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# Ansty Garden Community

## Environmental Statement

### Volume 2

November 2023



# CHAPTER 9: NOISE AND VIBRATION

## 9 Noise and Vibration

### 9.1 Scope of Assessment

- 9.1.1 This chapter of the ES assesses the likely significant effects of the Proposed Development in terms of noise and vibration and is supported by **ES Volume 4, Appendix E: Noise and Vibration**.
- 9.1.2 The chapter describes: the assessment methodology; the baseline conditions currently existing at the Site and in the surrounding area; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; the likely residual effects after these measures have been employed; and the cumulative effects associated with the Proposed Development in combination with other developments within 5 km of the Site.
- 9.1.3 Type 1 cumulative effects ‘intra-project effects’ which are the combined effects of individual topic impacts on a particular sensitive receptor are considered in **ES Volume 2, Chapter 14: Effect Interactions**.

### 9.2 Key Legislation, Policy and Guidance Considerations

- 9.2.1 The noise and vibration assessment has been undertaken within the context of relevant planning policies, guidance documents and legislative instruments. These are summarised below.

#### Legislation and Regulation

##### *Control of Pollution Act 1974*

- 9.2.2 The Control of Pollution Act 1974<sup>1</sup> (CoPA) requires that ‘Best Practicable Means’ (BPM), as defined in section 72 of CoPA, are adopted to control construction noise on any given site.
- 9.2.3 CoPA makes reference to BS 5228 as best practicable means. Section 61 sets out the process for making an application to the local authority for prior consent to carry out works.

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<sup>1</sup> Control of Pollution Act. (1974).

## Planning Policy

### *National Planning Policy Framework*

- 9.2.4 The National Planning Policy Framework<sup>2</sup> (NPPF) sets out the Government’s planning policies for England and how these should be applied.
- 9.2.5 Planning policies and decisions should contribute to and enhance the natural and local environment by preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution. Paragraph 185 of the 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.”*

### *Noise Policy Statement for England*

- 9.2.6 The Noise Policy Statement for England<sup>3</sup> (NPSE) seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise.
- 9.2.7 The statement applies to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise.
- 9.2.8 The statement sets out the long-term vision of the government’s noise policy, which is to *“promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development”*.
- 9.2.9 The guidance promotes the effective management and control of noise, within the context of Government policy on sustainable development and thereby aims to:
- *“avoid significant adverse impacts on health and quality of life;*

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<sup>2</sup> Department for Communities and Local Government. (2012, Last updated September 2023). National Planning Policy Framework (NPPF).

<sup>3</sup> Defra. (2010). Noise Policy Statement for England.

- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvements of health and quality of life.”*

9.2.10 The statement uses the concept of noise exposure categories as follows:

- No Observed Effect Level (NOEL) – the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
- Lowest Observable Adverse Effect Level (LOAEL) – the level above which adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL) – the level above which significant adverse effects on health and quality of life occur.

9.2.11 It is recognised that SOAEL does not have a single objective noise-based level that is applicable to all sources of noise in all situations and therefore the SOAEL is likely to be different for different sources, receptors and at different times of the day.

9.2.12 No guidance has been issued at the time of writing to identify the SOAEL and LOAEL for typical noise sources and receptors.

### *Planning Practice Guidance – Noise*

9.2.13 The Planning Practice Guidance<sup>4</sup> (PPG) expands on the use of SOAEL:

*“if the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused.”*

9.2.14 The PPG also goes on to identify unacceptable noise exposure:

*“at the highest extreme, noise exposure would cause extension and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be prevented from occurring.”*

9.2.15 In addition, PPG refers to further considerations to mitigating noise on residential developments. PPG states that the noise impact may be partially off-set if the residents of those dwellings have access to:

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

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<sup>4</sup> Department for Communities and Local Government. (2014). Planning Practice Guidance – Noise.

- 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 a 5 minutes walking distance).

## Regional & Local Policy

### *Mid Sussex District Plan 2014-2031*

- 9.2.16 The Mid Sussex District Plan<sup>5</sup> (MSDP) was adopted as a new development plan document on 28<sup>th</sup> March 2018 and is the main planning document used by the Mid Sussex District Council (MSDC) when considering planning applications. The District Plan replaces the majority of the Mid Sussex Local Plan (adopted in 2004).
- 9.2.17 The MSDP provides a framework for new development, employment growth, infrastructure and as a measure to ensure the protection of the countryside. It also guides other planning documents, such as Neighbourhood Plans and site Allocation Plans.
- 9.2.18 Any development in the countryside must comply with policy ‘D29: Noise, Air, Pollution’.
- 9.2.19 The MSDP states the following:

*“...the quality of people’s life will be protected from unacceptable levels of noise, light and air pollution by only permitting development where:*

*Noise pollution:*

- *It is designed, located and controlled to minimise the impact of noise on health and quality of life, neighbouring properties and the surrounding area;*
- *If it is likely to generate significant levels of noise it incorporates appropriate noise attenuation measures;*
- *Noise sensitive development, such as residential, will not be permitted in close proximity to existing or proposed development generating high levels of noise unless*

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<sup>5</sup> Mid Sussex District Council (2016), Mid Sussex District Plan 2014 – 2031 Submission Version

*adequate sound insulation measures, as supported by a noise assessment are incorporated within the development.*

*In appropriate circumstances, the applicant will be required to provide:*

- *An assessment of the impact of noise generated by a proposed development; or*
- *An assessment of the effect of noise by an existing noise source upon a proposed development.”*

### *Mid Sussex District Plan 2021-2039 Consultation Draft*

9.2.20 The draft District Plan 2021-2039<sup>6</sup> was published for the Regulation 18 consultation between 7<sup>th</sup> November and 19<sup>th</sup> December 2022. It provides updated and new policies to ensure that the Plan remains effective and in accordance with National Policy.

9.2.21 Policy DPN7: Noise Impacts states the following:

*“The natural environment and people’s health and quality of life will be protected from unacceptable levels of noise.*

*Areas valued for tranquillity for recreation and amenity reasons, including protected landscapes and their setting and nature conservation sites, will be protected from unacceptable levels of noise.*

*Development will only be permitted whether it:*

- *Avoids significant adverse impacts on health and quality of life; and*
- *Mitigates and minimises adverse impacts on health and quality of life; and*
- *Where possible, contributes to the improvement of health and quality of life.*

*Development will be expected to be located, designed and controlled to avoid or minimise any potential significant adverse impacts from noise. Development should have good acoustic design including orientating or organising buildings (including consideration of the internal layout of buildings) to locate more noise sensitive areas, such as the principle habitable rooms, away from potential sources of noise. Parking arrangements should be carefully considered to avoid noise and headlight nuisance.*

*Noise sensitive development, such as residential, will not be permitted in close proximity to existing or proposed development generating high levels of noise, or other sources of high levels of noise such as commercial/industrial sites or transport sources, unless adequate sound insulation measures, as supported by a noise assessment, are incorporated within the development.*

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<sup>6</sup> Mid Sussex District Council (November 2022). Mid Sussex District Plan 2021 – 2039 Consultation Draft (Regulation 18)

*Noise generating development will be permitted where it can be demonstrated that nearby noise sensitive uses (existing or planned) will not be exposed to noise impact that will significantly adversely affect the amenity of the existing and future users.”*

### *Planning Noise Advice Document: Sussex*

9.2.22 The Planning Noise Advice document – Sussex<sup>7</sup> (September 2021) is a cross Sussex guidance document relevant to various local authorities. The section relevant to new noise sensitive developments is Chapter 6, paragraphs 5.5.2 and 5.5.3, which pertains to design criteria of any proposed residential development in Sussex. This text references the internal levels outlined in BS 8233:2014 and additionally the internal  $L_{Amax}$  recommendations from the WHO guidelines. The relevant sections to this chapter are reproduced below:

*“6.5.2. Design control measures should aim to meet the recommended standards set out in table 4 of BS 8233:2014 and regular night time noise events such as scheduled aircraft or passing trains which can cause sleep disturbance shall be minimized and assessed as ( $L_{Afmmax}$ ), as recommended in the World Health Organisation’s (WHO) Night Noise Guidelines for Europe (2009), unless there are particular reasons why this is not considered appropriate. In such cases, a clear explanation of the reasons should be provided.*

*6.5.3. While noise mitigation measures can be used to achieve suitable internal sound levels, preference is to be given to criteria based on windows being partially open.*

*6.5.5 Where the property is at risk of overheating an overheating assessment shall be conducted in accordance with Acoustics Ventilation and Overheating (AVO) Residential Design Guide (January 2020) and CIBSE’s Design Methodology for the Assessment of Overheating Risk in Homes (TM59: 2017).”*

9.2.23 Regarding noise from fixed plant, the document states:

*“3.2.1 The rating level of the industrial or commercial sound source should, where practicable, achieve a level no greater than the representative background sound, when measured in accordance with BS 4142:2014 + A1: 2019. There may be instances, for specific sites, where a rating level below background is deemed appropriate. This can be determined through discussion with the Local Planning Authority (LPA).”*

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<sup>7</sup> Sussex County (September 2021), Planning Noise Advice Document: Sussex.

## Technical Standards and Guidance

### *ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development*

9.2.24 Current Government guidance on planning and noise for new residential developments is found in the NPPF. One of the strengths of the NPPF is that it sets clear objectives. However, the Institute of Acoustics (IOA), Association of Noise Consultants (ANC) and Chartered Institute of Environmental Health (CIEH) feel there is insufficient technical guidance for practitioners and developers on how to deliver the Government's objectives. Therefore, these professional bodies have jointly produced the ProPG<sup>8</sup> which aims to complement existing Government advice and provides a recommended approach that can be applied proportionately to each development site to encourage good acoustic design.

9.2.25 The ProPG seeks to promote the use of good acoustic design to:

- enable new homes to be built in areas previously considered unsuitable because of noise by appropriate evaluation and careful use of suitable mitigation;
- allow rapid identification of sites where noise is unlikely to be a constraint for new residential developments;
- permit swift recognition of noisy sites that are very unlikely to be suitable for new residential developments; and
- help to reduce the harmful impact of noise on those moving into the properties and the surrounding communities.

9.2.26 The ProPG recommends the following:

*"Where ... there is a justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment. In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide "whole dwelling ventilation" in accordance with Building Regulations Approved Document F (e.g. trickle ventilators) in the open position...*

*It should also be noted that the internal noise level guidelines are generally not applicable under "purge ventilation" conditions as defined by Building Regulations Approved*

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<sup>8</sup> ProPG Planning and Noise: Professional Practice Guidance on Planning & Noise May 2017, ANC, IOA, CIEH

*Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).*

*In addition to providing purge ventilation, open windows can also be used to mitigate overheating. Therefore, should the LPA accept a scheme is to be assessed with windows closed, but this scheme is reliant on open windows to mitigate overheating, it is also necessary to consider the potential noise impact during the overheating condition”.*

### *British Standard 7445*

- 9.2.27 British Standard (BS) 7445-2: 1991 ‘Description and measurement of Environmental Noise’<sup>9</sup> defines parameters, procedures and instrumentation required for noise measurement and analysis.

### *British Standard 8233*

- 9.2.28 British Standard 8233: 2014 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’<sup>10</sup> provides criteria for the assessment of internal noise levels for various uses including dwellings and commercial properties. This recently supersedes BS8233:1999 which is withdrawn but referred to in a number of the planning policy documents referenced above.

### *British Standard 5228*

- 9.2.29 British Standard 5228: 2009 ‘Code of practice for noise and vibration control on construction and open sites’<sup>11,12</sup> provides a ‘best practice’ guide for noise and vibration control and includes sound power level (SWL) data for individual plant as well as a calculation method for noise from construction activities. Part 1 relates to noise and part 2 relates to vibration.

