OXFORDSHIRE
STRATEGIC RAIL FREIGHT INTERCHANGE

Preliminary Environmental Information (Work in Progress) Report (PEIR)

Draft Environmental Statement

Chapter 5: Noise and Vibration (including Human Health)

On behalf of
Oxfordshire Railfreight Limited

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5.1 INTRODUCTION

5.1.1 This draft ES chapter considers the potential noise and vibration effects that may arise as a result of the construction and operation of the proposed Oxfordshire Strategic Rail Freight Interchange (SRFI) and the associated highway works.

5.1.2 The Proposed Development has the potential to generate noise from the following sources:

- Construction of the SRFI (including warehousing) and the Highway Works (both the construction traffic and main construction works);
- The change in road traffic flows on the highway network around the Main Site, including any effects of the Highway Works;
- The freight trains serving the SRFI travelling on the Chiltern Railway Line;
- Noise arising from activity at the main site including;
    - The traffic serving the SRFI on the internal roads within the Main Site;
    - The freight trains serving the rail terminal moving within the Main Site including the associated loading and unloading activities;
    - Heavy goods vehicles (HGVs) and other operational activity at the Main Site, such as manoeuvring, loading and unloading at the proposed warehouses and freight terminal;
    - Operational activities associated with the relocated In Vessel Composting (IVC) facility.
    - Mechanical services plant associated with the warehousing at the Main Site.

5.1.3 With reference to vibration, of the construction works that will be required, only piling has been identified as having the potential to generate levels of vibration which could adversely affect nearby receptors. At the time of writing, it is understood that the only piling likely to be required is the contiguous piles that will be needed to create the bunding to the north of the rail terminal. With regard to potential vibration from construction traffic, it is not expected that there would be any significant adverse effects. However, this will be confirmed in the final Environmental Statement.

5.1.4 It is also possible that the additional freight trains serving the SRFI travelling on the Chiltern Line could lead to an increase in perceptible vibration at receptors in close proximity to the line during the operational phase of the Proposed Development.

5.1.5 It has been agreed with the Examining Authority that vibration from HGVs travelling along surrounding roads could be scoped out of the operational phase assessment providing that explanation is given regarding how the roads would be maintained to avoid vibration issues subsequently arising.

5.1.6 At the time of writing, the scheme development and noise assessment are still a work in progress. Having said that, baseline sound and vibration surveys have been

undertaken and indicative results from these surveys are presented. However, the information required to undertake all of the different elements of the assessment is not yet available. As a result, it has not yet been possible to undertake a full assessment of the noise and vibration impacts likely to result from the Proposed Development.

5.1.7 The work to date has involved identifying the likely impacts from the currently Proposed Development, particularly from the Main Site. From that, the emerging mitigation strategy is being developed to minimise the likely impacts and effects at the surrounding receptors in accordance with Government Policy on noise.

5.1.8 This chapter sets out the proposed assessment methodologies, data sources and an initial overview of the likely impacts and effects based on work undertaken to date. It should be noted that as part of the evolution of the Proposed Development, there have been changes to the scheme and proposed highway strategy which have not yet been modelled.

5.1.9 This chapter is supported by the following technical appendices:

- Appendix 5.1 Glossary of Terms
- Appendix 5.2 Noise and Vibration Receptor Locations
- Appendix 5.3 Scoping Opinion Responses
- Appendix 5.4 Noise and Vibration Monitoring Locations
- Appendix 5.5 Summary of Noise and Vibration Survey Monitoring Equipment
- Appendix 5.6 Noise Survey Summary Results
- Appendix 5.7 Noise Action Planning – Important Areas
- Appendix 5.8 Derivation of Background Sound Levels for SRFI Operational Noise Assessment

Competency

5.1.10 The noise and vibration surveys, predictions, assessments, and preparation of this draft chapter has been carried out by suitably qualified and experienced acousticians who are members of the Institute of Acoustics (IoA), the professional body for acousticians and noise consultants, following the guidance set out in Government policy and relevant British Standards.

5.1.11 Vanguardia are an acoustic consultancy with extensive experience in providing the noise and vibration chapter to support the Environmental Statement for a wide range of schemes including previously securing consent for a Strategic Rail Freight Interchange under the Development Consent Order process. The practice is also member of the Association of Noise Consultants.

5.1.12 The chapter was drafted by a Corporate Member of the IOA with 11 years and has been reviewed by an Honorary Fellow of the IOA who has over 40 years' experience working in the field of acoustics and noise control in both the private and public sector including 15 years spent providing technical advice to Government noise policy officials.

5.2 POLICY CONTEXT

5.2.1 For nationally significant road, rail and strategic rail freight infrastructure projects (as defined in the Planning Act 2008), The National Policy Statement for National Networks (NPSNN) sets out the relevant policy objectives.

National Policy Statement for National Networks (NPSNN)[1]

5.2.2 Paragraph 5.193 of the NPSNN, states that in decision making, due regard should be given to the Noise Policy Statement for England[2] (NPSE), the National Planning Policy Framework[3] (NPPF) and the Government's associated Planning Practice Guidance on Noise[4] (PPG(N)).

5.2.3 In terms of human receptors, the NPSNN specifies (paragraph 5.191) that noise and vibration should be assessed using the principles of the relevant British Standards and other guidance. The prediction of road traffic noise should be based on the method described in Calculation of Road Traffic Noise[5] (CRTN) and prediction of noise from railways should be based on the method described in Calculation of Railway Noise[6] (CRN). For the prediction, assessment and management of construction noise, the NPSNN states that reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies.

5.2.4 The NPSNN also states that:

"Applicants should consider opportunities to address the noise issues associated with the Important Areas as identified through the noise action planning process" (Paragraph 5.200).[7]

5.2.5 Regarding mitigation, in paragraph 5.197, the NPSNN states that:

[1] National Policy Statement for National Networks, Department for Transport (2014)
[2] Noise Policy Statement for England, Defra (2010)
[3] Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework
[4] Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government (2019), Planning Practice Guidance: Noise. https://www.gov.uk/guidance/noise--2
[5] Calculation of Road Traffic Noise, Department of Transport (1988)
[6] Calculation of Railway Noise, Department of Transport (1995)
[7] Important Areas are defined in the relevant Noise Action Plans produced by the Department for Environment, Food and Rural Affairs when implementing the Environmental Noise (England) Regulations 2006, as amended (SI 2006/2238).

"The Examining Authority and the Secretary of State should consider whether mitigation measures are needed both for operational and construction noise over and above any which may form part of the project application. The Secretary of State may wish to impose requirements to ensure delivery of all mitigation measures."

5.2.6 Furthermore, in paragraph 5.198 it states that

"Mitigation measures for the project should be proportionate and reasonable and may include one or more of the following:

- *engineering: containment of noise generated;*
- *materials: use of materials that reduce noise, (for example low noise road surfacing);*
- *lay-out: adequate distance between source and noise-sensitive receptors; incorporating good design to minimise noise transmission through screening by natural or purpose built barriers;*
- *administration: specifying acceptable noise limits or times of use (e.g., in the case of railway station PA systems)."*

5.2.7 The NPSNN (at Paragraph 5.199) also notes that for most projects, the relevant Noise Insulation Regulations will apply (see below). This means that the assessment must consider whether the Proposed Development is likely to trigger any eligibility under the terms of these Regulations and provide an indication of any likely eligibility.

5.2.8 Paragraph 5.195 of the NPSNN describes the obligation on the Secretary of State when considering the merits of the proposal:

"The Secretary of State should not grant development consent unless satisfied that the proposals will meet the following aims, within the context of Government policy on sustainable development:

- *avoid*[8] *significant adverse impacts on health and quality of life from noise as a result of the new development;*
- *mitigate and minimise other adverse impacts on health and quality of life from noise from the new development; and*
- *contribute to improvements to health and quality of life through the effective management and control of noise, where possible."*

5.2.9 These statements reflect the aims of the Noise Policy Statement for England (NPSE).

[8] "Avoid" here does not mean a significant adverse effect cannot ever exist. Instead, it means make every effort so that significant adverse impacts do not occur. The hierarchy set out in the PPG(N) confirms this to be the case – see Table 5.1 of this Chapter. The reason is that the NPSE covers all sources and for historical legal reasons, there are certain circumstances (e.g. statutory nuisance legislation) where a significant adverse impact is lawfully allowed to occur.

Noise Policy Statement for England (NPSE)

5.2.10 The NPSE is the overarching Government policy on noise. It seeks to clarify the underlying principles and aims in past and existing policy documents, legislation and guidance in relation to all forms of noise including environmental noise, neighbour noise and neighbourhood noise (but not noise in the workplace).

5.2.11 It uses the established concepts of No Observed Effect Level (NOEL) and Lowest Observed Adverse Effect Level (LOAEL). The NPSE extends these by introducing Significant Observed Adverse Effect Level (SOAEL). This is the level above which significant adverse effects on health and quality of life occur. However, the explanatory note to the NPSE states that it is not possible to identify a single objective value to define SOAEL for noise that is applicable to all sources of noise in all situations. It is likely to be different for different noise sources, for different receptors and at different times. The NPSE recognises that '*further research is required to increase understanding of what may constitute a significant adverse impact on health and quality of life from noise. However not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available'.* Consequently, the practitioner must determine the appropriate threshold values to be adopted for the sources and situations being assessed, based on the available evidence.

5.2.12 The NPSE's vision is consistent with paragraph 5.195 of the NPSNN (paragraph 5.2.8 above). It is to:

"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.
This long-term vision is supported by the following aims:

- *Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development: Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life."*

5.2.13 Within the NPSE, the phrase '*within the context of Government policy on sustainable development'* is used. This means that noise must not be treated in isolation. Instead, when implementing the aims of the policy, consideration should be given to the economic and social benefit of the activity causing the noise as well as the other environmental effects of the development.

5.2.14 The second aim of the NPSE refers to noise impacts that lie somewhere between LOAEL and SOAEL. The NPSE asserts that, while this means that all reasonable steps should be taken to mitigate and minimise adverse effects, this does not mean that such adverse effects cannot occur.

