Tritax Symmetry (Hinckley) Limited

HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

The Hinckley National Rail Freight Interchange Development Consent Order

Project reference TR050007

Environmental Statement
Volume 1: Main Statement

Chapter 10: Noise and vibration

Document reference: 6.1.10

Revision: 07

November 2022

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 Regulation 14

Chapter 10 ◆ Noise and vibration

INTRODUCTION

10.1. This Chapter assesses the likely significant effects of the Proposed Development in respect of noise and vibration. It considers the potential effects of noise and vibration impacts associated with the construction, including construction traffic, and operation of the Proposed Development. This Chapter describes the methods used to assess the impacts, the baseline conditions currently existing at the site and surroundings, the potential direct and indirect impacts of the development arising from noise and vibration, the mitigation measures required to prevent, reduce, or offset the impacts and the residual impacts. It has been written by BWB Consulting Ltd. All contributors to the Chapter hold relevant acoustic qualifications, are experienced in the assessment of environmental noise and vibration and are Members of the Institute of Acoustics (IOA).

10.2. Whilst every effort has been made to ensure that this Chapter is easy to understand, it is necessarily technical in nature. Therefore, to assist the reader, a glossary of terminology is included in Appendix 6.2.10.1.

10.3. A full description of relevant policy, standards and guidance is provided in Appendix 6.2.10.2.

METHODOLOGY AND DATA SOURCES

Scoping opinion

10.4. Consultation has been undertaken in the form of the project's Scoping Report which was issued to statutory consultees in 2020. The scoping opinion has been received and the response in relation to noise and vibration is detailed below in Tables 10.1 and 10.2.

Table 10.1: EIA scoping and commentary

ID	Ref	Point	Comments	Response
4.4.1	9.36	Road Links – Vibration during operation	The Scoping Report proposes to scope out operational vibration impacts for the proposed new roads. Considering that a resurfaced road surface / new road will be free of irregularities as part of project design and under general maintenance, the	This is agreed, no further action is required.

ID	Ref	Point	Comments	Response
			Inspectorate agrees that an assessment of operational vibration can be scoped out on this basis.	
4.4.2	9.16	Baseline	The Scoping Report appears to describe the baseline in relation to the main interchange site only. The ES must describe the baseline environment surrounding all relevant proposed works (including the bypass and works to the M69 Junction 3 /M1 Junction 21).	A review has been undertaken of the off-site road links. This indicates that for most of the junctions, there is unlikely to be an impact from a noise perspective. Potential impacts have been identified associated with the proposed A47 Link Road and the baseline has been characterized in this area. Further detail is provided in Paragraph 10.221 to 10.234.
4.4.3	9.24	Construction phase road traffic noise	The Scoping Report does not clearly state whether the ES will assess road traffic noise during construction. The ES should assess impacts associated with road traffic noise where significant effects are likely to occur.	A construction phase road traffic assessment has been undertaken as part of the ES.
4.4.4	9.25	Operational phase rail movements	The Scoping Report states that the ES will assess rail noise from rail movements within the site. Should an increase in rail movements off site lead to significant noise and vibration effects these should also be assessed.	Noise from rail movements within the site has been included within the operational assessment. Noise from additional rail movements off-site has also been assessed, which indicates that noise from

ID	Ref	Point	Comments	Response
				this source is not significant.
4.4.5	9.25	Operational phase vibration from service yard activity	The Scoping Report states that the ES will assess noise arising from operational service yard activities. The potential for vibration during operation has not been addressed. The ES should assess impacts associated with operational vibration where significant effects are likely to occur.	Service yard activities are likely to include vehicle movements, storage, loading/unloading of vehicles including HGVS, all of which are unlikely to cause significant levels of vibration. However, the nearest sensitive receptor is located at least 90m away from the proposed sidings. Therefore, vibration from operational service yard activities is unlikely to be significant and does not warrant consideration within the assessment. It is considered that the additional movements associated with the rail freight interchange are unlikely to result in a significant change in the level of vibration currently experienced at nearby sensitive receptors. The proposed rail lines associated with the interchange are likely to be at a greater distance than the existing rail line and given the stage of the application, the detail required to undertake an assessment of vibration impacts is unlikely to be available. It is therefore considered that