### *British Standard 7385*

- 9.2.30 British Standard 7385: 1993 ‘Evaluation and Measurement for Vibration in Buildings’<sup>13</sup> presents guide values or limits for transient vibration, above which there is a likelihood of cosmetic damage.

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<sup>9</sup> British Standard 7445-2: 1991 Description and measurement of environmental noise, Part 2: Guide to the acquisition of data pertinent to land use, BSI, London.

<sup>10</sup> British Standard 8233: 2014 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’, BSI, London.

<sup>11</sup> British Standard 5228-1: 2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise

<sup>12</sup> British Standard 5228-2: 2009 + A2:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration

<sup>13</sup> British Standard 7385-2: 1993 Evaluation and measurement for vibration in buildings — Part 2: Guide to damage levels from groundborne vibration

### *British Standard 4142*

- 9.2.31 British Standard 4142: 2014 *'Methods for rating and assessing industrial and commercial sound'*<sup>14</sup> describes methods to use outdoor sound levels to assess the likely effects of sound of an industrial and / or commercial nature on people who might be inside or outside a dwelling or premises used for residential purposes upon which the sound is incident.

### *Calculation of Road Traffic Noise*

- 9.2.32 Department of Transport / Welsh Office Memorandum *'Calculation of Road Traffic Noise'*<sup>15</sup> (CRTN) describes procedures for traffic noise calculation and is suitable for environmental assessments of schemes where road traffic noise may have an impact.

### *Design Manual for Road and Bridges*

- 9.2.33 Highways England's *'Design Manual for Road and Bridges Sustainability and Environment Appraisal LA111 – Noise and Vibration'*<sup>16</sup> (DMRB) provides guidance on the appropriate level of assessment to be used when assessing the noise and vibration impacts arising from all road projects, including new construction, improvements and maintenance.

### *Guidelines for Community Noise*

- 9.2.34 The World Health Organisation's (WHO's) Guidelines for Community Noise (1999)<sup>17</sup> sets out guidance on suitable internal and external noise levels in and around residential properties. This document states that, in dwellings, the critical effects of noise are on sleep, annoyance and speech interference.

### *ISO 9613*

- 9.2.35 ISO 9613-2: 1996 *'Attenuation of sound during propagation outdoors – Part 2: A general method of calculation'*<sup>18</sup> gives general methods of calculating sound propagation outdoors including attenuation due to geometrical divergence (distance); air and ground absorption; screening; reflections and other effects.

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<sup>14</sup> British Standard 4142: 2014+A1:2019 Methods for rating and assessing industrial and commercial sound'.

<sup>15</sup> Calculation of Road Traffic Noise, Department of Transport Welsh Office, HMSO, 1988

<sup>16</sup> Design Manual for Roads and Bridges, Volume 11, Environmental Assessment, Section 3, Environmental Assessment Techniques, LA 111, Noise and Vibration, (formerly HD 213/11, IAN 185/15), Highways England, May 2020

<sup>17</sup> World Health Organisation (1995), WHO Guidelines for Community Noise.

<sup>18</sup> ISO 9613-2: 1996 Attenuation of sound during propagation outdoors – Part 2: A general method of calculation

### *Acoustics, Ventilations and Overheating (AVO) Residential Design Guide*

- 9.2.36 'Acoustics, Ventilation and Overheating: Residential Design Guide'<sup>19</sup> recommends an approach to acoustic assessments for new residential development that takes due regard of the interdependence of provisions for acoustics, ventilation, and overheating. Application of the AVO Guide is intended to form part of demonstrating good acoustic design as described in the ProPG when considering internal noise level guidelines.

### *Guidelines for Noise Impact Assessment 2014*

- 9.2.37 The Institute of Environmental Management and Assessment's (IEMA's) and IOA's Guidelines for Noise Impact Assessment<sup>20</sup> sets good practice standards for scope content and methodology of noise impact assessment. The guidelines present categories of significance relating to the change of basic noise levels.

### *Building Regulations Part O (Approved Document O)*

- 9.2.38 Approved Document O<sup>21</sup> (ADO) provides practical guidance in common building situations in residential buildings on how to meet the requirements of the Building Regulations with regards to overheating.

### *Building Bulletin 93: Acoustic Design of Schools – Performance Standard*

- 9.2.39 Building Bulletin 93<sup>22</sup> (BB93) is a Department for Education and Skills design guide that provides a regulatory framework for the acoustic design of schools in support of the Building Regulations.

### *Sports England Design Guidance Note: Artificial Grass Pitch (AGP) Acoustics – Planning Implications*

- 9.2.40 The Artificial Grass Pitch (AGP) Acoustics<sup>23</sup> guidance document provides details of acoustic implications associated with such facilities. AGP Acoustics recognises there is no previous guidance or assessment methodologies for AGPs and considers the issues from first principles; the document makes reference to the NPPF, WHO and IEMA guidelines. It proposes appropriate noise criteria, typical source noise levels and

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<sup>19</sup> Acoustics Ventilation and Overheating: Residential Design Guide, January 2020, Version 1.1

<sup>20</sup> Institute of Environmental Management and Assessment. (2014) Guidelines for Environmental Noise Impact Assessment

<sup>21</sup> HM Government. The Building Regulations 2010 - Approved Document O, Overheating (2021)

<sup>22</sup> Department of Education. (2015). Building Bulletin 93 (BB93): Acoustic design of schools: Performance Standards, Department for Education, February 2015.

<sup>23</sup> Sport England (2015) Artificial Grass Pitch Acoustics – Planning Implications

assessment methods as well as outlining practical methods that can be applied to reduce noise in sensitive areas.

### 9.3 Scoping and Consultation

9.3.1 No EIA Scoping was undertaken; however, on 10<sup>th</sup> October 2022, Richard Budesha, a Senior Consultant at Temple contacted the Mid Sussex Pollution Team ([pollution@midsussex.gov.uk](mailto:pollution@midsussex.gov.uk)) via email. This was to outline the survey requirements for the assessment, surrounding noise sensitive receptors and assessment methodology for comment. On 24<sup>th</sup> October 2022, a response was received from Nick Bennett, confirming that the approach was suitable with no further comments.

### 9.4 Assessment Methodology

- 9.4.1 The Proposed Development and Parkland Reserve Site have been considered holistically within this assessment and ES chapter. The proposed works to the Parkland Reserve Site will include the change of use of farmland and woodland to parkland reserve to include public access and instigation of long-term management and rewilding regime, including establishment of pedestrian and cycle tracks, with new pedestrian and cycle access points off Cuckfield Road to the south and Staplefield Road to the north; proposals will also include the addition of two wooden viewing platforms; and sports pitches at Beech Farm Field will remain in sports use.
- 9.4.2 In view of the above, it is anticipated that the proposed construction works would result in a limited amount of noise for short periods during the construction of fences and the viewing platforms but would not give rise to any high levels or sustained sources of noise or vibration. No noise-generating activities would be introduced to the Parkland Reserve Site during operation and no notable additional vehicle movements would be generated during the construction or operation of the Parkland Reserve Site. Consequently, the effects of the Parkland Reserve Site in isolation are expected to be negligible and collectively with the Proposed Development are not anticipated to be any worse than the effects presented for the Proposed Development. Therefore, the effects presented in this ES chapter considering the sites holistically are considered to apply to both the Proposed Development and Parkland Reserve Site.

#### Determination of Baseline

- 9.4.3 In order to assess the potential noise impact of the Proposed Development, it is necessary to determine the baseline conditions. The baseline conditions are typically the current (at the time of writing the ES) environmental and socio-economic conditions of the Proposed Development and surroundings. Baseline surveys were undertaken in Autumn 2022.
- 9.4.4 The Proposed Development is exposed to noise from the following sources:

- road traffic noise from the A272;
- road traffic noise from the B2036;
- plant noise from Cuckfield Sewage Treatment Works;
- pedestrian noise from public footpaths; and
- aircraft noise.

9.4.5 The Site is located approximately 15 km away from the 54 dBA  $L_{Aeq,16hr}$  Gatwick Airport Noise Contour<sup>24</sup>.

9.4.6 All survey measurements were undertaken in accordance with BS 7445. **Figure 9.1** shows the unattended and attended measurement locations from the 2022 survey.

9.4.7 Further details and results of the baseline noise and vibration surveys are provided in **ES Volume 4, Appendix E: Noise and Vibration**.

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<sup>24</sup> <https://aircraftnoise.gatwickairport.com/2021/03/29/our-current-noise-contour/>



## Prediction Methodology and Significance Criteria

- 9.4.8 A noise impact is a change in the acoustic environment. This may be through the introduction of a new noise source, a change to an existing source causing change to the noise climate at existing receptors or the introduction of a new noise sensitive development.
- 9.4.9 The magnitude of the noise impact can depend on the absolute noise level, change in noise level, duration of the exposure and the time of day at which it occurs.
- 9.4.10 Noise impacts can lead to effects on receptors, such as annoyance or sleep disturbance for residential receptors or disturbance to non-residential receptors.
- 9.4.11 The significance of a noise effect can vary depending on the type of receptor and its sensitivity to noise, such as residential, commercial, or educational land uses.
- 9.4.12 The extent of the potential effects of the Proposed Development will be assessed using a scale from 'major adverse' to 'major beneficial', a duration scale of short, medium and long term, and a geographic scale of local, district, regional, national and international. A 'major' or 'moderate' effect constitutes a 'significant effect'.
- 9.4.13 **Table 9.1** below details how this relates to the national noise policy effect levels and, therefore, the action to be taken.

**Table 9.1: Significance of Adverse Effect Related to National Noise Policy**

Significance of Effect	Increasing Effect level	Action to be taken
Negligible	Noise impact exceeding NOEL	No Specific measures
Minor adverse	Noise impact exceeding LOAEL, just below SOAEL	Mitigate and reduce to a minimum
Moderate adverse	Noise impact exceeding SOAEL	Avoid
Major adverse	Unacceptable Adverse Effect	Prevent

### Construction Noise

#### Prediction Methodology

- 9.4.14 To quantify potential construction noise impact, typical worst-case construction activity noise levels,  $L_{Aeq,10hr}$  ( $L_{Aeq,5hr}$  on Saturdays, no night-time or evening works anticipated) from the assumed construction activities have been predicted in accordance with BS 5228: Part 1 at a point 1 m from the façade of the relevant receptor. Calculations have been based on anticipated construction methods and mechanical plant likely to be used.
- 9.4.15 The predictions have calculated the likely noise levels at the closest receptors to the Site during the worst-case construction periods. The calculations account for screening provided by the hoarding, ground absorption and likely percentage on

times for the construction plant. Further information regarding the calculations is given in **ES Volume 4, Appendix E: Noise and Vibration**.

### Impact Threshold

9.4.16 Construction noise impacts have been assessed using the predicted noise levels in accordance with the evaluation criteria set out in **Table 9.2**. These criteria are based on the ABC construction evaluation criteria set out in BS 5228: Part 1.

**Table 9.2: Construction Evaluation Criteria**

Assessment category and threshold value period	Threshold value, in decibels (dB) ( $L_{Aeq,T}$ )		
	Category A <sup>A)</sup>	Category B <sup>B)</sup>	Category C <sup>C)</sup>
Night-time (23:00 – 07:00)	45	50	55
Evening and weekends <sup>D)</sup>	55	60	65
Daytime (07:00 -19:00) and Saturdays (07:00 – 13:00)	65	70	75
Note 1: 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. 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 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. Note 3: Applied to residential receptors only.			
<sup>A)</sup> Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. <sup>B)</sup> Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. <sup>C)</sup> Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values. <sup>D)</sup> 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.			