National Planning Policy Framework (NPPF)

5.2.15 The National Planning Policy Framework (NPPF), is referenced in paragraph 5.193 of the NPSNN. The document was originally published in 2012 and last amended in July 2021, and sets out the Government's planning policy for England. At its heart is an intention to promote more sustainable development.

5.2.16 The relevant paragraphs concerning noise in the NPPF are:

- Paragraph 174: *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
  e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of ….. noise pollution, … Development should, wherever possible, should help to improve local environmental conditions".
- Paragraph 185 "*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or 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 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"

5.2.17 It can be seen from these paragraphs how the NPPF reflects the aims of the NPSE and the decision tests in the NPSNN (Paragraph 5.195). Furthermore, the NPPF makes reference to the NPSE for advice on the achievement of these policy aims, and particularly in connection with adverse impacts. It also evident from paragraph 174 that there is a higher level of impact than the significant adverse effect level i.e. the unacceptable level. This is discussed further in paragraph 5.2.23 below.

Planning Practice Guidance (Noise) (PPG(N))

5.2.18 Further government guidance on the consideration of noise for planning has been published as the Planning Practice Guidance for Noise (PPG:N) originally published in 2014. Its most recent revision was in July 2019. The PPG:N supports the NPPF by providing a range of advice.

5.2.19 Paragraph 003 notes that plan-making and decision making should take account of the acoustic environment and in doing so should consider:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and
- Whether or not a good standard of amenity can be achieved.

5.2.20 The PPG:N includes a noise exposure hierarchy table, and again makes reference to the NPSE. The hierarchy table (replicated in Table 5.1) provides descriptive (i.e. non-numerical) guidance on the potential effects of various degrees of noise exposure.

5.2.21 Paragraph 004 of the document states that while the word level is used in the definitions of NOEL, LOAEL and SOAEL, it does not mean the effects can only be defined in terms of a single value of noise exposure. In some circumstances adverse effects are defined in terms of a combination of more than one factor such as noise exposure, the number of occurrences of the noise in a given time period, the duration of the noise and the time of day the noise occurs. The table confirms that adverse effects (between LOAEL and SOAEL where noise starts to cause small changes in behaviour or attitude) should be mitigated and reduced to a minimum[9].

Table 1: PPG:N Noise Exposure Hierarchy Table

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			

[9] With the NPSE confirming in its paragraph 2.24 that reasonable steps should be taken to achieve that outcome.

Response	Examples of outcomes	Increasing effect level	Action
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	No Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

5.2.22 The table confirms that adverse effects (between LOAEL and SOAEL where noise starts to cause small changes in behaviour or attitude) should be mitigated and reduced to a minimum .

5.2.23 Increasing noise exposure will cause the SOAEL boundary to be crossed. As shown in the table there are two levels of adverse effect above the SOAEL:

- a significant observed adverse effect level – at this level, noise causes a material change in behaviour e.g. keeping windows closed or avoiding certain activities at certain times. The planning process should be used to avoid this effect occurring, for example through choice of sites and use of appropriate mitigation (discussed further below). It is undesirable for such exposure to be caused, but as mentioned in Footnote 5, there are circumstances when such effects can occur. Decisions must take account of the economic and social benefit of the activity causing or affected by the noise caused.
- an unacceptable adverse effect level (UAEL) – at this level, noise exposure would cause extensive and sustained adverse changes in behaviour and / or health without the ability to mitigate the effects of the noise. Under these

circumstances the impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise this situation must be prevented from occurring.

5.2.24 Regarding appropriate mitigation measures that can be employed to avoid significant adverse effects (and mitigate and minimise adverse effects), paragraph 010 of the PPG(N) indicates that there are 4 broad types of mitigation:

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

National Policy Summary

5.2.25 With regard to government policy on noise, it is recognised that:

- Adverse effects can occur, as long as reasonable steps have been taken to keep such effects to a minimum.
- Significant adverse effects should be avoided but there may be circumstances where this cannot be achieved, even after the application of mitigation.
- Unacceptable adverse effects must not occur, regardless of the economic and social benefits that may arise from the activity generating the noise.

Local Policy

5.2.26 The Cherwell Local Plan 2011 – 2031[10] sets out the long-term spatial vision for the District, and contains policies to assist in achieving that vision.

5.2.27 The Local Plan does not appear to contain any policies relating to noise which are applicable to the Proposed Development.

[10] Cherwell District Council, 2015, The Cherwell Local Plan 2011 – 2031 (Incorporating Policy Bicester 13 re-adopted on 19 December 2016).

Other Guidance

5.2.28 In addition, the assessment is taking into consideration a number of British Standards and other guidance documents. These include:

- Calculation of Road Traffic Noise (CRTN), 1988;
- Calculation of Railway Noise (CRN), 1995;
- Noise Insulation Regulations, 1975 (as amended 1988);
- The Noise Insulation (Railways and Other Guided Transport Systems) Regulations, 1996;
- Design Manual for Roads and Bridges (DMRB)[11], LA111 Noise and Vibration May 2020 Revision 2
- BS 4142:2014+A1:2019 Method for rating and assessing industrial and commercial sound;
- BS 5228:2009+A1:2014 (Parts 1 and 2) Code of Practice for Noise and Vibration Control Construction and Open Sites;
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings;
- BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting;
- ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors part 2: General method of propagation;
- World Health Organisation, Guidelines for Community Noise (1999);
- IEMA Guidelines for Environmental Noise Impact Assessment (2014).

5.3 ASSESSMENT SCOPE AND METHODOLOGY

Receptor Identification

5.3.1 Sensitive receptors are identified as locations where a human or ecological habitat could be exposed to increased levels of noise and/or vibration due to the proposed development.

5.3.2 These usually include the nearest receptors to proposed development or highway works, on the basis that these represent the worst affected receptors. That means that the impact at all other locations would be no greater, and in many cases, lower than at the receptors included in the assessment.

5.3.3 Regarding the sensitivity of the receptors, the table below summaries the sensitivity of different types of receptors to noise and vibration.

[11] Although strictly only applicable to scheme promulgated by National Highways for the Strategic Road Network

Table 5.2: Receptor Sensitivity

Receptor Sensitivity	Description
High	Receptors where people or operational activities are extremely susceptible to effects from noise and vibration. For example, residential accommodation, hospital operating theatres/high dependency units, care homes etc.
Medium	Receptors where people are moderately susceptible to noise and vibration. For example: offices, schools and universities, hospital wards, temporary holiday accommodation and hotels, places of worship, private gardens and outdoor areas used for stationary recreation;
Low	Receptors with a low susceptibility to disturbance from noise and vibration. For example: sports grounds bars, cafes, restaurants.

5.3.4 A review was undertaken of the surrounding area to identify the nearest sensitive receptors to the Application Site. As the Proposed Development comprises several different elements, such as the SRFI at the Main Site and the new bypass and link roads, not all receptors will be potentially affected by the same sources of noise and not all receptors will be potentially affected by vibration.

5.3.5 Consequently, the potential impacts and effects have been considered at different receptor locations depending on which sources are likely to have potential to cause adverse impacts and effects. Broadly, these are the receptors closest to the particular source.

Residential Receptors

5.3.6 The residential receptors currently selected for assessment are listed in Table 5.3 together with the expected relevant sources of noise from the Proposed Development that might affect them. The locations of the receptors are shown in **Appendix 5.2**. This list will expand as work on the different areas of the assessment progresses particularly with respect to the receptors potentially affected by the Highway Works.

5.3.7 Where different facades of the same receptor are considered in the assessment – the façade is denoted after the receptor number. For example, R5-N indicates the receptor on the northern façade while R5-S indicates the receptor on the southern façade.

Table 5.3: Indicative list of residential receptors to be assessed and sources of noise that might affect them

Receptor		Construction (Main Site)	Traffic	Mainline Rail	Main Site Operational Noise
R0	Property in Woods - South	Y	-	Y	Y
R5-N	Cross Roads Farm - North		-	Y	-
R5-S	Cross Roads Farm - South	Y	Y	-	Y

Receptor		Construction (Main Site)	Traffic	Mainline Rail	Main Site Operational Noise
R6-E	Quarry Cottages - East	-	-	Y	Y
R6-S	Quarry Cottages - South	Y	Y	Y	Y
R7	Fewcott Lodge - South	-	Y	-	-
R8	Almscar - North	-	Y	-	-
R9	The Cottages - East	-	Y	-	-
R10-E	26/28 Ardley Road - East	-	Y	-	-
R10-W	26/28 Ardley Road - West	-	Y	-	-
R11-E	2/4 Ardley Road - East	-	Y	-	-
R11-S	2/4 Ardley Road - South	-	Y	-	-
R12	Castle Fields - South	Y	-	Y	Y
R13-N	Manor Farm Ardley - North	-	Y	-	-
R13-S	Manor Farm Ardley - South	Y	-	Y	Y
R14-E	Church Road - East	-	Y	-	-
R14-W	Church Road - West	Y	-	Y	Y
R15	Orchard Cottage - South	Y	-	Y	Y
R16-N	Exton Cottage - North	-	Y	-	-
R16-S	Exton Cottage - South	-	Y	-	-
R16-W	Exton Cottage - West	-	Y	-	-
R17	Fox & Hounds - West	-	Y	-	-
R18-S	1 St Marys Walk - South	-	Y	-	-
R18-W	1 St Marys Walk - West	-	Y	-	-
R19-N	Grooms Cottage - North	-	Y	-	-
R19-E	Grooms Cottage - East	-	Y	-	-
R20-N	Barnhouse Kennels - North	-	Y	-	-
R20-S	Barnhouse Kennels – South	-	Y	-	-
R20-W	Barnhouse Kennels – West	-	Y	-	-
R21-N	Foxfield Farm – North	-	Y	-	-
R21-E	Foxfield Farm – East	-	Y	-	-
R22	Woodbine Cottage – West	-	Y	-	-
R23	1/2 Jersey Cottages – East	-	Y	-	-
R24-E	3 Station Road – East	-	Y	-	-
R24-W	3 Station Road – West	Y	-	Y	Y
R25	Wood View – South	-	-	Y	Y
R26-E	The Bungalow – East	-	Y	-	-
R26-S	The Bungalow – South	Y	Y	Y	Y
R26-W	The Bungalow – West	-	-	Y	Y
R27-E	Upland Cottage – East	-	Y	Y	-
R27-S	Upland Cottage – South	-	Y	Y	Y
R27-W	Upland Cottage – West	Y	Y	Y	Y