ID	Ref	Point	Comments	Response
				operational vibration associated with the proposed rail interchange is unlikely to be significant and does not warrant consideration at this stage. This is addressed further in paragraphs 10.205 to 10.208.
4.4.6	9.30	Tranquility assessment	The Scoping Report states that "where required, a tranquility assessment will be undertaken". It is not explained under which circumstances this will be undertaken or what the scope of such an assessment would be. The ES should consider the impact on the tranquility in open spaces across the lifetime of the scheme, where significant effects are likely to occur. The Scoping Report states that a suitable approach will be derived and agreed with the relevant consultees and stakeholders. This should be explained in the ES and it should be clear how stakeholder engagement has informed the assessment.	A tranquillity assessment has been included within the following assessment and is detailed in paragraphs 10.239 to 10.249. Although various approaches have been put forward in the past to determine the impact of a development on tranquillity, there is no industry standard approach. Therefore, a methodology has been adopted drawing on multiple sources such as local open space policies, BS 8233:2014, WHO Guidelines (1999), CPRE Tranquillity Map for England, and other web-based tranquillity tools.

Table 10.2: Scoping opinion consultee commentary and advice

Consultee	Comments	Response
Blaby District Council (BDC)	The methodology and choice of noise receptors should be agreed with the Environmental Health Department of	Further consultation has been undertaken and the methodology and noise sensitive receptors

Consultee	Comments	Response
	BDC	have been agreed with BDC.
	Noise impacts on people should be specifically addressed and particularly any noise disturbance at night and other unsocial hours such as weekends and public holidays	Weekend periods have been considered within the following assessment, along with noise impacts during the night-time. It is considered that a weekend period will be similar to a public holiday. Baseline monitoring has been undertaken to cover a weekday and weekend period and operational noise associated with the Proposed Development has been assessed against each period. It has been assumed that the weekend operations will be the same as those on a weekday.
	Regarding noise, several residential properties to the west of Elmesthorpe are known to be exposed to road traffic noise from the A47 and its junctions. The Environmental Statement (ES) should include these properties in its assessment of both the construction and operational phases.	The assessment has included receptors located along Billington Road East and Bridle Path Road, which are located closer to the Main HNRFI Site and proposed A47 Link Road, than those properties located within Elmesthorpe. Therefore, it is considered that any impact from the construction and operational phases is likely to be less at properties in Elmesthorpe, than at those receptors identified within the assessment. Therefore, receptors located further away than Billington Road have not been included within the following assessment. Any re-routing of traffic as a result of the Proposed Development is captured within the traffic data and has been

Consultee	Comments	Response
		assessed in line with the pertinent guidance.
	The ES should consider the effects of construction and operational phases of the proposed development for both night and day. It should state how noise generated by each element of the proposed development has been evaluated. Any assumptions underlying the evaluation of potential impacts should be stated. Noise contour maps would be welcomed to report the assessment of noise generation.	The assessment has considered noise from the construction phase of the Main HNRFI Site during the daytime. Motorway works, particularly those concerning Junction 2 of the M69 will likely be undertaken during the night-time. However, this will be agreed with National Highways, BDC and HBBC under the Control of Pollution Act[1] and will likely be subject to their noise and vibration requirements to ensure appropriate control measures are put in place.
	Consideration should be given to monitoring noise complaints during construction and when the development is operational.	Any noise complaints received during the construction phase would be managed in line with the CEMP. Consideration will be given to operational noise monitoring which can be defined once the nature of any complaints are known.
Sharnford Parish Council	Houses in Sharnford are less than 1.0 metre from the B4114 with cracks in walls and excessive noise.	The potential effect of additional road traffic associated with the proposed development has been assessed, and mitigation has been recommended where adverse impacts are identified.
	Operational Phase – Rail Freight Interchange – although many British	The noise and vibration assessment has considered the

[1] Control of Pollution Act 1974 Section 60

Consultee	Comments	Response
Stoney Stanton	Standards are quoted, this section does not make any specific mention of the fact that 24-hour, 7 day per week operation is expected, whereas now no such operations take place. The ES should specifically consider noise generated at nighttime which is likely to have an impact over a larger area than daytime noise.	proposed operations over 24 hours a day, 7 days a week.
	Section 9.16 – states "dominant source of noise is likely to be from road traffic on the M69 to the south and east and existing rail movements on the railway line to the northwest". This should be refined as assessment at the DIRFT facility locally it is clear that the shunting of trains and loading and unloading of containers can easily be heard above the sound of the M1 and A5. This statement should be reassessed.	This refers to existing baseline conditions. i.e., prior to development. Noise associated with the Proposed Development has been assessed against the existing baseline noise climate to determine any potential impacts.
	Section 9.23 states that a baseline noise assessment will be conducted but not how this will be done and what assessment criteria will be used for the locations.	This is detailed within the technical note NTT2814 – Hinckley Survey Method Statement_Issue_P02, which has been submitted to and agreed with BDC and Hinckley and Bosworth Borough Council. This document can be found in Appendix 6.2.10.5. Further detail is also provided within the Baseline Conditions section.
	Section 9.33 references short term but fails to clarify that with a meaningful statement. This needs to state the use and definition of short term in respect to this comment. It also states "….	This is addressed within this Chapter. The CEMP details the control measures in place and must be