9.4.17 The noise levels presented in **Table 9.2** are not intended to be used as a limit for noise emissions from construction activities but rather as a guide to determine the significance or otherwise of the noise effects during the construction.

9.4.18 The magnitude of impact from noise can be summarised as shown in **Table 9.3**.

**Table 9.3: Magnitude of Impact from Construction Noise**

Magnitude of Impact	Total Construction Noise Level
Negligible	Less than Ambient Noise Level
Minor adverse	Greater than Ambient Noise Level
Moderate adverse	Greater than the impact threshold value defined in <b>Table 9.2</b> .
Major adverse	5 dB greater than the impact threshold value defined in <b>Table 9.2</b> .

- 9.4.19 The SOAEL is considered to be the level at which the predicted construction noise level (based on professional judgement / guidance and industry norms) exceeds the construction noise evaluation 'Moderate Adverse' criteria. Construction noise levels which fall into the 'minor adverse' criteria are considered to fall in between the SOAEL and the LOAEL.
- 9.4.20 If the moderate adverse impact criteria, is exceeded, other project-specific factors such as the duration and the character of the impact as well as the use of the receptor may also need to be considered to determine if there is a significant effect.
- 9.4.21 The construction noise evaluation criteria apply to all residential receptors, there are no non-residential receptors (which would have a different criteria). No night-time works are anticipated during the construction works; therefore, no night-time evaluation criteria have been used in the assessment.

### Construction Vibration

- 9.4.22 The Proposed Development will potentially introduce vibration from temporary construction plant and processes to the area. It is considered that the main sources of vibration during construction works relate to surface compaction works.
- 9.4.23 The vibration predictions have been undertaken in accordance with the methodologies described in BS 5228: Part 2 for the closest residential receptors.
- 9.4.24 Predicted vibration levels have been assessed utilising the example vibration criteria contained within BS 5228: Part 2 to assess the effect of perceptible vibration on people and BS 7385: Part 2 to assess the effect of vibration on buildings.
- 9.4.25 **Table 9.4** below is reproduced from BS 5228: Part 2. The vibration levels are in terms of Peak Particle Velocity (PPV) at the receptor. The 0.3 mm/s level is considered to be the LOAEL and 1 mm/s level to be the SOAEL.

**Table 9.4: from BS 5228 Part 2 'Guidance on Effects of Vibration Levels'**

Vibration Level	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm/s	Vibration might just be perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if early warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

- 9.4.26 **Table 9.5** below is reproduced from BS 7385: Part 2. The levels given represent guide values for the onset of cosmetic damage in buildings.

**Table 9.5: from BS 7385 Part 2: 'Transient Vibration Guide Values'**

Type of Building	Peak Component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures industrial and heavy commercial buildings	50mm/s at 4 Hz and above	
Unreinforced or light framed structures Residential or light commercial type buildings	15mm/s at 4 Hz increasing to 20mm/s at 15 Hz	20mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above
Note 1 Values referred to are at the base of the building. Note 2 for unreinforced, at frequencies below 4Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded.		

### Off-Site Construction Traffic Noise

- 9.4.27 The change in noise associated with increased construction traffic on the surrounding road network has been calculated in accordance with CRTN.
- 9.4.28 The potential impacts as a result of off-site road traffic have been evaluated in accordance with the DMRB short term traffic noise effect criteria given in **Table 9.6**. The change has been calculated as the difference between the baseline scenario and baseline with peak construction traffic.

**Table 9.6: DMRB Short Term Traffic Noise Effect Criteria**

Noise Change, $L_{A10,18hr}$ dB	Magnitude of Effect
0	No Change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 – 4.9	Moderate
5+	Major

### Operational Noise

#### Mechanical Plant Noise

- 9.4.29 The operation of noise sources from the Proposed Development, including building services mechanical plant, has been assessed against BS 4142. The assessment is based on the difference between the rating noise level of the specific operational noise source and the measured background noise levels during periods of potential operation. The rating level includes corrections for acoustic character should these be present in the specific operational noise (such as tones or impulsiveness).

9.4.30 **Table 9.7** gives an indication of how the BS 4142 assessment may align with the national noise policy effect levels; however, the actual impact will depend on the context the new noise source is introduced into.

**Table 9.7: BS 4142 Criteria**

Difference between Rating Level and Background Level	BS 4142 Rating	NPSE effect level
- 10 dB*	N/A*	NOEL
0 dB	Indication of the specific sound source having a low impact depending on the context.	LOAEL
+ 10 dB	Likely to be an indication of a significant adverse impact depending on the context.	SOAEL

\* The difference between rating level and background level of -10 dB was removed from BS 4142 in the 2014 revision; however, this rating level can still be used as an indication of NOEL.

### Off-Site Operational Traffic Noise

9.4.31 The change in noise associated with increased operational traffic on the surrounding road network has been calculated in accordance with CRTN. The potential impacts as a result of off-site road traffic have been evaluated in accordance with DMRB long term traffic noise effect criteria in **Table 9.8**. The change has been calculated as the difference between the future year 'do minimum' scenario and a future year 'do something' scenario, representative of the operational year 2039.

**Table 9.8: DMRB Long Term Traffic Noise Effect Criteria**

Noise Change, $L_{A10,18hr}$ dB	Magnitude of Effect
0	No Change
0.1 – 2.9	Negligible
3 – 4.9	Minor
5 – 9.9	Moderate
10+	Major

9.4.32 The SOAEL is considered to be equivalent to be a 3 dB change for short to medium term effects and a 5 dB change for long term effects; the LOAEL is a 1 dB and 3 dB change respectively. The change in noise level is calculated on individual road links, however the effect criteria apply to the total road traffic noise change at receptors, so in some cases additional calculations have been completed.

### Sports Pitch Noise

- 9.4.33 The total noise level from the proposed sports facilities has been calculated based on typical source noise levels from Sport England Guidance document ‘AGP Acoustics Planning Implications’.
- 9.4.34 The prediction of the sports pitch noise has been carried out in CandaA noise modelling software. Area sources have been drawn in the locations of the proposed pitches / courts and calibrated based on typical noise levels presented in Sports England Guidance. Receivers have been located at the closest point for residential development in the proposed masterplan to each pitch / court.
- 9.4.35 The potential impact from the sports facilities noise has been assessed against criteria in the IEMA Guidelines for Environmental Noise Impact Assessment, these are outlined in **Table 9.9**. The 2002 draft version of this document is referenced in ‘AGP Acoustics Planning Implications’ for comparison of AGP noise against existing baseline.

**Table 9.9: IEMA Guidelines environmental noise impact criteria**

Baseline Relative Change dB	Magnitude of Change
0.1 – 2.9	Negligible
3 – 4.9	Minor
5 – 9.9	Moderate
10+	Major

- 9.4.36 The SOAEL would be equivalent to a 5dB change and LOAEL a 3 dB change.

### School Playground Noise

- 9.4.37 There are currently no standards or guidance on predicting noise levels from school playground areas. One approach could be to consider the noise levels of raised voices based on the number of children using the playground at any one time.
- 9.4.38 There are no details on the proposed capacity of the school at this stage or the times at which the playground area would be in use. For the purpose of this assessment, it has been assumed that there would be 50 raised voices at any one time for a period of 1 hour during the day. Noise levels for a raised voice have been based on data in BB93.
- 9.4.39 Typical noise levels from the school playground have then been predicted at the nearest proposed area for residential development (which would be the closest receptors to the playground). The predicted noise levels have been summed with the existing ambient noise levels to determine the total change in noise levels experienced whilst the playgrounds are in use. The assessment has been undertaken

against the noise change criteria in IEMA Guidelines for Environmental Noise Impact Assessment in **Table 9.9**.

### *Proposed Development Site Suitability*

- 9.4.40 The introduction of a noise sensitive development into areas exposed to noise requires that a site suitability assessment to be completed to assess whether the new noise sensitive uses would be undermined. The uses within the Proposed Development consist of residential units (including a care home / retirement living) and school buildings which have noise sensitive internal rooms and external spaces.
- 9.4.41 With the Proposed Development operational, the area will be exposed to noise from the existing noise sources. The area will also be exposed to new noise sources which will be implemented as part of the Proposed Development such as mechanical plant associated with the mechanical ventilation servicing the school and care home buildings.
- 9.4.42 Assessment of the Proposed Development has been based on survey data from the attended baseline measurements.
- 9.4.43 The Site suitability assessment involves comparison of measured noise levels to various internal and external guidelines which the Proposed Development should be designed to meet. Where the Proposed Development meets these guidelines, it is expected that the noise levels experienced by future users will be below the LOAEL and adverse effects will be unlikely to occur.
- 9.4.44 Distance attenuation calculations have been used to predict road traffic noise exposure at the closest dwellings to the main roads surrounding the Proposed Development. Line source attenuation has been applied to the road  $L_{Aeq}$  levels and point source attenuation has been applied to the  $L_{Amax}$  levels.

### **Internal Noise Levels – Residential**

- 9.4.45 The following guideline internal ambient noise levels for habitable rooms, shown in **Table 9.10**, are given in BS 8233. The feasibility of the Proposed Development achieving these guideline levels has been assessed to determine the suitability of the Site for the proposed noise sensitive uses.

**Table 9.10: BS 8233 Residential Internal Ambient Noise Level Criteria**

Activity	Typical Situation	Average Ambient Day time Noise Level $L_{Aeq,16hr}$ dB	Average Ambient Night-time Noise Level $L_{Aeq,8hr}$ dB
Resting	Living rooms	35	N/A
Dining	Dining rooms	40	N/A
Sleeping (Daytime resting)	Bedrooms	35	30

- 9.4.46 In locations where regular individual noise events occur (such as scheduled aircraft) which can cause sleep disturbance, BS 8233 recommends that a guideline value be set in terms of SEL or  $L_{AFmax}$  depending on the character and number of events per night. Where development is considered necessary or desirable, these may be relaxed (increased) by up to 5 dB.
- 9.4.47 The WHO Guidelines of Community Noise 1999 recommends that a 'Typical night-time  $L_{AFmax}$  dB' value of 45 dB should not be exceeded more than 10 to 15 times inside bedrooms during the night-time period to avoid potential sleep disturbance.

**Internal Noise Levels – Educational**

- 9.4.48 The guideline internal ambient noise levels for teaching spaces, shown in **Table 9.11**, are given in BB93. The feasibility of achieving these guideline levels for educational use have been assessed to determine the suitability of the Site for the Proposed Development.

**Table 9.11: BB93 internal noise criteria**

Type of Room	Upper Limit for the Indoor Ambient Noise Level $L_{Aeq,30mins}$ dB
1. Ensemble room; Recording studio; Teaching space intended specifically for students with special hearing and communication needs.	30
2. Nursery school rooms; Primary school: classroom, class base, general teaching area, small group room; Secondary school: classroom, general teaching area, seminar room, tutorial room, language laboratory; Primary music room; Secondary music classroom; Small and large practice/group room; Performance/recital room; Control room - for recording; Control room - not for recording; Lecture room; SEN calming room; Drama studio, assembly hall, multi-purpose hall (drama, PE, audio/visual presentations, assembly, occasional music).	35
3. Open plan: Teaching area; Resource/breakout area; Study room (individual study, withdrawal, remedial work, teacher preparation); Libraries: Quiet study area; Resource area; Science laboratory; Design and technology: Resistant materials, CAD/CAM area; Electronics/control, textiles, food, graphics, design/resource area, ICT room, art; Sports hall; Dance studio; Gymnasium/Activity studio; Meeting room, Interviewing/counselling room, video conference room; Office, medical room, staff room.	40
4. Atrium, circulation space not intended for teaching and learning; Dining room; Corridor, stairwell, coats, and locker area.	45
5. Swimming pool, kitchen, changing area, toilet.	50

- 9.4.49 To protect students from regular discrete noise events, e.g. aircraft, indoor ambient noise levels should not exceed 60 dB  $L_{A1}$ , 30mins. This is achieved by default for spaces with indoor ambient noise levels up to 40 dB  $L_{Aeq}$ , 30mins but requires assessment in spaces with higher indoor ambient noise level limits, i.e. 45 and 50 dBA.