Receptor		Construction (Main Site)	Traffic	Mainline Rail	Main Site Operational Noise
R28-W	Ardley Field Farm Cottages – West	Y	Y	Y	Y
R30-N	Upper Heyford – North	-	-	Y	-
R30 -E	Upper Heyford – East	Y	-	-	Y
R30-S	Upper Heyford – South	Y	-	-	Y
R30-W	Upper Heyford – West	Y	-	-	Y
R31	Camp Road – East	Y	-	-	Y
R32	Heyford Grange – East	Y	-	-	Y
R33	42 Trenchard Close – East	Y	-	-	Y
R34	PYE Homes – East	Y	-	-	Y
R34A	Richborough Estates Residential Development	Y	Y	-	Y
R35 -N	50 Duvall Park – North		Y	-	-
R35-E	50 Duvall Park – East	Y	-	-	Y
R36	Manor Farm - North	Y	Y	-	Y
R37-N	4 Manor Farm Cottages – North	Y	Y	-	Y
R37-E	4 Manor Farm Cottages – East	-	Y	-	Y
R38	1 Manor Farm Cottages - South	-	y	-	-
R39-S	Dewars Farm – South	-	Y	-	-
R39-W	Dewars Farm – West	Y	Y	-	Y
R40	Dewars Farm Cottages – East	-	Y	-	-
R40	Dewars Farm Cottages – West	-	Y	-	-
R41	Bucknell Lodge – West	-	Y	-	-
R42-S	40 Middleton Road – South	-	-	Y	-
R42-W	40 Middleton Road – West	-	-	Y	-
R43	Homelands Farm – South	-	-	Y	-
Numbering may not be consecutive as receptors may have been scoped in and out of the assessment as the scheme has evolved.					

5.3.8 A receptor height of 1.5m is used to represent ground floor windows and a height of 4.5m represents first floor windows.

5.3.9 The effects of any potential increase in ground borne vibration from additional freight trains serving the SRFI will be predicted at two receptors: R05 Cross Roads Farm and R6 Quarry Cottages. The locations of the receptors are shown in **Appendix 5.2**.

Non Residential Receptors

5.3.10 With regard to non-residential receptors, the locations listed in Table 5.4 have been identified. Receptors O1 to O5 were identified in Oxfordshire County Council's Scoping Opinion comments as needing to be considered in the noise assessment. The other non-residential receptors have been identified in consultation with the project ecologist. The list of non-residential receptors may expand as work on the different areas of the assessment progresses.

Table 5.4: Indicative list of non-residential receptor locations and sources of noise to be considered

Receptor	Construction TBC	Traffic	Mainline Rail	Main Site Operational Noise
O1 St Marys Church, Ardley	-	Y	-	-
O2 Ardley Village Hall	Y-Highway works	Y	-	-
O3 Ardley Playing Fields	Y- Highway works	Y	-	-
O4 Ardley Woods (also part of Ardley Cutting and Quarry SSSI).	Y – Main site	-	Y	Y
O5 Ardley Fields Quarry Local Wildlife Site (LWS)	Y – Main site and highway works	Y	Y	Y
O6 Ardley Fields Ponds West LWS	Y – Main Site	Y	-	Y
O7 The Heath proposed District Wildlife Site (pDWS)	Y – Main Site	Y	-	Y
O8 Upper Heyford Airfield (LWS)	Y – Main Site	Y	Y	Y

5.3.11 The locations of these receptors are also shown in **Appendix 5.2.**

5.3.12 For non-residential receptors, sensitivity to noise depends on their usage. For the most part they are less sensitive than residential receptors, in which case the thresholds for LOAEL and SOAEL can be at higher levels. The effect level thresholds for these other receptors will be dealt with on a case by case basis.

5.3.13 The potential noise impacts of the Proposed Development on ecological receptors (O4, O5, O6, O7 and O8) and the species present in these habitats will be considered in Chapter 6 Ecology. It is understood that the main concern is related to species that are likely to have some sensitivity to noise, including birds with wintering birds, breeding birds and farmland birds being present at some of the receptor locations.

Approach to the Assessment

5.3.14 The Proposed Development has the potential to give rise to several different types of noise and vibration impacts. Broadly speaking these comprise:

- Construction noise arising from development of the Main Site and the Highway Works;
- Construction vibration (depending on the construction techniques to be used)
- Operational road traffic noise resulting from the change in road traffic flows on the highway network around the Main Site and associated Highway Works;
- Operational railway noise from the freight trains serving the SRFI travelling along the Chiltern Line;
- Operational vibration arising the freight trains serving the SRFI travelling along the Chiltern Line; and
- Operational noise arising from the Main Site.

5.3.15 In general, the assessment methodology used for each type of source is different in terms of how the potential noise or vibration impact is predicted and how the effect is assessed. In line with government policy and where practicable, thresholds levels have been defined for LOAELs and SOAELs for the different noise sources considered in the assessment.

5.3.16 The assumptions that have been made for each element of the predictions and subsequent assessment will be clearly stated in the supporting technical appendices to the final assessment chapter. In general sound has been predicted at a distance of 1m from the receptor façade, and unless otherwise stated, excludes the effect of acoustic reflection from that façade (i.e. a free field level at the façade).

5.3.17 The magnitude of the impact and the significance of the effect is dependent upon several factors, including:

- the existing sound environment
- the noise level generated from the particular activity,
- the change from the baseline (existing sound environment) or future baseline (i.e. the 'do minimum' situation) as a result of the new noise source,
- the duration, timing and character of the different noise sources,
- in some situations, the number of dwellings affected can form part of the assessment of significance.

5.3.18 The assessment methodologies and significance criteria anticipated for each element of the assessment are described below.

Construction Traffic

5.3.19 Noise levels associated with construction traffic will be calculated and assessed in accordance with the Calculation of Road Traffic Noise (CRTN, 1988). The significance of construction traffic noise effects would be determined using the thresholds set out in Table 5.5, which reflect those set out in Table 3.17 of the DMRB LA111 Noise and Vibration document with respect to construction traffic.

Table 5.5: Thresholds of potential effects of construction traffic at residential receptors

Magnitude of Impact	Increase in noise level ($L_{Aeq,T}$ dB)
Major	Greater than or equal to 5.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Minor	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0
Note: Construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding; *a) 10 or more days or nights in any 15 consecutive days or nights* *b) A total number of days exceeding 40 in any 6 consecutive months.*	

Construction Noise

5.3.20 In relation to demolition and construction noise impacts, indicative noise levels will be predicted at the nearest receptors using the methodology contained within Annex F of British Standard BS 5228-1:2009+A1:2014[12]. The predictions will be based on informed assumptions about the construction plant and equipment that will be used. The propagation of construction noise will be predicted following the principles of the ISO 9613-2:1996 methodology, assuming moderate downwind propagation between the source and receptors.

5.3.21 The significance of potentially adverse construction noise effects will be determined using the thresholds set out in Table 5.6. The values are based on the guidance within Annex E of BS 5228-1:2009+A1:2014 and the effects that construction noise can have on those exposed to it. The thresholds are expressed in terms of current Government policy (i.e. LOAELs and SOAELs).

Table 5.6: Thresholds of potential effects of construction noise at residential buildings

Effect	Time Period	Threshold Value ($L_{Aeq,T}$)[a]
LOAEL	Day (07:00 – 19:00)	65
	Evening (19.00 – 23.00)	55
	Night (23.00 – 07.00)	45
SOAEL	Day (07:00 – 19:00)	75
	Evening (19.00 – 23.00)	65
	Night (23.00 – 07.00)	55
Notes: [a] *These effects are expected to occur if the programme of works indicates that the relevant threshold values are likely to be exceeded over a period of at least one month.*		

[12] BS 5228-1:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites, Part 1: Noise

Effect	Time Period	Threshold Value ($L_{Aeq,T}$)[a]
The values apply to a location one metre from a residential building façade containing a window, ignoring the effect of the acoustic reflection from that façade.		

5.3.22 Where necessary, measures to avoid any significant adverse effects on health and quality of life, and to mitigate and reduce to a minimum any adverse effects, will be identified. This would include the use of best practicable means (BPM) to reduce effects and/or deliver mitigation.

Construction Vibration

5.3.23 It is understood that contiguous piling will be required to form the bund structure to the north of the rail terminal. An assessment will be undertaken regarding the potential vibration impact from piling at the nearest receptors. This assessment will follow the method set out in BS 5228-2:2009+A1:2014[13].

5.3.24 Although the concepts regarding LOAEL and SOAEL in Government policy refer only to noise exposure, it is helpful to adopt the same principles when assessing vibration impact and effect. Table 5.7 sets out the construction vibration exposure thresholds based on the guidance within Annex B of BS 5228-2:2009+A1:2014.

Table 5.7: Thresholds of potential effects of construction vibration at residential buildings[14]

Effect	Threshold Value (PPV, mm/s)[a]
LOAEL	0.5
SOAEL	1.0[b]
Notes: [a] This is the level at a residential receptor. [b] Guidance in BS 5228-2:2009+A1:2014 states that this level of exposure can be tolerated by those affected if prior warning and explanation has been given. It goes on to state that a level of 10 mm/s is likely to be intolerable in most building environments for any more than a very brief exposure.	

Operational Phase

5.3.25 The noise emission from operational activities will be predicted using proprietary noise modelling software IMMI, using the standard UK prediction methodologies.