Consultee	Comments	Response
	controlled through a suitably worded CEMP", this should read the 'execution of a suitable CEMP' as it implies in its current form that a document is all that is required to mitigate issues.	followed during the construction phase.
	Section 9.36 refers to the scoped-out vibration analysis of the road and how this will be detrimental and could be assessed as an adverse effect. Given that there are new proposed roads to be built the makeup of the ground should be sampled and the determination of makeup used to ensure this section is scoped in. Furthermore, the re-surfacing of existing roads, whilst welcome will only assess the road in an as new condition and not the likely condition for the life span of the road, there for an as new assessment of the road should be replaced with a typical condition of road. Finally, where an existing road is re-surfaced but the type and volume of traffic changes as a result of any part of this assessment change the vibrations from the road then this should be factored in. Given how close to people's home, and villages that this will be this section should be scoped in with the required works completed.	It has been agreed within the scoping opinion provided by The Planning Inspectorate (PINS) that vibration from road traffic does not need to be considered within the noise and vibration assessment. The scoping report states the following; '*The Scoping Report proposes to scope out operational vibration impacts for the proposed new roads. Considering that a resurfaced road surface / new road will be free of irregularities as part of project design and under general maintenance, the Inspectorate agrees that an assessment of operational vibration can be scoped out on this basis'*.
Burbage Parish Council	It is possible that soil conditions require the use of high noise techniques such as pile driving. The ES should specifically consider the impact of construction noise and mitigation to ensure no long-term impact on local wildlife occurring whilst the site is under construction.	The assessment has considered the construction methods to be undertaken. Liaison with the project's ecologists has confirmed that noise from the construction phase does not need to be considered at ecological receptors. Please see Chapter 12: *Ecology*.

Consultee	Comments	Response
	It is likely that there will be considerable noise generated by operations at the site, including but not limited to steady beeping of reversing vehicles.	This noise assessment considers the potential operational noise impact as a result of the Proposed Development and recommends mitigation where required.
	Consideration should be given to the stability of the ground for large structures and if this is leading to pile driving activity which can cause extreme noise concerns. The ES should include the results of a full study all such noise pollution (during construction and operation), which should specifically include the impact upon: • Immediate residents of the proposed development, • Members of the public enjoying the amenity space of Burbage Common, woods and surrounding areas, • All wildlife in the woods and common, • The new crematorium being built near Leicester Road, Hinckley, Consider the impact of the above on nighttime operations.	The construction phase assessment has accounted for piling activities. Further details can be found in paragraphs 10.131 to 10.135 and associated tables. The noise assessment has considered the potential noise impact as a result of the Proposed Development, on the identified receptors, which have been agreed with Blaby District Council and Hinckley and Bosworth Borough Council. Liaison with the project's ecologist has confirmed that noise from the construction and operational phase does not need to be considered at ecological receptors. The new crematorium has been included as a receptor, however given that there are receptors located much closer to the Proposed Development, any impact is likely to be less at the crematorium, than at those receptors identified within the assessment. Night-time operations have been considered within the assessment.

Consultee	Comments	Response
Elmesthorpe Parish Council	The applicant states that the study area will be defined and agreed with the Local Authority and relevant stakeholders, however there is no definition of 'relevant stakeholders'. This is a cause of concern as the Applicant previously suggested a study area which the Parish Council considered to be inappropriate. The ES should include an assessment of all areas that are likely to be affected.	The receptors to be included within the assessment have been agreed with Blaby District Council and Hinckley and Bosworth Borough Council, which cover the area of Elmesthorpe. The study area will include all areas which are likely to be affected by the proposals.
National Highways (NH)	Adverse change to noise and air quality should be particularly considered, including in relation to compliance with the European air quality limit values and/or in any local authority designated Air Quality Management Areas (AQMAs).	The potential noise effect of additional road traffic associated with the Proposed Development has been assessed. The air quality issues are addressed in Chapter 9: Air Quality.
Public Health England	As the application is for a road-rail interchange development, we have included guidance on the effects of noise on public health and wellbeing in Appendix 2. Our guidance pertaining to noise is informed by the recommendations in the 2018 Environmental Noise Guidelines for the European Union published by the World Health Organisation (WHO) and high-quality systematic reviews of scientific evidence.	The assessment has considered Appendix 2. The 2018 Environmental Noise Guidelines for the European Union are largely concordant with 1999 Guidelines for Community Noise. The 2018 guidelines state in section 2.6 '*The current environmental noise guidelines for the European Region supersede the CNG from 1999. Nevertheless, the GDG recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid*.' The criteria to be achieved internally is similar. The criteria