### External Noise Levels - Residential

- 9.4.50 The suitability of the use of outdoor amenity spaces within the Proposed Development has been assessed in line with guidance from BS 8233 which states the following:

*“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB  $L_{Aeq,T}$  with an upper guideline value of 55 dB  $L_{Aeq,T}$  which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.”*

*“Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB  $L_{Aeq,T}$  or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.”*

### External Noise Levels – Educational

- 9.4.51 BB93 recommends maximum external noise levels applying to fields, recreational area and areas used for formal and informal outdoor teaching, it states:

*“For new schools, 60 dB  $L_{Aeq,30min}$  should be regarded as an upper limit for external noise at the boundary of external premises used for formal and informal outdoor teaching, and recreational areas. Under some circumstances it is possible to meet the specified indoor ambient noise levels on sites where external noise levels are as high as 70 dB  $L_{Aeq,30min}$  but this will require considerable building envelope sound insulation, screening or barriers.*

*“Noise levels in unoccupied playgrounds, playing fields and other outdoor areas should not exceed 55 dB  $L_{Aeq,30min}$  and there should be at least one area suitable for outdoor teaching activities where noise levels are below 50 dB  $L_{Aeq,30min}$ . If this is not possible due to a lack of suitably quiet sites, acoustic screening should be used to reduce noise levels in these areas as much as practicable, and an assessment of predicted noise levels and of options for reducing these should be carried out.*

*“Playgrounds, outdoor recreation areas and playing fields are generally considered to be of relatively low sensitivity to noise, and indeed playing fields may be used as buffer zones to separate school buildings from busy roads where necessary.”*

### Site Vibration Exposure

- 9.4.52 The nearest potential vibration source is local road traffic on the A272. Heavy road traffic would only be expected to lead to significant vibration levels if it is within a 5 to 10 m distance from the sensitive receptor and the roads are in poor condition. The roads surrounding the Site are in good condition. Therefore, road traffic is not expected to give rise to significant vibration effects due to the propagation distances and road surface conditions required to maintain significant levels of vibration at the receptor. Subsequently, no further assessment of vibration exposure from road traffic has been completed.

## Limitations and Assumptions

### Construction Phase

#### Construction Noise

- 9.4.53 Detailed methodology for the construction of the Proposed Development is not available at this stage and would be determined by the appointed contractor. However, indicative construction information has been provided based upon size and scale of the Proposed Development, its location and professional judgement. This includes an indicative construction programme and plant list. Please refer to **ES Volume 2, Chapter 5: The Proposed Development and Construction Overview**.
- 9.4.54 Assuming continuous working, the construction programme is anticipated to span 6 years and 9 months, commencing in Q3 2025 and finishing in Q1 2032.
- 9.4.55 Based on the current available works description, it is considered that the noise impact would be greatest during enabling and substructure activities.
- 9.4.56 Within **ES Volume 2, Chapter 5: The Proposed Development and Construction Overview**, an indicative plant list of the machinery likely to be used per construction activity has been included. Noisy works during the enabling and substructure works could include:

- excavation – may include tracked/wheeled 360-degree excavators, dumpers and earth compaction equipment across the Site;
- concrete pours and levelling – may involve concrete pumps, mixer trucks and vibrating rollers at building foundations and piling locations; and
- spoil movements – may involve excavators, tipper lorries and dumpers moving spoil across the Site.

9.4.57 Noise impacts from superstructure and envelope works are likely to be lower than the enabling/substructure and would be lower still during the fit-out and services installations stages of works.

9.4.58 The core working hours for Site preparation and construction would be:

- 08:00 – 18:00 hours on weekdays;
- 08:00 – 13:00 hours on Saturday; and
- No working on Sundays or public holidays.

9.4.59 The core hours are in line with guidance in BS 5228: Part 1; any work outside these hours would be subject to prior agreement with MSDC and their Environmental Health Office (EHO). These hours would be strictly adhered to unless or in the event of:

- an emergency demands continuation of works on the ground of safety;
- works are being carried out within the containment of the building envelope; or
- completion of an operation that would otherwise cause greater interference with the environment / general public, if left unfinished.

9.4.60 Assessment of worst-case construction noise levels has used the closest distance between the relevant receptor and the Proposed Development area with an additional 10 m (as plant will not be located up against the hoarding), this is still considered worst case as it is unlikely that all active plant will be operating in the same place.

9.4.61 Future occupiers of Phases 1 and 2 of the Proposed Development have also been included in the construction noise assessments as it is proposed that they will be occupied during the construction of the remaining phases. As exact locations of the dwellings are not finalised, the assessment also uses the closest distance between the Proposed Development areas with an additional 10 m for the worst-case assessment.

9.4.62 A typical prediction has also been undertaken for all receptors which is based on the distance between the receptors and the centre point of nearby construction phases to provide a more representative prediction of daily construction noise levels.

### Construction Vibration

- 9.4.63 Based on the indicative construction plant list in **ES Volume 2, Chapter 5: The Proposed Development and Construction Overview**, it is assumed that surface compaction has the potential to lead to significant levels of vibration at receptors.

### Construction Road Traffic Noise

- 9.4.64 Two-way construction traffic will be up to 75 vehicles each day (25 heavy goods vehicles (HGVs) and 50 light goods vehicles (LGVs)), assuming a continuous build out rate for the entirety of the construction period, these numbers have been considered the peak daily traffic levels.
- 9.4.65 Peak construction traffic levels have been assessed against 2019 baseline traffic flows which is considered to represent the worst-case noise change on the surrounding roads, as a result of the Site construction activities. 2019 baseline traffic flows have been used as 2019 reflects the baseline year of the Mid Sussex Strategic Highway Model, which has been used, as agreed with West Sussex County Council.
- 9.4.66 The assessment is based on traffic data provided by the Applicant's Transport Consultants.

### Operational Noise

#### Operational Mechanical Plant

- 9.4.67 The design includes mechanical ventilation with heat recovery (MVHR) for the school and care home buildings. MSDC will require any external plant to comply with guidelines set out in BS 4142 for a low impact (i.e. that the rating level does not exceed the representative background noise levels ( $L_{A90}$ )) as stated in Planning Noise Advice Document - Sussex<sup>7</sup>. It is assumed that sufficient embedded mitigation will be employed so that the limits are complied with.

#### Operational Road Traffic

- 9.4.68 The traffic flows used in this assessment (provided by the project's Transport Consultant) were based on the Mid Sussex Strategic Highway Model and a future year of 2039 (which is the end of the period for the draft Mid Sussex District Plan), as agreed with West Sussex County Council, to ensure that a worst-case scenario in terms of traffic growth has been considered and assessed.
- 9.4.69 Future traffic flows include all predicted flows to be generated by the proposed and committed developments in order to represent the worst-case noise change on the surrounding roads when the Proposed Development is fully operational, and all units are occupied.

### Sport Facility Noise

9.4.70 The assessment of noise from sports facilities has been based on typical noise levels from AGPs from the Sport England AGP Acoustics guidance document. The typical noise level was derived from measurements of football, hockey and rugby matches. Although there is no data for the tennis courts, the Sport England typical levels have been applied and is considered worst case as they are based on team sports with a greater number of participants. The assessment is also considered worst case as it assumes all pitches / courts are in use at the same time and no screening from buildings.

### Playground Noise

- 9.4.71 Information on the capacity of the school is not currently available or the times of day / durations for which the school playground would be in use, and therefore these have both been assumed for the assessment (see previous section for details on assumptions).
- 9.4.72 Should the number of people using the playground differ vastly from that assumed in the assessment, or the durations for which the playground is used, the assessment should consider this at the detailed design stage once this information is available.

### Site Noise Exposure

#### Cuckfield Sewage Treatment Works

9.4.73 Plant noise from Cuckfield Sewage Treatment works was measured on 27<sup>th</sup> October 2022 between 13:00 and 23:00, the noise levels are considered representative of typical operations. Day to day operational noise levels may vary and therefore peak levels may have occurred outside of this measurement period. As a result, the assessment has been based on the worst case 15-minute period and assumes the plant is operating during the night-time.

## 9.5 Baseline Assessment and Identification of Key Receptors

### Noise Sensitive Receptors

- 9.5.1 The following existing noise sensitive receptors in proximity to the Proposed Development have been taken into consideration when assessing the impacts associated with noise and vibration from both the construction and operational phases.
- 9.5.2 The existing receptors and type of receptor are presented below in **Table 9.12**.

**Table 9.12: Existing Noise Sensitive Receptors**

Receptor ID	Receptor	Type
R1	Dwelling on Private Access Road intersecting the Site	Residential
R2	Highbridge Mill and Cottages 1 & 2	Residential
R3	Mackerel Farm Cottage	Residential
R4	Old Furnace, Copyhold Ln	Residential
R5	Dwellings off B2036 and on Mount Noddy	Residential
R6	Dwellings off B2036	Residential
R7	Dwellings off B2036 and on Private Access Road intersecting the Site	Residential
R8	West Riddens Farm and Oak Tree Farm	Residential
Phase 1	New receptors introduced on the Proposed Development	Residential
Phase 2	New receptors introduced on the Proposed Development	Residential

9.5.3 **Figure 9.1** shows the locations of the existing noise sensitive receptors.

### Baseline Survey

9.5.4 During the unattended and attended survey measurements, it was noted that the noise environment across the majority of the Site is dominated by road traffic noise from the surrounding road network; areas to the north-east are also exposed to plant noise from Cuckfield Sewage Treatment Works. A description of dominant and perceptible noise sources at each measurement location is included in **ES Volume 4, Appendix E: Noise and Vibration**.

9.5.5 **Table 9.13** presents a summary of the unattended survey results measured at ground level.

9.5.6 Measurements at each location were considered to be under free field conditions. Full results of the baseline noise survey and information concerning how they are derived are presented in **ES Volume 4, Appendix E: Noise and Vibration**.

**Table 9.13: Summary of Unattended Noise Survey Results**

Parameter	Period	U1	U2	U3	U4	U5
Typical $L_{Aeq,T}$ , dB	Day (07:00-23:00)	65	62	48	64	52
	Night (23:00-07:00)	55	51	30	55	n/a
Maximum $L_{Aeq, 30mins}$	Day (09:00-16:30)	69	n/a	n/a	n/a	n/a

Parameter	Period	U1	U2	U3	U4	U5
Typical (10 <sup>th</sup> highest) L <sub>AFmax</sub> , dB	Night (23:00-07:00)	77	77	60	78	n/a
Typical Lowest L <sub>AF90</sub> , dB	Day (07:00-23:00)	38	37	36	39	46
	Night (23:00-07:00)	25	29	24	36	n/a

9.5.7 Supplementary short term attended measurements were undertaken on 27<sup>th</sup> and 31<sup>st</sup> October 2022, the results of which are summarised in **Table 9.14**.