[13] Code of Practice for Noise and Vibration Control Construction and Open Sites, Part 2: Vibration;
[14] These were the thresholds used for the Northampton Gateway application which was approved by the Secretary of State.

Operational Phase - Road Traffic Noise

5.3.26 The noise levels associated with changes in road traffic on the surrounding road network arising from the Proposed Development will be predicted using the methodology detailed in the Department for Transport memorandum, Calculation of Road Traffic Noise (CRTN[15]). Using traffic data supplied by the project traffic consultant, that describes the anticipated change in flows from the future baseline (i.e. the flows for the assessment years without the Proposed Development – 'do minimum') and then the flows with the Proposed Development (i.e. 'do something'), the potential effects of the predicted change in noise levels will be assessed.

5.3.27 The significance of potentially adverse road traffic noise effects will be based on a combination of the change in noise exposure between the do minimum (future baseline) and do something scenarios and the resulting noise exposure at the receptors. The noise exposure thresholds are set out in Table 5.8. These have been derived from the effects that road traffic noise can have on those affected[16] and are expressed in terms of Government policy.

Table 5.8: Threshold of potential effects of road traffic noise (residential receptors)

Time period	Effect	Noise Exposure Threshold Value
Day (06:00-00:00)	LOAEL	50 dB $L_{Aeq\ 16\ hour}$ (free-field)[a,b]
	SOAEL	63 dB $L_{Aeq\ 16\ hour}$ (free-field)[a,c]
Night (23.00-07.00)	LOAEL	40 dB L_{night} (free-field)
	SOAEL	55 dB L_{night} (free-field)
Notes: [a] This is the *average daily value (07:00 – 23:00 hours) at a position one metre from a residential building façade containing a window, ignoring the effect of an acoustic reflection from that façade.* *b* equivalent to 55 dB $L_{A10,18hr}$ façade *c* equivalent 68 dB $L_{A10,18hr}$ façade		

5.3.28 If the daytime LOAEL threshold is exceeded, the data in Table 5.9 sets out how the magnitude of the impact will be described taking account of the change in daytime noise exposure and the resulting exposure level.

[15] Department of Transport, 1988, Calculation of Road Traffic Noise, CRTN,
[16] The evidence for using some these values can be found in guidance from the World Health Organisation. Similar values have been used for the assessment of other schemes such as A14 DCO and Northampton Gateway DCO and are presented in the Design Manual for Roads and Bridges.

Table 5.9: Descriptors of impact magnitude of daytime road traffic noise change

Magnitude of Impact	Do Something Noise Exposure	
	Between LOAEL and SOAEL	**SOAEL or greater**
No Change	0	0
Negligible	Up to 2.9 dB(A)	Up to 0.9 dB(A)
Minor	3.0 – 4.9 dB(A)	**1.0 – 2.9 dB(A)**
Moderate	5.0 – 9.9 dB(A)	**3.0 – 4.9 dB(A)**
Major	10.0 dB(A) and over	**5.0 dB(A) and over**

5.3.29 Whether or not a significant adverse effect is expected to occur will be determined through a two-stage process. Firstly, the predicted do something noise level (with the Proposed Development) will be compared with the LOAEL and SOAEL thresholds shown in Table 5.8 to determine whether they are below the LOAEL, between the LOAEL and SOAEL, or at/above SOAEL. Secondly, the change in noise due to the Proposed Development will be considered (i.e. the difference between the do something and do minimum scenarios). Table 5.9 is then used to determine the extent of the impact. If the result for any property falls into the categories shown by the shaded boxes with text in bold, that indicates that the property is regarded as experiencing a significant adverse effect.

5.3.30 If the night-time LOAEL threshold is exceeded, the data in Table 5.10 sets out how the magnitude of the impact would be described taking account of the change in night-time noise exposure and the resulting exposure level.

Table 5.10: Descriptors of impact magnitude of night-time road traffic noise change

Magnitude of Impact	Do Something Noise Exposure	
	Between LOAEL and SOAEL	**SOAEL or greater**
No Change	0	0
Negligible	Up to 0.9 dB(A)	Up to 0.9 dB(A)
Minor	1 – 2.9 dB(A)	**1.0 – 2.9 dB(A)**
Moderate	3.0 – 4.9 dB(A)	**3.0 – 4.9 dB(A)**
Major	5.0 dB(A) and over	**5.0 dB(A) and over**

5.3.31 Whether or not a significant adverse night-time effect is expected to occur will also be determined through a two-stage process. Firstly, the predicted do something noise level (with the Proposed Development) will be compared with the LOAEL and SOAEL values shown in Table 5.8, to determine whether they are below the LOAEL, between the LOAEL and SOAEL or at or above SOAEL. Secondly, the change in noise due to the Proposed Development will be considered (i.e. the difference between the do minimum and do something scenarios). Table 5.10 is then used to determine the extent of the impact. If the result for any property falls in the categories shown by the

shaded boxes with text in bold, that indicates that the property is regarded as experiencing a significant adverse effect.

Operational Railway Noise

5.3.32 Changes in railway noise from freight trains serving the SRFI travelling along the Chiltern line in proximity to the Main Site will be predicted in accordance with the methodology in the Calculation of Railway Noise[17]. Impacts will be considered at receptors within a longitudinal distance of 2300m along the track from the proposed connection between the main line and the SRFI. The distance of 2300m is considered appropriate and proportionate as the trains departing the SRFI will take approximately 2000m to accelerate to full speed. Receptors will be considered within a lateral distance of 300m from the track.

5.3.33 Predictions will be undertaken for the baseline situation (i.e. do minimum, DM) and then with the Proposed Development (i.e. do something, DS).. The potential effects of the predicted change in noise levels would be assessed in accordance with the relevant policy requirements as described throughout this methodology section.

5.3.34 The significance of potentially adverse railway noise effects would be based on a combination of the change in noise exposure between the do minimum and do something scenarios, and the resulting noise exposure. The noise exposure thresholds are set out in Table 5.11. These have been derived from the effects that railway noise can have on those affected[18] and are expressed in terms of Government policy.

Table 5.11: Thresholds of potential effects of railway noise at residential buildings

Effect	Time Period	Threshold Value ($L_{Aeq,T}$)[a,b]
LOAEL	07.00 – 23.00	50
	23.00 – 07.00	40
SOAEL	07.00 – 23.00	65
	23.00 – 07.00	55

Notes:
[a] *This is the average daily value at a position one metre from a residential building façade containing a window, ignoring the effect of an acoustic reflection from that façade.*
[b] *For the night-time period of 23.00 – 07.00, the relevant noise indicator is L_{night}.*

5.3.35 If the daytime LOAEL threshold value is exceeded, the data in Table 5.12 sets out how the magnitude of the impact is described taking account of both the change in daytime noise exposure and the resulting exposure.

[17] Calculation of Railway Noise (CRN), 1995.
[18] The evidence for using some these values can be found in guidance from the World Health Organisation. Similar values have been used for the assessment of other schemes such as HS2 and Northampton Gateway.

Table 5.12: Descriptors of impact magnitude of daytime railway noise change

Magnitude of Impact	Resulting Do Something Exposure Level	
	Between LOAEL & SOAEL	**SOAEL or greater**
No Change	0	0
Negligible	Up to 2.9 dB(A)	Up to 0.9 dB(A)
Minor	3.0 – 4.9 dB(A)	**1.0 – 2.9 dB(A)**
Moderate	5.0 – 9.9 dB(A)	**3.0 – 4.9 dB(A)**
Major	10.0 dB(A) and over	**5.0 dB(A) and over**

5.3.36 Whether or not a significant adverse effect is expected to occur will be determined through a two-stage process. Firstly, the predicted do something noise level (with the Proposed Development) will be compared with the LOAEL and SOAEL values shown in Table 5.11 to determine whether they are below the LOAEL, between the LOAEL and SOAEL or at/above the SOAEL. Secondly, the change in noise due to the Proposed Development will be considered (i.e. the difference between the do minimum and do something scenarios). Table 5.12 then used to determine the extent of the impact. If the result for any property falls in the categories shown by the shaded boxes with text in bold, that indicates that the property is regarded as experiencing a significant adverse effect.

5.3.37 If the night-time LOAEL threshold is exceeded, the data in Table 5.13 sets out how the magnitude of the impact is described taking account of the change in night-time noise exposure and the resulting exposure.

Table 5.13: Descriptors of magnitude of night-time railway noise change

Magnitude of Impact	Resulting Exposure	
	Between LOAEL & SOAEL	**SOAEL or greater**
No Change	0	0
Negligible	Up to 0.9 dB(A)	Up to 0.9 dB(A)
Minor	1.0 - 2.9 dB(A)	**1.0 – 2.9 dB(A)**
Moderate	3.0 – 4.9 dB(A)	**3.0 – 4.9 dB(A)**
Major	5.0 dB(A) and over	**5.0 dB(A) and over**

5.3.38 Whether or not a significant adverse effect is expected to occur will be determined through a two-stage process. Firstly, the predicted do something noise level (with the Proposed Development) will be compared to the LOAEL and SOAEL values shown in Table 5.11, to determine whether they are below the LOAEL, between the LOAEL and SOAEL or at or above the SOAEL. Secondly, the change in noise due to the Proposed Development will be considered (i.e. the difference between the do minimum and do something scenarios). Table 5.13 is then used to determine the extent of the impact. If the result for any property falls in the categories shown by the

shaded boxes with text in bold, that indicates that the property is regarded as experiencing a significant adverse effect.

Operational Noise from Main Site

5.3.39 Sound from operational activities taking place at the SRFI Main Site has the potential to cause impacts at nearby receptors during the day and night-time period. Noise will be generated from the following sources:

- Rail movements inside the SRFI i.e. freight train movements on the internal tracks;
- HGV movements inside the SRFI (both from the main highway network and between the rail terminal and the warehouses);
- Loading, unloading and manoeuvring activities associated with the rail terminal and the warehousing. This will include the use of gantry cranes, reach stackers and empty container handlers at the rail terminal;
- Operational activities at the existing but relocated green waste processing facility; and
- Mechanical services plant serving the warehousing.