Consultee	Comments	Response
		for external spaces is reported as a L_{den}, which is not widely used in the United Kingdom. Therefore, in the absence of any other relevant criteria, the following assessment has adopted the metrics within BS 8233.

10.5. In addition to the above, consultation has also been undertaken with the Environmental Health Department at Blaby District Council (BDC) and Hinckley and Bosworth Borough Council (HBBC) to agree the proposed noise and vibration assessment methodology. Table 10.3 provides a summary of the consultation undertaken.

Table 10.3: Consultation with Blaby District Council (BDC) and Hinckley and Bosworth Borough Council (HBBC)

Consultee	Date	Comments	Actions
Blaby District Council	12th February 2021	As you may be aware, I was satisfied with the methodology that was proposed in 2018. I advised that that there are several different land holdings/caravan sites in the Aston Firs area. You may wish to consider any implications for your impact assessment.	The caravan and mobile homes sites, have been included as sensitive receptors within the assessment.
	5th March 2021	I am generally satisfied with your stated methodology, including proposed method of allowing for the impact of Covid-19 restrictions. I note your proposals with regards to a tranquillity assessment and would be happy to discuss these by phone. However, I cannot see any issues with them.	The comments indicate that there are no issues with the proposed approach., following the submission of the PEIR document, specific comments relating to the tranquillity assessment were provided by BDC

Consultee	Date	Comments	Actions
		BDC does not have specific criteria to be achieved with regards to BS 4142. Please find attached a planning guidance document that we regularly send to applicants with respect to noise requirements. In addition, the receptors that you have identified appear to be reasonable, and the monitoring locations likely to be representative of them. In terms of local roads, in order to answer your query as to whether there are any additional roads that I would wish to be included in the assessment, it would be useful if you could provide a plan showing the roads currently proposed to be included. I look forward to hearing from you regarding the local roads. Perhaps you could suggest some dates and times that are suitable to you for discussing the tranquillity assessment.	which are detailed in Appendix 6.2.10.3. Consideration has been given to the planning guidance document. Following submission of the PEIR document, Blaby District Council did not provide further commentary on the roads included within the assessment and therefore it is assumed that the methodology is acceptable.

Consultee	Date	Comments	Actions
Hinckley and Bosworth Borough Council	26th March 2021	A concern was raised regarding the receptor on the junction of Sapcote Road and Smithy Lane. A concern was also raised regarding the receptor at Houston Lodge	It was agreed that these receptors were to be scoped out of the assessment, and the following was received: *'The methodology appears fine.* *Houston Lodge is on Burbage Common Road. The assessment at Basset Cottage and Bridge Farm should address any issues there*'.

Section 42 Consultation

10.6. Public consultation was undertaken with the public for a period of 12 weeks from the 12th January 2022 to 8th April 2022. Comments were received from a number of consultees which mainly focused on an increase in noise during the construction and operational phases. Concerns regarding the operational phase relate to an increase is road and rail use, sleep disturbance and loss of tranquillity.

10.7. As part of this process, both BDC and HBBC provided comments. It was agreed, following a meeting with each council, that a formal written response would be provided, and these are provided in Appendices 10.3 and 10.4.

Section 47 Consultation

10.8. On the theme of noise, Section 47 consultation responses related to the increase in noise during the operational phase including road and rail use, night-time disturbance and the loss of tranquillity, the amount of noise mitigation proposed and the level of noise and vibration during the construction phase.

10.9. The consultation responses have been addressed through this Chapter, which details the baseline noise and vibration climate at the site and has been used as a basis for the assessment. The assessment has been undertaken considering the potential impact of noise and vibration at sensitive receptors during the construction and operational phase of the Proposed Development, and mitigation has been recommended where appropriate.