**Table 9.14: Summary of Attended Noise Survey Results**

Location	Date / Time	L <sub>Aeq, 15min</sub> dB	L <sub>A90, 15min</sub> dB
A1	31/10/2022 14:24	53	46
A1	31/10/2022 16:18	54	49
A1	31/10/2022 17:11	54	51
A2	27/10/2022 12:56	58	44
A2	27/10/2022 15:28	58	45
A2	27/10/2022 17:25	58	45
A3	27/10/2022 12:20	48	45
A3	27/10/2022 14:47	47	44
A3.1	27/10/2022 17:47	54	51
A4	31/10/2022 13:55	39	34
A4	31/10/2022 15:16	41	35
A4	31/10/2022 16:42	42	38
A5	27/10/2022 11:30	47	39
A5	27/10/2022 14:20	40	38
A5	27/10/2022 16:47	42	38

9.5.8 It should be noted that location A3.1 is considered to be representative of location A3; it was used by the surveyor on-site, instead of repeating the measurement at location A3, due to access concerns.

### Future Baseline

9.5.9 Without the Proposed Development, road traffic noise levels in the area may increase marginally over time, primarily due to road traffic growth or specific committed developments. Other factors such as changes in car and road surface technology may offset that increase to an extent. It is expected that these changes will have a negligible effect on the assessment and therefore, no adjustments have been made to the existing baseline data collected to account for changes in the future baseline.

## 9.6 Identification and Description of Changes Likely to Generate Effects

### Construction

- 9.6.1 Construction activities close to sensitive receptors could potentially generate noise impacts, particularly when more than one noisy activity coincide. These impacts can lead to temporary direct, reversible effects in the form of annoyance, speech interference and disturbance and are confined to the local scale (i.e. surrounding buildings).
- 9.6.2 Where compaction activities are to take place near existing sensitive receptors, vibration impacts may arise. This impact can lead to temporary direct, reversible effects in the form of annoyance from perceptible vibration of short to medium duration and are confined to the local scale (i.e. surrounding buildings).
- 9.6.3 Construction road traffic could potentially generate additional noise impacts at noise sensitive receptors surrounding the Proposed Development. These impacts can lead to temporary effects in the form of annoyance and disturbance of short to medium duration and are generally confined to the local scale (i.e. surrounding roads) but have the potential to lead to effects on the district scale (i.e. roads further afield).

### Operation

- 9.6.4 During the operational phase, mechanical plant noise from either the air source heat pumps (ASHPs) (residential and non-residential units) or MVHR (non-residential units) within the Proposed Development, or near to the Proposed Development (such as Cuckfield Sewage Treatment Works), could potentially generate noise impacts. This can lead to direct, reversible effects in the form of annoyance and disturbance of long-term duration and are confined to the local scale (i.e. surrounding receptors).
- 9.6.5 During operation of the Proposed Development, a change in road traffic could potentially generate noise impact. This can lead to indirect, reversible effects in the form of annoyance and disturbance of short to medium duration, then potentially lead to effects of long-term duration and are generally confined to the local scale (i.e. surrounding roads) but has the potential to effect on the district scale (i.e. roads further afield).

## 9.7 Assessment of Likely Effects

### Construction Phase

#### *Embedded Mitigation Measures*

#### Construction Noise and Vibration

- 9.7.1 During construction, the contractor will incorporate 'Best Practicable Means' (BPM) on-site to ensure all reasonable measures have been taken to reduce noise and vibration levels where practicable. General construction noise and vibration mitigation measures covered by BPM include the following:
- unnecessary revving of engines should be avoided, and equipment switched off when not in use;
  - internal haul routes should be kept well maintained;
  - drop heights of materials should be minimised;
  - plant and vehicles should be sequentially started up rather than all together;
  - as far as reasonably practicable, sources of significant noise should be enclosed;
  - plant should always be used in accordance with manufacturers' instructions;
  - care should be taken to place site equipment away from noise-sensitive areas;
  - where possible, loading and unloading should also be carried out away from such areas; and
  - regular and effective maintenance by trained personnel should be undertaken to keep plant and equipment working to manufacturers specifications.
- 9.7.2 As specified in **ES Volume 2, Chapter 5: The Proposed Development and Construction Overview**, hoarding will be installed around the Site perimeter with a minimum height of 2.4 m. Working hours will also be limited to 08:00-18:00 on weekdays and 09:00-13:00 on Saturdays.

#### Construction Off-Site Traffic Noise

- 9.7.3 A Construction Environmental Management Plan will be implemented which will manage vehicle routing, access to Site, on-site management and vehicle movements and working hours, measures may include:
- unloading of vehicles only to be carried out on-site, rather than on the adjacent roads;
  - all construction traffic entering and leaving the Site should be closely controlled;

- vehicles making deliveries or removing spoil from the Site should travel via designated traffic routes previously agreed with local authorities and interested parties;
- construction traffic should be controlled by means of a vehicle arrival and departure management plan to achieve an even spread of vehicle movements during the working day; and
- access and egress for construction vehicles may vary according to the particular stage or phase of the works.

### *Anticipated Effects*

#### **Construction Noise**

- 9.7.4 The nearest existing noise sensitive receptors around the Proposed Development are residential dwellings on the private access road intersecting the Site (R1). These noise sensitive properties, in some locations, are within 15 m of the Proposed Development.
- 9.7.5 Predictions of noise levels associated with construction activities listed in the indicative construction programme, outlined in **ES Volume 2, Chapter 5: The Proposed Development and Construction Overview**, have been undertaken at 1 m from the façade of the noise sensitive receptors identified in **Table 9.12**.
- 9.7.6 Calculations have been carried out in accordance with BS 5228: Part 1. The assessment includes activity plant items based on BS 5228 and likely percentage on times for the construction plant.
- 9.7.7 **Table 9.15** presents the predicted  $L_{Aeq,10hr}$  façade levels for a working day ( $L_{Aeq,5hr}$  for Saturdays) at varying distances for each activity.

**Table 9.15: Predicted Worst Case  $L_{Aeq, 10hr}$  ( $L_{Aeq, 5hr}$  for Saturdays)**

Receptor	Worst case distance to construction plant (distance to Site boundary +10m)	Typical distance to construction plant	Representative daytime ambient noise level ( $L_{Aeq, T}$ )	BS 5228 Category/Threshold	Predicted worst case construction noise level $L_{Aeq, 10hr}$ ( $L_{Aeq, 5hr}$ for Saturdays) (dB)	Typical construction noise level $L_{Aeq, 10hr}$ ( $L_{Aeq, 5hr}$ for Saturdays) (dB)	Resulting worst case impact magnitude	Resulting typical impact magnitude
R1	25m	200m	48 (U3)	A (65)	69	54	Moderate	Minor
R2	35m	300m	51 (A3/A3.1)	A (65)	67	50	Moderate	Negligible
R3	80m	400m	44 (A5)	A (65)	62	48	Minor	Minor
R4	80m	500m	41 (A4)	A (65)	62	46	Minor	Minor
R5	50m	300m	62 (U2)	A (65)	65	50	Minor	Negligible
R6	110m	400m	62 (U2)	A (65)	59	48	Negligible	Negligible
R7	65m	300m	54 (A1)	A (65)	64	50	Minor	Negligible
R8	70m	500m	62 (U2)	A (65)	63	46	Minor	Negligible
Phase 1	25m	150m	48 (U3)	A (65)	69	56	Moderate	Minor
Phase 2	35m	300m	48 (U3)	A (65)	67	50	Moderate	Minor

- 9.7.8 Based on **Table 9.15**, the worst-case predictions indicate that there is a potential for moderate adverse impacts at residential dwellings on the private access road intersecting the Site (R1), Highbridge Mill and Cottages 1 & 2 (R2), and future occupiers of Phase 1 and 2, due to their close proximity to the works. There is also potential for minor adverse effects at Mackerel Farm Cottage (R3), Old Furnace (R4), dwellings off B2036 and on Mount Noddy (R5), dwellings on the private access road intersecting the Site (R7) and West Riddens Farm and Oak Tree Farm (R8).
- 9.7.9 It should be noted that the calculation methodology has used worst-case distances for all work activities based on the Proposed Development area parameter. Using more typical distances to the works, the resulting effects would be reduced to **minor adverse** at the worst affected receptors.
- 9.7.10 The assessment of typical construction noise levels indicates there is a potential for **minor adverse** effects at residential dwellings on the private access road intersecting the Site (R1), Mackerel Farm Cottage (R3), Old Furnace (R4) and future occupiers of Phase 1 and 2. There will be a **negligible** effect at all other receptors.
- 9.7.11 The nature of the construction works mean that the worst-case situation predicted may only exist for a matter of days, or even hours. There would be regular periods, even during a single day, when the assumed plant would not be in operation, for example, during breaks or changes of working routine. As previously discussed, all works would be undertaken in accordance with best practicable means, and appropriate mitigation adopted where practicable.

### Construction Vibration

- 9.7.12 According to the information provided within **ES Volume 2, Chapter 5: The Proposed Development and Construction Overview**, the most significant vibration generating activities associated with the works will be ground compaction during substructure works.
- 9.7.13 Based on assumptions of a typical vibratory roller, a double drum Bomag BW 135 AD vibratory roller, free-field resultant PPVs have been calculated using calculations in TRL Report 429 'Groundborne vibration caused by mechanised construction works'.
- 9.7.14 The calculated resultant peak particle velocities for steady state operation are shown in **Table 9.16**. Details of the calculations are presented in **ES Volume 4, Appendix E: Noise and Vibration**.

**Table 9.16: Estimated Free-Field Vibratory Roller PPVs**

Receptor	Worst case distance between receptor and vibratory roller, m	Resultant Peak Particle Velocity (mm/s)
R1	15	0.8
R2	25	0.4
R3	70	0.1

Receptor	Worst case distance between receptor and vibratory roller, m	Resultant Peak Particle Velocity (mm/s)
R4	70	0.1
R5	40	0.2
R6	100	0.1
R7	55	0.1
R8	60	0.1
Phase 1	15	0.8
Phase 2	25	0.4

- 9.7.15 Calculations show that at a distance of 15 to 25 m from a building, the vibratory roller could generate PPVs in the region of 0.4 to 0.8 mm/s. This suggests there is a risk of vibration to have minor adverse effects at the nearest receptors to the Site within 25 m (i.e. receptors located at the centre of the Site on the internal private access road (R1), Highbridge Mill and Cottages 1 & 2 (R2) and new receptors introduced in Phases 1 and 2 of the Proposed Development).
- 9.7.16 It should be noted that the assessment is based on worst case distances (i.e. between the receptor and Site boundary) and, therefore, activities at this distance will be limited to in their durations and will occur over a larger area. Given the likely short duration of the exposure to these levels, the effect is likely to be **negligible** at all receptors.
- 9.7.17 This potential vibration impact will be managed via planning for compacting activities to take place, where possible, during periods when occupants of the surrounding buildings are least likely to be sensitive to the construction vibration.
- 9.7.18 Vibration levels generated during all construction works would be significantly below the levels that may cause damage to properties.

### Construction Off-Site Traffic Noise

- 9.7.19 Noise impacts that may arise due to construction traffic flows have been assessed based on information provided by the Applicant's Transport Consultant and detailed in **ES Volume 2, Chapter 5: The Proposed Development and Construction Overview**.
- 9.7.20 Peak construction traffic levels have been assessed against 2019 baseline traffic flows (in line with the Mid Sussex Strategic Highway Model, which has been used, as agreed with West Sussex County Council) to assess potential worst-case construction traffic noise effects.
- 9.7.21 Proposed routes for construction vehicles have been included **ES Volume 2, Chapter 5: The Proposed Development and Construction Overview**. It is proposed that

construction traffic will approach the Proposed Development along the following routes:

- From the A23, via Bolney Road and the A272;
- From Haywards Heath, via Tylers Green and the A272; and
- From Burgess Hill, via the B2036 and the A272.

9.7.22 The change in noise associated with increased construction traffic on the surrounding road network has been calculated in accordance with CRTN; the results of this assessment are presented in **ES Volume 4, Appendix E: Noise and Vibration**.