5.3.40 Two different methods of prediction have been used depending on the type of source, all of which assume downwind propagation from the source to the receptor. These are:

- Calculation of Railway Noise (CRN) for freight trains travelling on the internal railway tracks; and
- ISO 9613-2:1996 for all other sources, together with appropriate source data.

5.3.41 The results from the different assessment methodologies have been processed so as to determine the impact during the peak hour of operations in the 16-hour daytime period (07.00 – 23.00), and the peak 15 minutes of operations in the 8-hour night-time period (23.00 – 07.00). These are the assessment periods stated within BS 4142:2014+A1:2019[19] and represent a worst-case situation.

5.3.42 Predictions have been based on the site operating at full capacity with all warehousing in use, meaning that robust assumptions have been considered for this aspect. The following information has been incorporated into the prediction model:

- The expected maximum level of HGV activity at the proposed warehousing and rail freight terminal, including travel on the internal access roads;
- The number and type of freight train movements, including arrival, departure and shunting manoeuvres;

[19] BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

- The expected activities at the rail terminal including the likely durations that equipment will be operational during the assessment periods;
- The potential layout of the site as shown in the illustrative masterplan, including the size and heights of the proposed warehousing which is considered to be a reasonable worst-case representation of the proposed scheme parameters; and
- The proposed topography for the site, including the inherent screening effects of bunding and landscaping which is proposed to be fixed as a scheme parameter.

5.3.43 The assessment of the potential sound impacts from the operation of the Main Site has been based on the principles and guidance provided in BS 4142:2014+A1:2019. This methodology provides an initial estimate of impact based on the difference between the sound source being assessed (the specific sound level) and the existing background sound level at the receptor location, followed by consideration of the context in which the sound at the receptor occurs.

5.3.44 The standard also states that certain characteristics, if perceptible at the receptor location can increase the extent of the impact over that expected from a simple difference in noise levels. These characteristics include tonality, impulsivity and intermittency. The standard describes various options for taking any such features into account and for determining what is described in the standard as a rating level.

5.3.45 The standard states that the initial extent of the impact can be determined by subtracting the typical background sound level from the rating level. The greater the difference, the greater the magnitude of the initial impact estimate. The standard indicates that:

- A difference of around +10 dB[20] or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context;
- Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context; and
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact.

[20] BS 4142 states that: All the measurements and values used throughout this standard are “A”-weighted. Where “A” weighting is not explicit in the descriptor, it is to be assumed in all cases, except where it is clearly stated that it is not applicable, as in the case of tones.

5.3.46 While the difference between the rating level and background sound level provides an initial estimate of the impact, the standard indicates in section 11 that other factors should be considered in terms of the context in which the sound occurs, such as:

- the resultant absolute noise level;
- how the character and level of the specific sound source relates to the existing sound environment;
- sensitivity of receptor; and
- the façade insulation

5.3.47 Regarding the consideration of the absolute levels of sound, the relevant guideline values provided in BS 8233:2014[21] have been referenced. Table 4 of that standard sets out desirable internal levels to be achieved in new dwellings from external sources. This would take into consideration the façade sound insulation of the dwelling, usually in terms of the propagation through a partially open window. If the façade of the property had been mitigated against external noise and also had alternative form of ventilation installed, the enhanced insulation of the façade would be taken into consideration. The table also provides information regarding desirable levels of sound for external amenity spaces associated with dwellings. The various values from BS 8233:2014 are summarised in Table 5.14 below.

Table 5.14 Summary of guideline sound levels from BS 8233:2014

Location (activity)	Time Period	Desirable Sound Level not to be exceeded
Inside Bedrooms and Living Rooms (resting)	Day (07:00 – 23:00)	35 - 40 dB $L_{Aeq,T}$
Inside Bedrooms (sleeping)	Night (23:00 – 07:00)	30 - 35 dB $L_{Aeq,T}$
Inside Dining Room/area (dining)	Day (07:00 – 23:00)	40 - 45 dB $L_{Aeq,T}$
External Amenity Space	Day (07:00 – 23:00)	50 - 55 dB $L_{Aeq,T}$

5.3.48 The lower values shown in Table 5.14 above are generally regarded as the LOAEL for steady external sound, i.e. no adverse effect due to the impact of the sound would be expected. If the sound has certain characteristics, it could be appropriate to consider a lower value as the LOAEL. Alternatively, a correction for those characteristics would be applied to the predicted levels. The latter is the approach followed in this assessment, with the rating levels (including any appropriate corrections for the acoustic character of the noise present at the receptor location) being used as the basis of the assessment of the absolute noise levels.

5.3.49 Applying the principles outlined above, there are three scenarios to consider :

- Night-time – During the night-time period, people will generally be in their bedrooms sleeping and therefore it is the absolute level internally at night which

[21] BS 8233:2014: Guidance on sound insulation and noise reduction for buildings, BSI (2014)

is most relevant to consider rather than the change in the external noise level. Therefore, the initial estimate of the impact is amended by the context of the expected internal noise levels in bedrooms. The internal noise level is derived by assuming a 12 dB reduction on the free field external level through a partially open window.

- Daytime – Internal. With regard to internal noise levels during the daytime, the same approach can be taken as at night i.e. it is the internal level which is most important rather than the change in the external noise level. So, the initial estimate of impact is amended by the context of the internal noise levels.
- Daytime – External. For external noise levels in amenity spaces such as gardens, the initial estimate of impact would be determined by the change in noise level, however consideration of the absolute level will determine the extent to which the sound would be present and whether or not it is intrusive.

5.3.50 The approach that has been taken is explained in more detail below.

5.3.51 To determine the initial estimate of the external impact based on the change from the background sound level, the criteria in the table below have been used. This is based on the guidance within BS 4142:2014+A1:2019 set out in paragraph 5.3.45. It is noted that BS 4142:2014+A1:2019 does not specify a level of change that equates to an unacceptable adverse impact.

Table 5.15: Magnitude of Impact based on change from background sound level

Excess of Rating Level vs Background	Magnitude of Impact	Initial Effect
Equal to or below background	No adverse impact likely	Below LOAEL
+1 to +4	Possible adverse impact	Adverse effects may start to occur for some people
+5 to +9	Adverse impact	Above LOAEL but below SOAEL
+10 and above	Significant adverse impact	At or above SOAEL

5.3.52 In terms of modifying the initial estimate of the night-time impact, by considering the absolute level of noise internally, the magnitude of impact has been determined according to the criteria set out in Table 5.16 below. These criteria are based on the guidance in BS 8223:2014 regarding desirable internal ambient noise levels. Above the level considered reasonable in the standard, an adverse impact is identified.

Table 5.16: Magnitude of impact based on internal rating level during the night-time

Internal Rating Level (LAeq,15 mins dB)	Magnitude of Impact	Effect Level
Equal to or below 30	No Adverse Impact Likely	Below LOAEL
31 to 35	Possible Adverse Impact	Adverse effects may start to occur for some people
36 – 39	Adverse Impact	Above LOAEL but below SOAEL

40 – 49	Significant Adverse Impact	At or above SOAEL but below UAEL
50 & above	Unacceptable Adverse Impact	At or above UAEL

5.3.53 For example, if an initial assessment indicates that at night, the external rating level is 41 dB $L_{Aeq,15min}$ and it exceeds the background sound level by 12 dB, this would be considered a significant adverse impact, according to Table 5.15. However, when considering the context in terms of the absolute sound level, the internal rating level is 29 dB $L_{Aeq,15min}$ (41 – 12 = 29). According to Table 5.14, this value does not exceed the LOAEL of 30 dBA. Therefore, as shown in Table 5.16, at this level no adverse impact would be likely at the receptor location. Therefore, no specific mitigation measures are required to be undertaken in response to the noise being generated.

5.3.54 In terms of considering the absolute level of noise internally during the day, the magnitude of impact has been determined according to the criteria set out in Table 5.17 below. These criteria are based on the guidance in BS 8223:2014 regarding desirable internal ambient noise levels. Above the level considered reasonable in the standard, an adverse impact is identified.

Table 5.17: Magnitude of impact based on internal rating level during the daytime

Internal Rating Level (LAeq,1 hour dB)	Magnitude of Impact	Effect Level
Equal to or below 35	No Adverse Impact Likely	Below LOAEL
36 - 39	Possible Adverse Impact	Adverse effects may start to occur for some people
40 - 44	Adverse Impact	Above LOAEL but below SOAEL
45 - 54	Significant Adverse	At or above SOAEL but below UAEL
55 & above	Unacceptable Adverse	At or above UAEL

5.3.55 For example, an initial assessment indicates that during the day, the external rating level is 54 dB $L_{Aeq,1hour}$ and it exceeds the background sound level by 12 dB. According to Table 5.15 this excess over the background sound level would be considered a significant adverse impact. However, when considering the context, in terms of the absolute level, the internal rating level is 42 dB $L_{Aeq,1hour}$ (54 – 12 = 42). According to Table 5.17, this value falls between the LOAEL and SOAEL and would equate to an adverse impact at the receptor location. In accordance with policy, at this level of impact reasonable steps should be taken to mitigate and reduce to a minimum the noise generated.

5.3.56 In terms of the absolute level of noise externally in amenity spaces during the day, the magnitude of impact has been determined according to the criteria set out in Table 5.18 below. These criteria are based on the guidance in BS 8223:2014

regarding desirable external noise levels in amenity spaces. Above the level considered reasonable in the standard, an adverse impact is identified.

Table 5.18: Magnitude of impact based on external rating level during the daytime

External Rating Level (LAeq,1 hour dB)	Magnitude of Impact	Effect Level
Equal to or below 50	No Adverse Impact Likely	Below LOAEL
51 – 54	Possible Adverse Impact	Adverse effects may start to occur for some people
55 – 64	Adverse Impact	Above LOAEL but below SOAEL
65 - 74	Significant Adverse	At or above SOAEL but below UAEL
75 & above	Unacceptable Adverse	At or above UAEL

5.3.57 For example, an initial assessment indicates during the day that the external rating level would be 45 dB $L_{Aeq,1hour}$ and exceeds the background sound level by 7dB. According to Table 5.15 this would equate to an adverse impact. But the absolute level of 45 dB is below the LOAEL described in Table 5.18. Based on the description in the PPG:N hierarchy table (Table 5.1 above); noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life (compared to the situation were the source not present).

