous flight augers over driven piles;
- **Equipment siting** - where practicable, construction plant items will be located away from noise sensitive areas. Noise reductions are achieved by setting plant specific setback distances; and
- **Working methods** – where practicable, adjust working methods so that the number of concurrent construction activities being undertaken is reduced.
- **Periods of working** – adjust the periods of the noisiest working so that the duration of noise exposure outside receptors is minimised as far as reasonably practicable.
- **Hours of work** – working hours on Site would be limited to the daytime period with any work outside of these hours will be subject to prior agreement of, and/or reasonable notice to KMBC as appropriate, including where necessary, a Section 61 agreement (see below).

8.121 Additionally, general provisions for the control of noise and vibration during the construction of the Development, such as management and monitoring processes, are required to ensure best

practicable means (BPM) are planned and employed, as defined in Section 72 of the COPA and Section 79 of the EPA.

8.122 General steps, including BPM, to minimise noise levels, in addition to any specific mitigation, as required for any of the considered construction activities, require construction contractors to undertake the following, as a minimum:

- integration of noise control into the preparation of method statements, including, where necessary, the use of effective silencers;
- proactive links between noise management activities and community relations activities;
- preparation of details of site hoardings, screens or bunds that will be put in place to provide acoustic screening during construction, together with an inspection and maintenance schedule for such features;
- preparation of risk assessments to inform structural surveys of buildings and structures that may be affected by vibration from construction;
- development of a noise and vibration monitoring protocol, including a schedule of noise and vibration monitoring locations and stages during relevant demolition and construction activities of the Development when monitoring will be undertaken;
- the undertaking and publication of all monitoring required to ensure compliance with all acoustic commitments and consents; and
- implementation of management processes to ensure ongoing compliance, improvement and rapid corrective actions to avoid any potential noncompliance.
- construction plant that is intermittently used should be shut down in the intervening periods between work or throttled down to a minimum;
- appointment of a site contact to whom complaints/queries about construction activity can be directed - any complaints should be investigated, and action taken where appropriate.
- local residents should be kept informed of periods of likely intensive construction, including working hours;
- all reasonable steps should be taken to limit the number of vehicles waiting to deliver materials to the Site;
- construction at the Site boundary (which would be closest to nearby residential receptors), should be undertaken as efficiently and quickly as reasonably possible; and
- with the exception of generators, pumps and electric plant, all plant and equipment should be shut down when not in use.
- In the event that, despite use of BPM, extended periods of elevated construction noise levels are anticipated, and/or substantive night-time working is required, then the contractor will seek a Section 61 agreement with the local authority under the Control of Pollution Act (CoPA, 1974). A Section 61 is a formal agreement between the contractor and the local authority which allows the contractor and local authority to agree, for example, noise levels and hours of work.

The Completed and Operational Development

- 8.123 With the exception of controlling the potential impact of any new building services plant that might come forward under the approved development (such as ASHPs) that can be secured by condition to be not significant, no further measures are necessary for the completed and operational development.

Residual Effects

- 8.124 The residual effect assessment is summarised in **Table 8.20**, which shows that the residual effects are negligible. The assessment has determined that the residual noise effects resulting from the Development are not significant for both the enabling and construction phases, and operational phases.

Table 8.20: Residual Effects Summary

Description of Effect	Embedded Mitigation	Nature of Effect	Potential Effect (inc. Significance)	Further Mitigation	Residual Effect (inc. Significance)
<i>Enabling and Construction</i>					
Vibration from Demolition and Construction	Restricted hours	Temporary, short-term	Minor Adverse to Negligible (not significant)	CEMP to be secured via planning condition None required	Minor to Negligible (not significant)
Noise from enabling and construction activities	Restricted hours	Temporary, short-term	Minor Adverse to Negligible (not significant)	None required	Minor to Negligible (not significant)
Noise from construction vehicles on the wider road network	Daytime only	Temporary, short-term	Negligible (not significant)	None required	Negligible (not significant)
<i>Operation (Completed Development)</i>					
Noise from vehicles on the wider road network	None	Permanent	Negligible (not significant)	None required	Negligible (not significant)
Noise from building services plant and equipment	Noise criteria secured via planning condition(s)	Permanent	Negligible (not significant)	None required	Negligible (not significant)