9.7.23 HGV and LGV traffic during peak construction periods on the anticipated construction route is likely to lead to a **negligible** effect on the A272 Bolney Road and A272 Tylers Green; there will be **no change** on all other links.

## Operational Phase

### *Embedded Mitigation Measures*

#### **Mechanical Plant Noise**

9.7.24 Currently there is no detailed information (such as the location, make or models) on the proposed noise generating plant to be used on-site once the Proposed Development is operational. To avoid adverse effects, it is recommended that external plant complies with criteria set out Planning Noise Advice Document - Sussex<sup>7</sup> (low impact in line with BS 4142 Guidance). It is assumed that sufficient embedded mitigation will be employed so that the limits are complied with if any mechanical plant is to be installed.

#### **Operational Traffic Noise**

9.7.25 There is no embedded mitigation proposed for operational traffic noise.

### *Anticipated Effects*

#### **Mechanical Plant Noise**

9.7.26 **Table 9.17** identifies recommended operational noise limits based on the noise survey results.

9.7.27 The operational noise limit has been based on the Rating level assessed at the receptor in accordance with BS 4142. The limit applies to the measured or calculated total combined Rating levels from the plant or equipment, at 1 m from the closest window of the relevant sensitive property during that stated time period.

**Table 9.17: Recommended Operational Noise Limits**

Receptor	Day (07:00-23:00)		Night (23:00-07:00)	
	Typical Lowest Background Noise Level, L <sub>A90</sub> dB	Operation Limit Rating Level dBA	Typical Lowest Background Noise Level, L <sub>A90</sub> dB	Operation Limit Rating Level dBA
R1, R2, R3, R4 (U3)	36	36	24	24
R5, R6, R7, R8 (U2)	37	37	29	29

### Operational Road Traffic Noise

- 9.7.28 The predicted change in noise level associated with increased Proposed Development traffic on the surrounding road network during operational phase year 2039 is presented in **ES Volume 4, Appendix E: Noise and Vibration**.
- 9.7.29 The assessment indicates that there will be a **negligible** effect or **no change** on all existing roads due to increased traffic flows during operation of the Proposed Development.

### Sports Pitch Noise

- 9.7.30 Noise exposure from sports pitches to nearby residential dwellings can cause impacts such as annoyance / disturbance. The principal noise source for such facilities catering to team sports is often the voices of players and balls striking perimeter fences.
- 9.7.31 It is currently proposed that there will be two large sports pitches as part of the school located on the western boundary of the Site, facing the A272 into Ansty. There will also be a further two large sports pitches and four smaller tennis / paddle courts in the north-east corner of the Proposed Development as part of the Sport Facility; these will be located adjacent to Cuckfield Sewage Treatment Works and facing onto the A272, running along the north of the Site. The noise levels from these pitches / courts have been assessed at the closest proposed area for residential development in the Site masterplan.
- 9.7.32 Based on survey data, a typical noise level for team sports on AGPs has been derived from the Sports England Guidance. For the sports facility, this has been used to predict noise levels at the closest proposed dwellings to each of the pitches / courts in the Proposed Development (no nearby existing dwellings). For the school’s sports pitches, the noise levels have been predicted and assessed at the nearest existing dwellings. The results of the assessment are presented in **Table 9.18** and **Table 9.19**.

**Table 9.18: Assessment of sports facility pitch noise at proposed residential dwellings**

Source	Typical free-field noise level at 10 m from AGP L <sub>Aeq, 1hour</sub> dB	Distance to closest (worst case) proposed receptor, m	Predicted source noise level at receptor L <sub>Aeq, 1hour</sub> dB	Effect
Sports Facility – Tennis / Padel Courts	58	40 (Phase 1 Plot 1A)	47	Negligible
Sports Facility - Larger Sports Pitches	58	60 (Phase 1 Plot 1A)	47	Negligible

9.7.33 The predicted noise levels for the sports facility pitches / courts are anticipated to be below the Sport England upper guideline limit of 50 dB L<sub>Aeq, 1hr</sub> for noise from AGPS to avoid moderate annoyance at the nearest proposed dwellings. The effect is, therefore, likely to be **negligible**.

**Table 9.19: Assessment of school sports pitch noise at existing residential dwellings**

Source	Typical free-field noise level at 10 m from AGP L <sub>Aeq, 1hour</sub> dB	Distance to closest (worst case) receptor, m	Predicted source noise level at receptor L <sub>Aeq, 1hour</sub> dB	Ambient noise level at receptor dB	Total Noise Level dB	Change, dB	Effect
School – Sports Pitches	58	70m (dwelling on private access road intersecting the site R7)	46	54 (A1)	58	0	No Change

9.7.34 The predicted noise levels from the school’s sport pitches are below the Sport England upper guideline limit of 50 dB L<sub>Aeq, 1hr</sub> at the nearest existing receptor (new proposed dwellings will be further away) for noise from AGPS to avoid moderate annoyance. There will be **no change** to existing ambient noise levels during times at which they are in use at the nearest existing noise sensitive receptor.

**School Playground Noise**

9.7.35 Based on the proposed illustrative masterplan, the school playground would be located on the western boundary immediately south of the school buildings. The

closest existing noise sensitive receptors are located on the private access road intersecting the Site (R7), located approximately 180 m away and the existing ambient noise levels at this location are 54 dB  $L_{Aeq,T}$ .

9.7.36 The predicted noise levels from the school playground are 42 dB  $L_{Aeq,1hr}$  at the residential dwellings on the private access road intersecting the Site (R7). This would result in **no change** to the existing ambient noise levels at this location.

### Site Suitability

#### Internal Levels – Residential

##### Road Traffic Noise

9.7.37 Noise exposure from existing sources incident on the Proposed Development can lead to noise impacts due to elevated internal noise levels in habitable rooms (such as living rooms and bedrooms). This can lead to effects such as annoyance, speech interference, disturbance and, during the night-time, sleep disturbance for occupants of the Proposed Development’s residential dwellings.

9.7.38 Noise survey results and distance attenuation calculations have been used to calculate the noise contribution from road traffic on the worst-affected receptors within the Proposed Development.

9.7.39 The road traffic noise exposure levels identified for the different areas of the Proposed Development are identified in **Table 9.20**.

**Table 9.20: Summary of Typical Noise Exposure at Most Exposed Areas**

Location	Representative monitoring location (distance from road)	Distance of closest proposed dwelling to road	Distance attenuation from monitoring location (line / point) dB	Predicted typical day $L_{Aeq,16hr}$ dB (0700-2300)	Predicted typical night $L_{Aeq,8hr}$ dB (2300-0700)	Predicted typical night $L_{Amax,8hr}$ dB (2300-0700)
North (facing A272)	U4 (14m)	30m	-3/-7	61	52	71
West (facing A272)	U1 (13m)	65m	-7/-14	58	48	63
South-west (facing B2036)	U2 (8m)	25m	-5/-10	57	47	67

9.7.40 It is understood that at the most exposed areas of the Site (identified above), bedrooms will be located on internal facing facades only i.e., facing away from the roads, and therefore will benefit from screening. It is assumed that this screening will completely remove the line of sight from the bedroom window to the road and, therefore, will provide at least 10 dB attenuation. The predicted noise exposure levels at such facades are presented in **Table 9.21**.

**Table 9.21: Summary of Typical Noise Exposure at Screened Facades**

Location	Screening attenuation dB	Predicted typical day $L_{Aeq,16hr}$ dB (0700-2300)	Predicted typical night $L_{Aeq,8hr}$ dB (2300-0700)	Predicted typical night $L_{Amax,8hr}$ dB (2300-0700)
North (facing away from A272)	-10	51	42	61
West (facing away from A272)	-10	48	38	53
South-west (facing away from B2036)	-10	47	37	57

9.7.41 Daytime internal noise levels should be controlled to allow reasonable resting conditions in living rooms and bedrooms. Night-time internal noise levels should be controlled to allow reasonable sleeping conditions in bedrooms. To achieve these requirements, guidance from BS 8233 and the WHO for internal noise levels has been followed.

9.7.42 **Table 9.22** shows the recommended design approach to achieve the targets set out in BS 8233 and the WHO guidance on internal noise levels for façades facing roads.

**Table 9.22: Required Sound Insulation and Design Approach for the Proposed Development**

Area	Elevation	Room type	Recommended outline design approach
North	Facing A272	Living Room	Standard performance double glazing (at least 26 dB $R_{W+Ctr}$ , for example 4/12/4). Alternate means of background ventilation required e.g. attenuated trickle vents.
	Facing away from A272	Bedroom	Standard performance double glazing (at least 16 dB $R_{W+Ctr}$ , for example 4/12/4). Alternate means of background ventilation required e.g. attenuated trickle vents.
West	Facing A272	Living Room	Standard performance double glazing (at least 23 dB $R_{W+Ctr}$ , for example 4/12/4). Alternate means of background ventilation required e.g. attenuated trickle vents.

Area	Elevation	Room type	Recommended outline design approach
	Facing away from A272	Bedroom	Standard performance double glazing (at least 13 dB $R_{W+Ctr}$ , for example 4/12/4). Openable windows can be used for background ventilation.
South-west	Facing B2036	Living Room	Standard performance double glazing (at least 22 dB $R_{W+Ctr}$ , for example 4/12/4). Alternate means of background ventilation required e.g. attenuated trickle vents.
	Facing away from B2036	Bedroom	Standard performance double glazing (at least 12 dB $R_{W+Ctr}$ , for example 4/12/4). Openable windows can be used for background ventilation.

- 9.7.43 As the internal ambient noise exposure can be controlled to suitable targets, the Proposed Development is suitable for residential purposes. It should be noted that the detailed prediction of noise ingress is dependent upon the precise façade make up (glazed area, ventilation solution etc.) and the acoustic characters of the final proposed internal spaces. Detailed prediction of noise exposure for screened facades is also dependant on building footprints, orientation and location.
- 9.7.44 During detailed design stage, specific calculated assessment is required of the sound insulation of the building envelope to review whether the proposed solution is suitable to meet the guideline internal noise levels. All the related information above is not currently available; as such, the above advice has been provided to demonstrate the feasibility of the mitigation. A more detailed assessment should be undertaken as the design progresses.

### Internal Levels – Educational

- 9.7.45 It is proposed that the school buildings will be located towards the west of the Site facing the A272. The closest façade of the school buildings in the illustrative masterplan is located approximately 80 m away from the road. Based on the noise survey results and distance attenuation calculations, the noise levels at the most exposed façade have been predicted and are presented in **Table 9.23**.

**Table 9.23: Typical Noise Exposure at Most Exposed Façade of School Buildings**

Location	Representative monitoring location	Distance of closest proposed façade to road, m	Distance attenuation from monitoring location (line source) dB	Predicted maximum day $L_{Aeq,30min}$ dB (0700-2300)
West (facing A272)	U1 (13m from road)	80	-8	61

- 9.7.46 At this stage of the design, it is not known where specific rooms will be located within the school buildings. It is proposed that one educational building will be used for a SEND school, therefore, the assessment has assumed that teaching spaces intended for students with special hearing and communications needs (30 dB  $L_{Aeq,30min}$  upper noise limit) will be located on the most exposed façade.
- 9.7.47 It is likely to be feasible to achieve BB93 criteria using the following practical design approach for the building façade:
- specific calculated assessment required of sound insulation for all elements of the building envelope;
  - moderate sound insulation for non-vision areas and roof; and
  - moderate performance double glazing (up to 31 dB  $R_{W+ctr}$ , for example 4/12/10).
- 9.7.48 It is understood that MHVR will be used on the school buildings and, therefore, windows can remain closed.
- 9.7.49 As the internal ambient noise exposure can be controlled to suitable targets, the Proposed Development is suitable for educational purposes. A more detailed calculation of the internal noise levels will be undertaken during detailed design stage to assist with the design of the building façade and ensure suitable internal noise levels are achieved.