Impact of Maximum Sound Levels

5.3.58 The World Health Organisation's Guidelines for Community Noise[22] have been used to consider the potential impact from any maximum short-term noise levels from operations at the Main Site during the night-time period.

5.3.59 The guidelines state that, for good sleep, indoor sound pressure levels should not exceed around 45 dB L_{AFmax} more than 10–15 times per night. This is equated to a level at the outside façade of 60 dB L_{AFmax} with a partially open window. It is generally accepted that this criterion is a LOAEL.

5.3.60 The Institute of Environmental Management and Assessment (IEMA) published their Guidelines for Environmental Noise Impact Assessment in 2014[23]. The document describes a process for undertaking such assessments. It notes that the extent of the effects of noise impact can rarely be determined solely by the difference between current and future noise levels, and that there are other factors to consider when determining potential effects. This principle will be followed in the assessment.

[22] Guidelines for Community Noise, WHO (1999)
[23] Guidelines for Environmental Noise Impact Assessment, IEMA (2014)

Operational sound from fixed mechanical plant and equipment

5.3.61 There is likely to be an element of fixed plant associated with the proposed development, such as plant used for the ventilation and cooling of the development buildings. Prior to the occupants of the buildings being known, information regarding the type, number or location of these units is not available.

5.3.62 Target noise rating levels for fixed plant noise levels well be set at the relevant receptor locations based upon the background noise levels measured during the baseline surveys and the other operational sounds arising from the site.

5.3.63 It is proposed that prior to installation, details of the mechanical plant will be submitted to the relevant planning authority for approval. As part of this process, sound from the proposed plant installations will be assessed following the principles of BS 4142:2014+A1:2019 in relation to the identified targets and, if required, mitigated to demonstrate compliance with Government and Local policy.

5.3.64 Items of plant will be selected and located to minimise operational sound at nearby receptors as far as reasonably practicable, with further options being available for standard mitigation including local screening, enclosures and in-duct attenuators.

Operational Railway Vibration

5.3.65 A proportionate and appropriate assessment can be carried out by evaluating the potential change in vibration from freight trains on the Chiltern Line at receptors within a longitudinal distance of 2300m along the track from the proposed connection between the mainline and the SRFI. An assessment will be made for any receptors within a lateral distance of 85m[24] from the track using the measurements from the baseline survey and factoring them in accordance with the increased number of freight trains.

5.3.66 Although the concepts regarding LOAEL and SOAEL in Government policy refer only to noise exposure, it is helpful to adopt the same principles when assessing vibration impact and effect. Table 5.19 sets out the railway vibration exposure thresholds together with the descriptors for the magnitude of impact. These have been derived from the guidance in BS 6472:2008[25].

[24] Derived from the U.S. Department of Transportation and the Federal Railroad Administration (Office of Railroad Development) (2005), High-Speed Ground Transportation Noise and Vibration Impact Assessment, Federal Railroad Administration and 242 U.S. Department of Transportation and the Federal Transport Administration (2006), Transit Noise and Vibration Impact Assessment Guidance Manual, Federal Transit Administration ,and as used on the HS2 phase 1, 2a and 2B ESs.
[25] British Standard 6472: 2008 Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting, BSi

Table 5.19: Thresholds of potential effects of railway vibration at residential buildings

Effect	Impact Description	Vibration Exposure	
		VDV Daytime ($m/s^{1.75}$)	VDV Night-time ($m/s^{1.75}$)
-	Negligible	< 0.2	< 0.1
LOAEL	Minor	0.2	0.1
-	Moderate	0.21 – 0.79	0.11 – 0.39
SOAEL	Major	0.8	0.4

Notes:
[a] *Usually determined in the centre of a normally loaded floor within the dwelling.*

5.3.67 The criteria presented above for determining the extent of the impacts and effects of noise and vibration inherently reflect the potential effects on human health and wellbeing and thus enable any adverse effects from the Proposed Development to be identified. Where threshold values are presented, these are generally based on residential dwellings and private amenity spaces to reflect the impact on human health. The greater the adverse effect at the receptor, the greater the potential impacts on human health and wellbeing.

Consultation

5.3.68 The Scoping Opinion provided by PINS on behalf of the Secretary of State indicated that some items should be included in the assessment over and above those which were described in the scoping report. These are set out in **Appendix 5.3** along with the comments raised by other consultees. Notes are also provided to indicate the action that has been taken in response to the comments.

5.3.69 The noise and vibration monitoring locations were agreed with Cherwell District Council (CDC) prior to the surveys being undertaken. The measurement parameters, duration and timing of the survey were also discussed and agreed.

5.3.70 Liaison also occurred with CDC regarding the assessment of operational noise from the main site and the application of BS 4142:2014+A1:2019 and CDC raised no objection about this approach.

Limitations and Assumptions

5.3.71 The following assumptions will be relevant to the noise and vibration assessment:

- The construction methods and equipment likely to be used will be estimated based on experience of other similar developments and information specific to this scheme. These assumptions are documented in the assessment.
- A number of assumptions have been made in terms of the types, locations and intensity of operational activities at the Main Site (both at the warehousing and the SRFI). These assumptions have been made in combination with the

rail consultant and traffic consultant and are documented within the assessment.

- With regard to noise from mechanical services plant associated with the warehousing, as the details of this plant will not be available at the time of assessment, target levels will be set according to the levels measured during the baseline noise surveys and the other operational sound from the site.
- The bunding around the proposed development will be considered as embedded mitigation and factored into the noise assessment.

5.3.72 The following limitations will apply to the assessment:

- It is impractical to predict the potential noise impact and effects from the various elements of the Proposed Development at every nearby noise-sensitive property. Instead, as is common practice, representative receptors will be carefully selected based on their location relative to the different sources of noise within the development, and their location with respect to other noise-sensitive properties nearby.
- It is also impractical to measure the existing noise and vibration environment at every receptor location therefore representative noise and vibration monitoring positions have been identified and agreed with CDC. Consequently, the results at a particular monitoring location have been used to represent the existing noise environment for a cluster of receptors which broadly experience the same exposure as the corresponding monitoring location.
- The baseline noise surveys were undertaken for a period of time considered suitable to determine the typical sound levels at the monitoring locations as it is not proportionate to monitor continuously at the identified locations.

5.4 BASELINE CONDITIONS

Current Baseline

Noise

5.4.1 To characterise and quantify the existing baseline sound environment around the proposed development a set of baseline sound surveys were undertaken between 24th June 2021 and 14th July 2021.

5.4.2 The surveys comprised 14 static monitoring locations left unattended for the duration of the monitoring and 8 locations where short-term attended measurements were undertaken. The locations were selected to be representative of existing noise sensitive receivers around the proposed development[26]. At all measurement

[26] As stated in paragraph 5.3.73, the monitoring locations were agreed with CDC.

positions the microphones were on the acoustic free field and at a height of 1.5 to 2.0m above local ground level.

5.4.3 A summary of the survey dates and observations of the main noise sources at each location are given in Table 5.20 for the unattended measurements and Table 5.21 for the attended measurements. The measurement locations are also illustrated in **Appendix 5.4**.

Table 5.20: Unattended survey locations, dates and main observations

Unattended Survey Location	Survey Dates		Observations of Main Noise Sources
	Start	End	
N1 Cross Roads Farm	06/07/21	14/07/21	Road traffic noise local and distant, birdsong, train pass-bys audible as well.
N2 Quarry Cottages	24/06/21	14/07/21	Distant low level road traffic, some local road traffic but less frequent, passing train audible.
N3 Castle Fields	24/06/21	14/07/21	Relatively quiet, birdsong, high altitude aircraft.
N4 The Old Post Office, Church Road	24/06/21	14/07/21	Road traffic from B430, M40 and also heard train pass-by which was audible.
N5 Upland Cottage	28/06/21	14/07/21	Road traffic noise from B430, M40 also audible.
N6 The Crossway	24/06/21	14/07/21	Road traffic noise from B430 frequent vehicles passing, high altitude aircraft.
N7 Grooms Cottage	24/06/21	14/07/21	Dominated by road traffic from local roads, in gaps in traffic you can hear M40 quite clearly.
N8 Ardley Kennels	24/06/21	14/07/21	Road traffic noise from M40, some local traffic from Ardley road but infrequent
N10 Near Copse Cottage	24/06/21	14/07/21	Road traffic noise from south and west, some birdsong
N11 Dewars Farm	24/06/21	14/07/21	Road traffic noise from B430, birdsong and light aircraft.
N12 Manor Farm	24/06/21	14/07/21	Distant road traffic noise from B430 and birdsong.
N13 75 Trenchard Close	24/06/21	14/07/21	Relatively quiet, birdsong, some distant construction
N14 Upper Heyford	24/06/21	14/07/21	Relatively quiet, birdsong distant aircraft and faint road traffic noise.
N15 Ashgrove Cottages	24/06/21	14/07/21	Road traffic noise from B430 and distant road traffic noise in the gaps.
Notes N1 Equipment suffered power failure and insect infestation 24/06/21 to 06/07/21 N5 No access to monitoring location until 28/06/21 N15 Power Failure and no data recorded between 04/07/21 and 06/07/21			

Table 5:21 Attended survey locations, dates and main observations

Attended Survey Location	Survey Dates		Observations of Main Noise Sources
	Date	Start/End time	
S1 Upper Heyford Dev	01/07/21	08:15 – 09:00	Dominated by distant road traffic noise from M40 and birdsong very quiet but some car pass-bys on the service yard.
	08/07/21	09:30 – 10:15	
S2 Ardley Woods	01/07/21	08:15 – 09:00	Main source is road traffic noise, area used frequently by dog walkers
	08/07/21	09:30 – 10:15	
S2a Quarry Cottages (south)	01/07/21	09:15 – 10:15	Local road traffic noise, wildlife.
S3 Ardley Playing Fields	01/07/2021	11:00-14:00	Dominated by road traffic noise from B430 and noise from people using playing field
S4 Baynards Green	01/07/2021	11:00-14:00	Road traffic noise from A43 and nearby junction, also contribution from M40 Motorway.
S5 Middleton Road	01/07/2021	11:00 – 14:00	Main source was M40 Motorway and local vehicle movements.
S6 Middleton Stoney Allotments	08/07/2021	13:00 – 16:00	Dominated by road traffic noise on Ardley Road (B430)
S7 Bicester Road Middleton Stoney	08/07/2021	13:00 – 16:00	Dominated by road traffic noise on Bicester Road (B4030)

5.4.4 At the time of the survey, there were still some restrictions on social contact in place relating to COVID. Schools were open, and most rules affecting outdoor contact had been removed. Indoor hospitality venues were reopened and travel outside the local area was permitted. Department for Transport statistics[27] indicated that road use was around 93% to 107% of pre pandemic levels although national rail traffic was only around 50% of pre-pandemic levels i.e. generating about 3 dB less rail noise than prior to the pandemic[28]. Nevertheless, it was agreed with the local authority that undertaking the survey during this period would be representative.