Conclusions

- 8.125 Potential significant effects from construction activities, and construction and operational traffic on the wider road network have been assessed.
- 8.126 The nearest receptors to the site and their respective sensitivities have been identified and a noise survey undertaken to quantify baseline levels at representative locations.
- 8.127 The results of the baseline survey have informed an assessment of construction activity noise, based on the methodology set out in BS 5228:2014. Moderate and Major Adverse impacts have been identified at a limited number of receptors. However, with appropriate mitigation, these short-term and temporary effects are assessed as having a not significant effect.
- 8.128 Traffic data has been used to undertake an assessment of the change in road traffic noise levels on link roads during the construction and completed development phases, which follow the principles set out in DMRB LA111. The assessment shows that noise from operational road traffic noise has a not significant effect.
- 8.129 Whilst full details of any fixed plant and equipment that may be installed in connection with the proposed development are unknown at this stage, suitably worded planning conditions can ensure that their operation has a not significant effect.

Assessment of Cumulative Effects

- 8.130 No existing construction sites are present in close proximity to the site, and therefore a cumulative assessment of noise from future construction activities has been scoped out of the EIA. The assessment of cumulative effects is limited to the road traffic during the enabling and construction phase and for the completed development. **Table 8.21** provides a list of the developments which be included within the cumulative sites assessment.
- 8.131 Cumulative effects of road traffic on the local network have been assessed by the inclusion of additional road traffic flows for the associated respective developments to the development generated road traffic flows and assessed with regard to the principles of the DMRB LA111. This data has been utilised earlier in the assessment which found cumulative effects to be not significant.

Table 8.21: Cumulative Sites

Site Ref.	Application No.	Distance and Direction	Proposal	Scoped-in / Scoped-out	Justification
1.	20/00193/FUL	500m southwest	266no. Residential dwellings	Scoped in	Generating traffic on links assessed within the EIA and TA. Requested at scoping with KMBC.
2.	20/00124/FUL	2km northeast	Erection of B8 Warehouse and distribution centre	Scoped in	Generating traffic on links assessed within the EIA and TA. Requested at scoping with KMBC.
3.	19/00337/OUT	1.5km northeast	Industrial led mixed use development	Scoped in	Generating traffic on links assessed within the EIA and TA. Requested at scoping with KMBC.

Likely Residual Cumulative Effects and their Significance**Construction and Completed and Operational Development**

- 8.132 The assessment has determined that the residual cumulative noise effects resulting from the Development are not significant for both the enabling and construction phases, and operational phases. It is therefore assessed that noise from operational road traffic noise has a not significant effect.

Figures

Figure 8.1: Construction Activity Areas and Noise Sensitive Receptors



Figure 8.2: Baseline Noise Monitoring Locations and Noise Sensitive Receptors



List of Tables

Table 8.1: Planning Practice Guidance – Noise, Exposure Hierarchy

Table 8.2: IEMA Guidelines Generic Relationship between Magnitude, Sensitivity and Significance

Table 8.3: ABC Method Construction Noise Thresholds

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Table 8.4: Indoor Ambient Sound Levels for Residential Dwellings (BS 82323:2014)

Table 8.5: Knowsley Council Consultation

Table 8.6: Definition of Receptor Sensitivities

Table 8.7: Description of Construction Activity NSRs

Table 8.8: Thresholds of Potential Significant Effects of Construction Activity Noise

Table 8.9: Construction Noise Assessment LOAEL and SOAEL and Magnitude of Impact

Table 8.10: Construction Noise Modelling Input Parameters

Table 8.11: Construction Phase, Activity and Plant Assumptions

Table 8.12: Construction Traffic Flow Data

Table 8.13: Magnitude of Impact - Construction Road Traffic Noise

Table 8.14: Completed Development Traffic Flow Data

Table 8.15: Magnitude of Impact – Completed Development Road Traffic Noise

Table 8.16: Determining the Significance of Effect

Table 8.17: Construction Traffic BNLs and Magnitude of Impact

Table 8.18: Baseline, Assessment and Construction Activity Noise Levels

Table 8.19: Completed Development Traffic BNLs and Magnitude of Impact

Table 8.20: Residual Effects Summary

Table 8.21: Cumulative Sites

List of Figures

Figure 8.1: Construction Activity Areas and Noise Sensitive Receptors

Figure 8.2: Baseline Noise Monitoring Locations and Noise Sensitive Receptors

List of Appendices

Appendix 8.1: Glossary

Appendix 8.2: Baseline Noise Survey Methodology and Results

Appendix 8.3: Site Suitability Assessment