### Overheating - Residential

- 9.7.50 Approved Document O (ADO) sets out the following noise limits inside bedrooms whilst mitigating overheating:
- 40 dB  $L_{Aeq,T}$  over 8 hours between 23:00 and 07:00; and
  - 55 dB  $L_{AFmax}$  more than 10 times between 23:00 and 07:00.
- 9.7.51 The current proposals are to mitigate overheating by opening windows. Following the simplified method for demonstrating compliance with ADO, the Site is located in an area of 'Moderate Risk' of overheating in buildings (urban areas are classed as 'High Risk' and all non-urban areas are 'Moderate'). For sites in 'Moderate Risk' areas, a minimum free area of 4% of the floor area of the room is required to mitigate

overheating, this equates to an approximate reduction of 9 dB in line with calculations presented in the ANC Guidance.

- 9.7.52 Based on the predicted noise exposure at the most exposed dwellings, as set out in **Table 9.21**, the worst-case noise levels at the bedrooms in dwellings located at the Site boundaries are 42 dB  $L_{Aeq,8hr}$  and 61 dB as the tenth highest night-time  $L_{AFmax}$  (northern boundary). Applying a 9 dB reduction, the internal noise levels, whilst mitigating overheating, would be 33 dB and 52 dB, respectively. This meets the ADO criteria and, therefore, no further mitigation is required.
- 9.7.53 It should be noted that the detailed prediction of noise ingress through a partially open window is dependent on the acoustic open area, room dimensions and acoustic properties of the room. During detailed design stage, specific calculated assessment is required of the sound reduction from the partially open window to review whether the proposed solution is suitable to meet the guideline internal noise levels and provide sufficient air flow to meet the overheating requirements.

### External Noise Levels – Residential

- 9.7.54 For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB  $L_{Aeq,T}$ , with an upper guideline value of 55 dB  $L_{Aeq,T}$  which would be acceptable in noisier environments.
- 9.7.55 Unscreened private gardens and public open spaces located within the following proximities to the local road network are likely to exceed the upper BS 8233 guideline level for external amenity areas of 55 dB  $L_{Aeq,T}$ :
- within 130 m of the A272, west of the Site;
  - within 120 m of the A272, north of the Site; and
  - within 50 m of the B2036, south-west of the Site.
- 9.7.56 As building layouts are not available at this stage of the design, this assessment assumes no screening from the buildings themselves. In practice, the finished Proposed Development will provide screening for some of these outdoor spaces and the levels within the upper guideline limits may be achieved at closer distances than those outlined above.
- 9.7.57 The effect of noise on residents with private external amenity areas exposed to more than 55 dB  $L_{Aeq,T}$  can be assessed as a moderate adverse effect. However, BS 8233 recognises that although there are ideal target levels, it is not always achievable in noisier areas where development is desirable. Higher noise levels need to be balanced against other considerations such as the benefit of living adjacent to strategic transport links (such as the A272).
- 9.7.58 Furthermore, the PPG advises that noise impacts may be partially off-set if the residents of those dwellings affected by high noise levels have access to:

- 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 a 5 minutes walking distance).

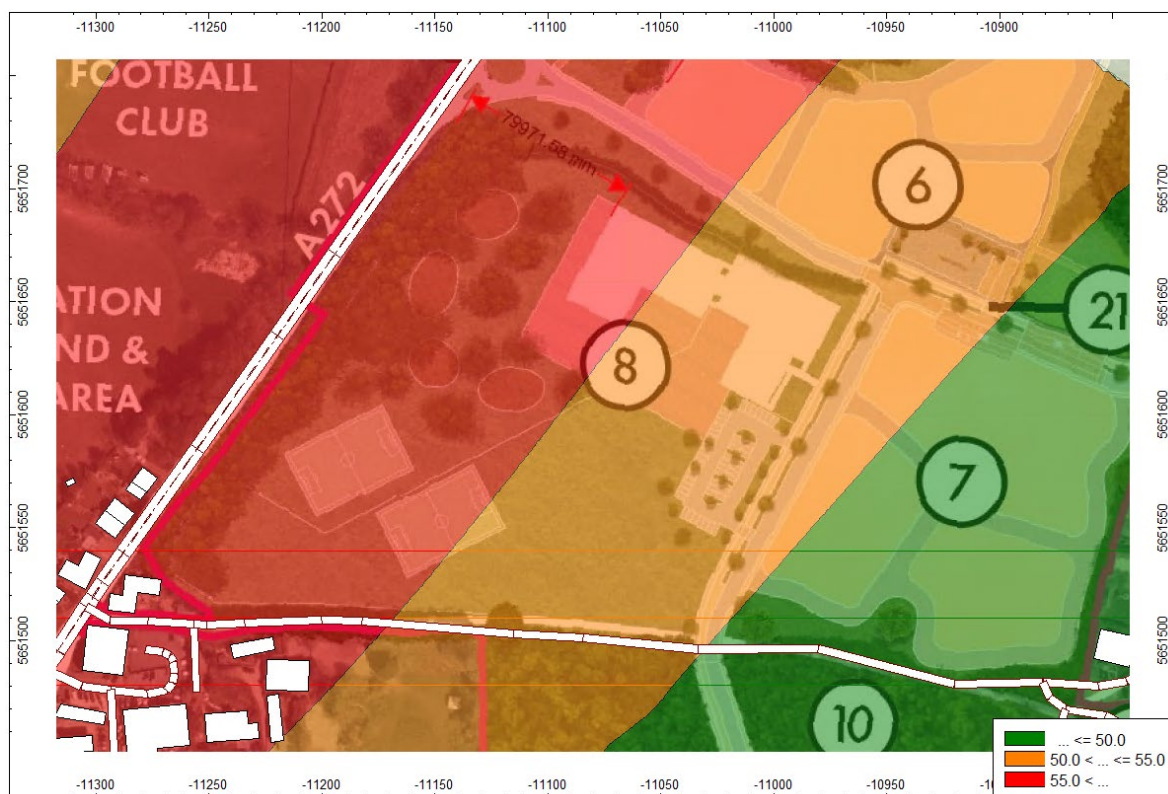
9.7.59 There are several large public open spaces within the Proposed Development which are likely to achieve levels within the BS 8233 guidelines should residents wish to enjoy lower noise amenity areas.

### External Noise Levels – Educational

9.7.60 BB93 provides recommendations which are considered good practice for acoustic conditions outside school buildings. It states that noise levels in unoccupied playgrounds, playing fields and other outdoor areas should not exceed 55 dB  $L_{Aeq, 30mins}$  and there should be at least one area suitable for outdoor teaching activities where noise levels are below 50 dB  $L_{Aeq, 30mins}$ .

9.7.61 **Figure 9.2** shows the predicted maximum  $L_{Aeq, 30mins}$  across the proposed school location, in the absence of any screening (no buildings). Approximately half of the school area will achieve typical levels below the BB93 recommended limit of 55 dB  $L_{Aeq, 30mins}$ . The remaining half of the school area of the Site adjacent to the A272 is likely to exceed the BB93 recommended limit as the predicted  $L_{Aeq, 30mins}$  for this area ranges between 55 and 69 dB. Should the final building design provide screening (removing line of sight to the A272) to external areas, it is likely that screened areas (behind the buildings) will achieve levels below 50 dB  $L_{Aeq, 30mins}$  and provide areas suitable for outdoor teaching.

**Figure 9.2: Assessment of external noise levels for educational purposes  $L_{Aeq, 30mins}$**



9.7.62 It should be noted that the maximum  $L_{Aeq, 30mins}$  (09:00 – 16.30) generally occurs between 09:00-10:00 and periods after this are typically 2 to 4 dB lower throughout the day. As a result, assessing the external noise levels across the school area of the Site against the typical  $L_{Aeq, 30mins}$ , it is predicted that some areas within the school boundary will achieve levels below 50 dB  $L_{Aeq, 30mins}$ .

9.7.63 To minimise noise levels in the areas intended for outside teaching, these spaces should be aimed to be in the quieter areas of the school location within the the Site i.e. furthest away from the road or those screened by the school buildings. However, if these areas are intended to be located in other areas with higher noise levels (i.e. closer to the road), mitigation measures such as noise barriers could be implemented to achieve guideline levels. The barrier heights and location requirements would be confirmed during the detailed design stage.

### Cuckfield Sewage Treatment Works

9.7.64 Noise from plant and works at the Cuckfield Sewage Treatment Works have the potential to cause impacts at future occupiers of the Proposed Development. Data captured at U5 during the daytime have been used to calculate the rating level for noise from the sewage treatment works. The specific sound level has then been predicted based on the nearest proposed residential dwelling to determine the impact, the assessment is shown in **Table 9.24**.

**Table 24 Cuckfield sewage treatment works noise assessment**

U5 highest $L_{Aeq, 15 \text{ min}}$ , dB	58
Predicted road traffic noise level at U5 (based on data from U4), dB	54
Plant noise at U5 dB	56
Specific sound level (at nearest receptor 190m), dB	41
Corrections	0
Rating Level dB	41
Typical Lowest $L_{AF90}$ dB daytime (07:00-23:00)	39
Typical Lowest $L_{AF90}$ dB night-time 23:00-07:00)	36
Exceedance over daytime background sound level, dB	2
Exceedance over night-time background sound level, dB	5
Daytime effect	Minor
Night-time effect	Minor

- 9.7.65 During the daytime visit to the Site, noise from the Cuckfield Sewage Treatment Works was noted to be broadband and continuous, as such no corrections have been made for tonality or impulsivity at this stage.
- 9.7.66 The assessment indicates that, in the absence of any additional mitigation, there is potential for **minor adverse** effect during the day and night-time.
- 9.7.67 Mitigation such as acoustic screening (which can provide up to and possibly more than 5 dB attenuation), should therefore be considered during detailed design to minimise the adverse effects at the closest dwellings to the Cuckfield Sewage Treatment Works.

## 9.8 Scope for Additional Mitigation Measures

### Potential Additional Mitigation Measures

#### *Construction Phase*

#### **Noise and Vibration**

- 9.8.1 BS 5228 does not state criteria for acceptable levels of construction noise; therefore, the preferred approach is to reduce noise levels where practicable. Sometimes a greater noise level may be acceptable if the overall construction time, and therefore length of disruption, is reduced.
- 9.8.2 A risk assessment identifying the probability of vibration from ground compaction activities should also be carried out prior to commencement of construction activities,

to determine the need for periodic or continuous vibration monitoring and to highlight opportunities for engagement and giving prior warning to local receptors.

### *Operational Phase*

#### **Mechanical Plant Noise**

- 9.8.3 Plant items should be located as far as possible away from and not overlooking any residential premises. Noise due to mechanical services equipment may need to be controlled by selecting low-noise items of plant, fitting acoustic louvred screens or enclosures, or erecting acoustic screens. An assessment of the proposed mechanical services plant should be undertaken, during the detailed design stage, to demonstrate that the limits proposed in **Table 9.17** will be achieved.

### *Site Noise Exposure*

#### **Internal Noise Levels**

- 9.8.4 Internal noise levels will be controlled to BS 8233, WHO and ADO guideline levels through a combination of layout (screening), specified double glazing and alternate means to open windows for background ventilation at the most exposed facades.
- 9.8.5 Where possible, plant will be located away from noise sensitive residential dwellings or amenity areas and regular maintenance will be undertaken on all mechanical plant to ensure the units are operating efficiently and not generating undue noise.