5.4.5 A field calibration check was undertaken prior to and following each set of survey measurements and no significant drift in calibration was identified for any measurement at any location. All the sound level meters (SLMs) and field calibrators used for the surveys were Class 1 approved. All SLMs were within 2 years of their last laboratory calibration, and all calibrators within 1 year. Details of the monitoring equipment used are given in **Appendix 5.5**.

[27] https://www.gov.uk/government/statistics/transport-use-during-the-coronavirus-covid-19-pandemic (last viewed 20th Sept 2021).
[28] One of the main purposes of the surveys around the Main Site was to determine the existing background sound levels as defined by L_{A90}. Because noise from railways is intermittent, the value of the L_{A90} is not affected by the rail traffic, but instead reflects the sound that exists between train pass-bys.

5.4.6 The results of the surveys are presented in **Appendix 5.6**. Time history graphs have been produced for the long-term unattended survey locations, and tables have been provided summarising the measured noise levels at the short-term attended locations.

5.4.7 A weather station was installed close to survey location N14 to record precipitation rate, wind speed and wind direction data from 10:00 hours on the 24th June 2021 until the end of the survey. However, the weather station did not provide information until 19:00 hours on 24th June 2021. For weather information prior to 19:00 hours on the 24th June 2021 publicly accessible weather data from the nearby weather stations (ICHIPP29[29] and IBICESTE12[30]) were used.

Noise - Important Areas

5.4.8 The NPSNN states that applicants should consider opportunities to address existing noise issues associated with Important Areas as identified by Defra. The following Important Areas have been identified in the vicinity of the proposed development:

- Properties adjacent to the M40 in the proximity of Foxfield Farm.
- Properties adjacent to the A43 in proximity to the junction with the B4100.

5.4.9 The locations of these Important Areas are shown in **Appendix 5.7**.

Characterisation of the background sound levels for the assessment of SRFI operational activities

5.4.10 As mentioned in the assessment methodology section, the assessment of potential impacts from the sound of operational activities at the SRFI is based on BS 4142:2014 which requires, as part of the process, determining the background sound level ($L_{A90,T}$).

5.4.11 BS 4142:2014 states that it is important to ensure that the background sound levels used in the assessment are reliable and represent the particular circumstances and periods of interest. The objective is to quantify what is typical during the periods when the noise sources would be operational, rather than ascertaining the lowest background sound level.

5.4.12 To characterise the baseline sound environment, the survey results and weather data were reviewed and any measured sound levels that were likely to have been contaminated by high wind speeds, precipitation, the dawn chorus and other such events were excluded.

[29] https://www.wunderground.com/dashboard/pws/ICHIPP29/graph/2021-06-29/2021-06-29/daily
[30] https://www.wunderground.com/dashboard/pws/IBICESTE12/graph/2021-06-25/2021-06-25/daily

5.4.13 Wind direction can have a significant effect on measured noise levels. This can be particularly apparent when the background noise levels are affected by a dominant, static steady source of noise, such as road traffic noise on the M40. The effect of the wind is greater as distance from the source increases. Noise levels will generally increase downwind of the source and decrease upwind of the source, although the effect is not symmetrical i.e. decreases due to upwind conditions are usually greater than increases caused by being downwind.

5.4.14 The effect of different wind directions will affect some noise indices used to describe the noise environment more than others. At locations which experience distant road traffic noise from the M40, the background level ($L_{A90,T}$), which is a measure indicating the constant, underlying level of noise, may vary significantly with wind direction. However, if there is local road traffic or railway noise at the same location, it is these sources that will usually dominate the ambient noise level ($L_{Aeq,T}$). Furthermore, as the local sources are typically closer to the receptors, the results will tend to show less variation with wind direction.

5.4.15 Because of the strong influence of the wind direction on the measured sound levels in the area around the proposed development, the results of the baseline survey have been split into two data sets based on the wind direction at the time of measurement, as follows:

- Broadly westerly winds (i.e. sound levels measured when the wind direction was from north northwest, north west, west northwest, west, west southwest, south west, south southwest and the south).
- Broadly easterly winds (i.e. sound levels measured when the wind direction was from north, north northeast, northeast, east northeast, east, east southeast, south east and south southeast.

5.4.16 As all the monitoring positions are located west of the M40 motorway, broadly easterly winds (i.e. blowing from the east) will result in higher background sound levels due to the motorway noise, while broadly westerly winds (i.e. blowing from the west) will cause generally lower background sound levels from the motorway noise.

5.4.17 After filtering the measurement data according to wind direction, the frequency of occurrence of the measured background sound levels (rounded to the nearest integer) was examined. The modal value, i.e. the most frequently occurring value, was identified for both the day and night-time periods for each monitoring location. Generally, the modal value is a good indicator of the typical background sound level when there is broadly a normal statistical distribution within these periods.

5.4.18 However, in some situations, the background sound level is not evenly spread about the modal value i.e. the distribution is not statistically normal and there can be quite a few occasions when a lower value occurs.

5.4.19 To explore whether this feature existed, the following process was adopted. For the measurements made at each monitoring location, the value of the result was identified for which 75% of the all the measured values were higher. This value is known as the lower quartile and was determined for both the day and night-time periods. When the lower quartile value was more than 2 dB(A) below the modal value, this was considered to be an indication that there was unevenness in the distribution of the background sound level. In those cases, the lower quartile value was used as a sensitivity test in the operational sound assessment, in addition to the modal value. This means that a robust approach to the consideration of typical background sound levels in the assessment has been followed.

5.4.20 Based on this analysis, the indicative background sound levels ($L_{A90,15min}$) for each monitoring position have been identified for the daytime (07.00 – 23.00) and night-time (23:00 – 07:00) periods for both westerly and easterly winds. These values are presented in **Appendix 5.8**. The appendix also identifies the representative monitoring position for each receptor location along with any required correction to relate the levels from the monitoring location to the relevant receptor location.

Baseline Vibration Survey

5.4.21 As previously discussed, receptors close to the Chiltern Line, on which freight trains serving the SRFI will be travelling, are already exposed to frequent passenger train passes. At the time of writing, it is understood that there is no regular pattern of freight train activity on this section of the line. However, there are some freight trains which use the line associated with High Speed 2 construction works and movements to and from the military deport at Bicester. This use is understood to be sporadic, often scheduled at short notice and currently only amounts to 1 to 2 trains per week. At the closest receptors to the line, ground borne vibration resulting from the train passes may be experienced.

5.4.22 To characterise and quantify the existing levels of vibration resulting passenger trains using the line, Vibration Dose Value (VDV) measurements of passenger train passes were undertaken at two of the closest receptors. These are shown as locations V1 and V2 on the monitoring location plan in **Appendix 5.3**. Due to the sporadic nature of the freight train activity, it was not possible to capture any vibration measurements of freight train movements during the baseline vibration survey.

5.4.23 Vibration measurements were carried out following the principles of BS 6472-1:2008. A triaxial accelerometer was attached to a mounting plate conforming to the German standard DIN 45669-2:2005-06. At V1 the mounting plate was placed in the middle of a concrete slab used for vehicular access to the disused farm buildings. At V2 it was placed on a slab near the driveway. Both positions were considered representative of the floor vibration experienced inside the properties.

5.4.24 Location V1 was approximately 110m to the south-west of the railway, and so closer to the northbound line and location V2 was approximately 180m north of the railway, closer to the southbound line.

5.4.25 At each location, a measurement was started as a train approached the monitoring site and stopped after it had moved away. The results indicated that there was no clear dominant axis for vibration. Therefore, the results for all three axes are presented.

5.4.26 The number and type of measured train passes together with the maximum VDV and the associated peak frequency of the vibration are summarised in Table 5.22 for northbound train passes and Table 5.23 for southbound train passes.

Table 5.22: Summary of Measured VDV levels for northbound train passes

Survey Location	X Axis (Horizontal)		Y Axis (Horizontal)		Z Axis (Vertical)	
	VDV_d[31] ($m/s^{1.75}$)	Frequency (Hz)	VDV_d ($m/s^{1.75}$)	Frequency (Hz)	VDV_b ($m/s^{1.75}$)	Frequency (Hz)
V1	0.002	6.3	0.002	6.7	0.002	6.2
	0.002	5.9	0.001	6.7	0.002	6.8
	0.002	6.2	0.002	8.2	0.002	19.1
V2	0.002	5.6	0.001	4.8	0.001	4.8
	0.002	4.5	0.002	4.6	0.001	4.7
	0.0004	6.6	0.001	9.0	0.0003	4.6

Table 5.23: Summary of Measured VDV levels for southbound train passes

Survey Location	X Axis (Horizontal)		Y Axis (Horizontal)		Z Axis (Vertical)	
	VDV_d ($m/s^{1.75}$)	Frequency (Hz)	VDV_d ($m/s^{1.75}$)	Frequency (Hz)	VDV_b ($m/s^{1.75}$)	Frequency (Hz)
V1	0.002	7.9	0.002	7.9	0.002	7.7
	0.002	7.8	0.002	7.6	0.002	8.7
	0.003	5.3	0.002	6.6	0.003	8.8
V2	0.001	5.4	0.001	6.3	0.000	5.1
	0.005	4.1	0.006	4.0	0.001	4.7
	0.0005	4.9	0.0004	5.2	0.0004	4.8

5.4.27 The observation of the surveyors was that vibration from the trains was not perceptible at the measurement locations. The low levels of recorded vibration reinforce this observation.

[31] For the instrumentation used the lower measurement limit is around the values shown in Table 5.22 and Table 5.23, therefore it is possible that the actual VDV impact at the measurement locations is lower.

Future Baseline

5.4.28 In the absence of the Proposed Development, the future noise and vibration environment is likely to continue to be governed by changes in the current dominant sources of noise and vibration at the sensitive receptors i.e. road and rail traffic.

5.4.29 The change in the baseline road traffic conditions has been determined through a review of road traffic forecasts for the future baseline assessment years and the inclusion of the relevant contribution from other committed developments.

5.4.30 With regard to rail traffic, the likely future changes in rail traffic will, where appropriate, be taken into account in the future baseline assessment year forecasts in terms of both noise and vibration.

5.5 EMBEDDED MITIGATON

5.5.1 The design of the Main Site has been developed through an iterative process which has sought to maximise the noise mitigation provided by the inherent design of the scheme. This has included:

- Maximising the height of the mitigation provided between the rail terminal and the village of Ardley as much as is practicable within the constraints of engineering solutions. It is proposed that this will comprise of an engineered earth bund with an acoustic barrier on top;
- Setting the rail terminal at a plateau that is as low as practicable within the site; and
- The mitigation provided by the bunding around the boundary of the site which offers as much as a 10m high bund against the existing surrounding ground levels (and are higher – up to around 15m-16m - compared to the proposed development plateau levels).

5.5.2 Consideration has also been given to the noise generating equipment employed at the site. Embedded mitigation within the scheme includes:

- Use of Eco reach stackers which have recently been developed and offered to the market which have 5 dB lower noise emissions than traditional reach stackers.
- Limiting the height of the noise making components of the gantry cranes to 18m (compared with some cranes which are at 24m) to assist in minimising the noise propagation to nearby noise sensitive receptors.

5.6 ANTICIPATED LIKELY EFFECTS

5.6.1 A full assessment of the noise impacts likely to result from the scheme has not yet been completed. However, based on the work carried out to date and from experience of assessing similar sites elsewhere, an outline has been provided below of the potential likely impacts where possible.

Construction Phase Effects

5.6.2 At the time of writing, no predictions or assessment work has been undertaken regarding the potential effects during the construction phase of the development.

5.6.3 The management of noise from construction of the proposed development will take account of the guidance in BS 5228 parts 1 and 2 and employ of Best Practicable Means (BPM). BPM requires that all reasonable steps are taken to mitigate and minimise the noise generated taking account of the cost of any measure and the benefit achieved. Noise management measures relating to the construction process will be addressed through a Construction Environmental Management Plan (CEMP) which will secure a range of mitigation and best practice measures to minimise a range of potential adverse environmental effects during the construction process.

Operational Phase Effects

Operational Road Traffic

5.6.4 Work is currently ongoing to determine the potential noise impacts of the Highway Works and determine what mitigation measures will be required to mitigate and minimise any adverse effects arising from these works.

5.6.5 The stopping up of the B430 is anticipated to provide a substantial reduction in the amount of traffic in Ardley by removing all vehicular through-traffic, noticeably reducing the traffic noise and having a beneficial impact at several receptors located in proximity to this section of the B430.

5.6.6 The Proposed Development would result in additional traffic travelling to and from the Main Site with the main route to the site being via the proposed Ardley Bypass. While the new Bypass would introduce an additional source of road traffic noise between the B430 and the M40, the potentially affected properties on the eastern side of Ardley are already exposed to some extent to existing road traffic noise. Furthermore, from the initial work undertaken to date it is anticipated that the increase in traffic noise on the facades exposed to the proposed bypass would be negligible at the majority of receptors.

5.6.7 However, it is anticipated that there could be an adverse or potentially significant adverse effect at small number of receptors in close proximity to the proposed

bypass. If this is the case, in line with government policy, measures would be proposed to mitigate and minimise these impacts such that any significant adverse effects would where practicable be avoided, and any adverse effects mitigated and reduced to a minimum. The final design of the bypass itself is expected to include mitigation where required, such as bunding and/or fencing to reduce noise and other effects. The noise assessment will provide the evidence base to inform consideration of further or additional mitigation if necessary. Nonetheless, it is possible that there could still be some residual adverse effects after the mitigation measures have been implemented, and these will be considered as part of the final noise assessment.

Operational Railway Noise

5.6.8 From the initial work undertaken, it is anticipated that there would not be any significant adverse effects at any receptors as a result of the freight trains serving the SRFI travelling along the Chiltern Line.

5.6.9 There would however be some receptors where there is likely to be an adverse impact because of the freight trains travelling along the line to serve the Proposed Development. Where practicable, reasonable steps would be taken to mitigate and minimise the noise impacts at these locations.

Operational Noise from Main Site

5.6.10 Work is still currently ongoing to determine the potential impacts of operational noise from the Main Site and incorporate mitigation measures to assist in minimising the impact of any potential adverse effects on the receptors.

5.6.11 The following paragraphs provide an initial indication of the likely impact based on the assessment work to date.

5.6.12 As discussed above there are three scenarios that are considered with regard to the operational noise impact arising from activities at the main site:

- Night-time impacts – inside bedrooms.
- Daytime impacts - inside habitable rooms.
- Daytime impacts - in external amenity spaces.

5.6.13 Once context has been taken into account it is anticipated that during the peak 15 minutes of activity at night, inside bedrooms there would be no adverse impact likely at the majority of receptors. Based on work undertaken to date, possible adverse impacts are likely at 4 receptors (R00, R06, R15 and R27). A potential significant adverse effect is also identified at one receptor (R28), albeit one which is not currently in residential use. As required by policy, consideration will be given to what further reasonable steps can be taken to mitigate and minimise the adverse effects. These

would include embedded mitigation in the scheme design as well as targeted measures where these are practicable.

5.6.14 With regard to daytime impacts inside the habitable rooms of dwellings, once context has been taken into account, no adverse impact is likely at the majority of receptors and there are not anticipated to be any significant adverse effects. At one receptor (R28) a possible adverse impact is predicted although this receptor is not currently in residential use. In line with policy, reasonable steps will be taken to mitigate and minimise any such impacts.

5.6.15 With regard to the daytime impacts in external amenity spaces, the initial assessment work indicates that at the majority of receptors the external rating level is predicted to be below the background sound level. According to the relevant standard this is below a low impact and no adverse effect is expected. At around 13 receptors there are anticipated to be exceedances of the background sound levels. These exceedances are generally between 5 to 10 dB and at one receptor (R6) it is 11dB. However, at all of these receptors, bar one (R28), the absolute levels are below the threshold where an adverse impact is likely. That means that although noise from the site may be audible from time to time, it would not be at a level which would interfere with the use of the external amenity area such as disrupting normal conversation outside. According to the guidance in Government policy, this impact would be expected to mean that the acoustic character of area may be slightly affected but not such there is a change in quality of life.

Operational Railway Vibration

5.6.16 An assessment of operational railway vibration has not yet been undertaken.

Cumulative Effects

5.6.17 The noise assessment will consider and describe any likely, relevant cumulative effects of the Proposed Development with other committed developments.

5.6.18 Cumulative noise impacts may occur when concurrent construction activities are undertaken at adjacent sites. Furthermore, there may also be cumulative effects if some of the site becomes operational before construction of the remainder of the site has been completed.

5.6.19 With regard to cumulative increases in road traffic, the traffic data provided will take account of all cumulative schemes in the vicinity of the proposed development (which will be agreed with the relevant Highways bodies). Therefore, the cumulative traffic effects on noise will inherently be assessed.

Climate Change

5.6.20 There are not anticipated to be any particular direct links between climate change and noise.

5.6.21 Climate change is generally associated with more variable weather conditions which could have an effect on the noise assessment. The dominant wind direction in England is south westerly, however, there can be prolonged periods of easterly winds associated with areas of high pressure and, in winter, colder weather. Both wind directions were captured during the baseline noise surveys and the assessment of operational noise effects from the Main Site have been considered under both wind directions.

5.6.22 Climate change also has the potential to intensify heat in the summer. Therefore potentially noise sensitive receptors could have their windows open for longer durations than at present. However, the operational assessment considers the internal noise levels through a partially open window which would be the worst case scenario.

5.7 FURTHER WORK

5.7.1 The following tasks are being undertaken in relation to the noise and vibration assessment:

- Final identification of all relevant sensitive receptor locations for each assessment
- Liaison with the ecologist to take into account ecological receptors to feed into their assessment
- Review of any scoping and consultation responses and actions which may subsequently arise
- Continued development of the acoustic model for the Main Site and the proposed bypass, link road and other highway works.
- Undertake the construction noise predictions and assessment.
- Consideration of the potential impacts of construction vibration, if required.
- Prediction and assessment of road traffic and railway noise impacts associated with the Proposed Development (including use of data to be received from the Transport consultant from the ongoing Transport Assessment).
- Operational noise predictions associated with the Main Site
- Identification of target levels for fixed plant associated with the Main Site.
- Prediction and assessment of operational vibration likely to arise from the freight trains travelling on the Chiltern Line.
- Assessment of the significance of likely noise and vibration impacts

- Investigation of any additional mitigation measures which may be practicable and what benefit they would provide.
- Determination of residual effects.
- Where appropriate, proposals for noise and vibration monitoring during the construction and operational phases of the development.