#### **External Noise Levels - Residential**

- 9.8.6 Residents whose gardens would be exposed to relatively high noise levels, due to their proximity to the roads, could mitigate the effects by using the relatively quiet amenity spaces in the public open areas that are located throughout the development, as set out by the advice in the PPG.

#### **Cuckfield Sewage Treatment Works**

- 9.8.7 To avoid adverse effects from plant noise associated with Cuckfield Sewage Treatment Works, mitigation such as screening should be considered. Screening could be achieved from building layouts e.g. the sport facility buildings blocking line of sight to the residential dwellings and / or from the dwellings themselves by placing noise sensitive rooms at facades facing directly away from the Cuckfield Sewage Treatment Works. A noise barrier could also be considered along the boundary between the Cuckfield Sewage Treatment Works and the Proposed Development. It is expected that screening from the methods noted above that removes line of sight between the source and receptor is likely to achieve at least 5 to 10 dB attenuation.

## Likely Effectiveness of Additional Mitigation Measures

### *Demolition and Construction Phase*

#### **Noise**

- 9.8.8 With the additional mitigation measures listed above, short term **minor adverse** effects are still likely at the closest residential properties surrounding the Site (R1, R3, R4 and future occupiers of Phases 1 and 2); however, they will be minimised as far as is practicable and, in some cases, reduced to **negligible** effects.

#### **Vibration**

- 9.8.9 With the additional mitigation measures listed above, the assessment indicates that there will be a **negligible** effect at all receptors from construction vibration.

#### **Off-Site Traffic Noise**

- 9.8.10 Roads which will experience a change in traffic noise will experience a **negligible** effect.

### *Operational Phase*

#### **Mechanical Plant Noise**

- 9.8.11 With the additional mitigation measures listed above, effects from operational mechanical plant noise are likely to be **negligible**.

#### **Off-Site Road Traffic Noise**

- 9.8.12 No additional mitigation measures are proposed for operational road traffic noise.

### *Site Noise Exposure*

#### **External Noise Levels**

- 9.8.13 With the additional mitigation measures listed above, effects on residents using outdoor amenity areas are likely to be **negligible**.

#### **Cuckfield Sewage Treatment Works**

- 9.8.14 With the additional mitigation measures listed above, effects from noise from the Cuckfield Sewage Treatment Works are likely to be **negligible**.

## **9.9 Residual Effects**

- 9.9.1 **Table 9.25** provides a summary of the residual effects resulting from the Proposed Development, after effective implementation of the embedded and additional mitigation measures proposed above.

**Table 9.25: Summary of the Residual Effects**

Phase	Resource or Receptor Affected	Residual Effect
Construction	Existing at receptors at the private access road intersecting the site (R1), Mackerel Farm Cottage (R3), Old Furnace (R4), and future occupiers of Phases 1 and 2.	Temporary minor adverse effect from construction noise due to close proximity to site boundary and low existing ambient noise levels.
	Existing residential receptors at Highbridge Mill and Cottages 1 & 2 (R2), dwellings off B2036 and on Mount Noddy (R5), dwellings off B2036 (R6), dwellings off B2036 and on the private access road intersecting the Site (R7), west Riddens Farm and Oak Tree Farm (R8)	Negligible effect from construction noise.
	All other existing and future receptors	Negligible effect from construction vibration.
	Noise sensitive receptors adjacent to surrounding roads	Negligible effect from construction traffic noise along Bolney Road and Tylers Green, no change along all other existing roads.
Operation	All existing future residential receptors introduced as part of the Proposed Development	<p>Negligible effect from internal and noise levels.</p> <p>Negligible effect from external noise levels.</p> <p>Negligible effect from external plant noise levels</p> <p>No effect from school playground noise</p> <p>Negligible effect from sports pitch noise</p> <p>Negligible effect from Cuckfield sewage treatment works noise</p>

Phase	Resource or Receptor Affected	Residual Effect
	Noise sensitive receptors adjacent to surrounding roads	Negligible effect/no effect from operational road traffic noise levels on all existing roads.
	Future educational receptors introduced as part of the Proposed Development	Negligible effect from internal and noise levels.  Negligible effect from external noise levels.

## 9.10 Cumulative Effects

- 9.10.1 Cumulative effects are the combined effects of several development schemes (in conjunction with the Proposed Development) which may, on an individual basis be insignificant but, cumulatively, have a significant effect.
- 9.10.2 The ES has given consideration to ‘Cumulative ‘Effects’ for schemes located within a 5 km radius from the boundary of the Site, as listed in **ES Volume 2, Chapter 3: EIA Methodology, Table 3.6.**

### Construction Phase

#### *Noise and Vibration*

- 9.10.3 Schemes that are located within approximately 200 m of the identified sensitive receptors can give rise to potential cumulative noise and vibration impacts should construction works take place simultaneously on all sites. The nearest cumulative scheme is located approximately 1.5 km away from the Site and, therefore, cumulative impacts are not expected.

#### *Off-Site Traffic Noise*

- 9.10.4 Cumulative noise from construction traffic from planned schemes is unlikely to give rise to any additional adverse effects. The contractors will liaise with the MSDC to establish a traffic management plan to reduce potential for effects of cumulative construction traffic noise along surrounding roads. Hence, it is considered that cumulative effects from construction off-site traffic noise are unlikely.

### Operational Effects

- 9.10.5 Given the large distance (1.5 km) to the nearest cumulative scheme, cumulative operational noise impacts are not expected.

## 9.11 Summary and Conclusions

- 9.11.1 The assessment has been based on environmental surveys, predictions and calculations undertaken for the Site.
- 9.11.2 The main sources of noise incident on the Site and surrounding receptors are road traffic noise from the A272 and B2036.
- 9.11.3 The impact of noise and vibration during construction of the Proposed Development has been predicted and assessed in accordance with BS 5228. Impacts from construction activities are predicted at the closest sensitive receptors to the works with temporary minor adverse effects likely as a result of noise, there will be a negligible impact from vibration. Best practicable means measures have been recommended to minimise noise and vibration from the construction Site.
- 9.11.4 It is predicted that off-site traffic, as a result of construction activities, will have a negligible impact at most on the noise environment due to an increase in construction traffic on the surrounding road network.
- 9.11.5 Final details on any proposed external plant are not currently available. It is recommended that the Proposed Development complies with noise limits set out in Planning Noise Advice Document - Sussex. It is assumed that sufficient embedded mitigation is employed so that the criteria to avoid adverse impacts are met. No significant effects are likely to occur if these limits are complied with.
- 9.11.6 Operational road traffic has been assessed in terms of a change in noise associated with the operation of the Proposed Development. Long term negligible effects or no change in noise levels during full operation of the Proposed Development have been predicted along all existing roads.
- 9.11.7 A Site suitability assessment has been completed. It is likely to be feasible to meet the BS 8233, WHO and BB93 guideline internal noise levels using the following practical design approach for the building façade and avoid adverse effects for future residents and educational uses:
- specific calculated assessment required of sound insulation for all elements of the building envelope;
  - for the dwellings on the northern boundary (facing the A272), standard performance double glazing (up to 26 dB  $R_{W+Ctr}$ , for example 4/12/4) and an alternate means of background ventilation to open windows e.g. attenuated trickle vents;
  - for the dwellings on the western boundary (facing the A272), standard performance double glazing (up to 23 dB  $R_{W+Ctr}$ , for example 4/12/4) and an alternate means of background ventilation to open windows e.g. attenuated trickle vents; and

- for the dwellings on the southwest boundary (facing the B2036), standard performance double glazing (up to 22 dB  $R_{W+Ctr}$ , for example 4/12/4) and an alternate means of background ventilation to open windows e.g. attenuated trickle vents.

9.11.8 Unscreened private gardens and public open spaces located within the following proximities to the local road network are likely to exceed the upper BS 8233 guideline level for external amenity areas of 55 dB  $L_{Aeq,T}$ :

- within 130 m of the A272, west of the Site;
- within 120 m of the A272, north of the Site; and
- within 50 m of the B2036, south-west of the Site.

9.11.9 As building layouts are not available at this stage of the design, this assessment assumes no screening from the buildings themselves. In practice, the finished development will provide screening for some of these outdoor spaces and the levels within the upper guideline limits may be achieved at closer distances than those outlined above.

9.11.10 The effect of noise on residents with private external amenity areas exposed to more than 55 dB  $L_{Aeq,T}$  can be assessed as a moderate adverse effect. This noise impact will be partially off-set as residents will have access to several large public open spaces within the Proposed Development which are likely to achieve levels within the BS 8233 guidelines.

9.11.11 An assessment of internal noise levels whilst mitigating overheating has been undertaken following the simplified method from ADO. Assuming a partially open window with an acoustic open area equivalent to 4% of the floor area it is likely that ADO criteria will be achieved in all bedrooms.

9.11.12 The nearest cumulative scheme is located approximately 1.5 km away from the Proposed Development; as a result, cumulative effects during construction and operation are not considered likely.

9.11.13 **Table 9.26** summarises the noise and vibration effects resulting from the Proposed Development.

**Table 9.26: Summary of Residual Effects**

Receptor/ Affected Group	Value or Sensitivity (Significan ce) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
<b>Construction</b>								
Existing at receptors at the private access road intersecting the site (R1), Mackerel Farm Cottage (R3), Old Furnace (R4), and future occupiers of Phases 1 and 2.	High	Constructio n Noise	BPM	Minor	Minor	Engagemen t and prior warning	Minor	Minor Adverse
				Local				
				Temporary				
				Likely				
All other existing receptors (R2, R5, R6, R7, R8)	High	Constructio n Noise	BPM	Negligible	Negligible	Engagemen t and prior warning	Minor	Negligible
				Local				
				Temporary				
				Likely				
All existing and future receptors	High	Constructio n Vibration	BPM	Negligible	Negligible	Engagemen t and prior warning	Negligible	Negligible
				Local				
				Temporary				
				Likely				
	High			Negligible	Negligible	None	Negligible	Negligible

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
Existing receptors on Bolney Road and Tylers Green (A272)		Constructio n Traffic	Constructio n traffic managemen t plan within CEMP	Local				
				Temporary				
				Likely				
<b>Operation</b>								
New residential receptors on the Site	High	Internal airborne noise levels	Design layout and sound insulation	Negligible	Negligible	None	Negligible	Negligible
				Local				
				Permanent				
				Likely				
New residential receptors on the Site	High	External noise levels	Design layout	Negligible	Negligible	Access to other quieter external amenity areas	Negligible	Negligible
				Local				
			Access to other quieter external amenity areas	Permanent				
				Likely				
Receptors on all existing roads	High		None	Negligible	Negligible	None	Negligible	Negligible
				Local				

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
		Operational road traffic noise		Permanent Likely				
All existing and future residential receptors	High	Operational mechanical plant	Plant noise limits	Negligible Local Permanent Likely	Negligible	None	Negligible	Negligible
New residential receptors on the Site	High	Noise from Cuckfield sewage treatment works	None	Moderate Local Permanent Likely	Moderate	Acoustic screening	Negligible	Negligible
All existing and future receptors	High	Sports pitch noise	None	Negligible Local Permanent Likely	Negligible	None	Negligible	Negligible
All existing receptors	High	School playground noise	None	Negligible Local Permanent Likely	No Impact	None	No Impact	No Impact
	High			Negligible	Negligible	None	Negligible	Negligible

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
New educational receptors on the Site		Internal airborne noise levels	Design layout and sound insulation	Local				
				Permanent				
				Likely				
New educational receptors on the Site	High	External noise levels	Design layout	Negligible	Negligible	None	Negligible	Negligible
				Local				
				Permanent				
				Likely				
<b>Cumulative Effects – Construction</b>								
No cumulative effects likely								
<b>Cumulative Effects – Operation</b>								
No cumulative effects likely								