Definition of the study area

10.10. The study area includes receptors that are adjacent to the Proposed Development, including the proposed A47 Link Road, and varies for the source under consideration. Noise from both the construction and operational phases has been considered at these receptors.

10.11. For the construction and rail freight interchange operations, which are localised to within the Main Order Limits, the closest receptors up to 500m, have been included within the study area. As noise and vibration levels reduce with distance, it is considered that receptors located at a greater distance from the Proposed Development will experience a lower impact.

10.12. For off-site rail movements, an initial assessment was undertaken for a notional receptor, 25m from the line, in accordance with Calculation of Railway Noise (1995)[2]. Where this initial assessment identifies an effect of moderate adverse and above, then the study area would be extended to include Stoney Stanton to the northeast and the outskirts of Hinckley to the southwest. This would represent a study area of 2.2km.

10.13. The Study Area for the assessment of development generated road traffic noise includes the following areas:

- the area within 600m of new road links or road links physically changed or bypassed by the project;
- the area within 50m of other road links with potential to experience a short term BNL change of more than 1.0 dB(A) as a result of the project.

10.14. These study areas are consistent with the guidance contained in DMRB LA 111[3].

10.15. In addition to the above, the extent of Burbage Common has been included within the study area. This is in response to comments made during consultation (See Appendix 6.2.10.3).

10.16. The Government, through consultation with Defra and local authorities, has prioritised areas where people are most exposed to noise and are at greatest risk of experiencing significant adverse impact to health and quality of life as a result of their exposure to noise. These identified areas are termed 'Noise Important Areas' (NIAs). A review of the current round of noise mapping via online resources[4] indicates that there are no NIAs located in the development generated road traffic study area.

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[2] *Department for Transport (1995), Calculation of Railway Noise.*

[3] *Highways England (2020), Design Manual for Roads and Bridges (DMRB) LA 111 Noise and Vibration Revision 2*

[4] *Extrium England Noise and Air Quality Viewer. Available at h* [redacted] *(Accessed: 22 August 2022).*

Scope

10.17. The assessment includes the following scope of works:

- the effect of noise and vibration resulting from the construction phase of the Proposed Development, including on-site activities on existing noise and vibration sensitive receptors;
- the effect of noise resulting from the operational phase of the freight interchange, including proposed rail movements, heavy goods vehicle (HGV) movements, including refrigerated movements, loading/unloading operations, fixed, mobile plant and break-out noise, and off-site road traffic impacts associated with the Proposed Development, including re-routing of traffic and development generated road traffic;
- the effect of noise and vibration resulting from proposed off-site rail movements;
- the effect of operational noise on local tranquillity; and,
- the effect of noise as a result of the proposed A47 Link Road.

Construction noise

10.18. The construction works are likely to be divided into several ground preparation and construction phases, including:

- Demolition, excavation and substructure works (including piling in some areas, although the need for this and locations are not yet known);
- rail works;
- plateau and bund formation;
- drainage works;
- superstructure and building envelopes;
- fitting out; and
- hard landscaping/highways infrastructure.

10.19. At the planning stage, before the appointment of a contractor, details on the construction activities, detailed programme or number and type of construction plant are not fixed. Nevertheless, an indicative quantitative and qualitative construction noise assessment at local Sensitive Receptors (SRs) was undertaken, taking account of the guidance in BS 5228-1 Code of practice for noise and vibration control on construction and open sites part

1:Noise[5], based on worst-case and average case scenarios and best practice mitigation measures.

10.20. The assessment of potential construction noise thresholds at residential properties was undertaken with reference to 'example method 1 – the ABC method' as defined in BS 5228-1. Table 10.4 provides guidance in terms of appropriate threshold values for existing residential receptors, based upon predicted noise levels. This method was chosen as it references the measured noise levels at the receptors and predicts the likely impact based on the existing noise at a given receptor.

10.21. Based upon the BS 5228 ABC method, the criterion which will be adopted in this assessment for the onset of potentially significant effects is the exceedance of the $L_{Aeq,T}$ threshold level for the category appropriate to the ambient noise level at Noise Sensitive Receptors (NSRs).

10.22. The magnitude of the impact of construction noise is classified in accordance with the descriptors in Table 10.4.

Table 10.4: Construction Noise Magnitude of Impact

Criteria	**Magnitude of Impact**
Exceedance of ABC Threshold Value by more than 5 dB	High
Exceedance of ABC Threshold Value up to 5 dB	Medium
Equal to or below the ABC Threshold Value by up to 5 dB	Low
Below the ABC Threshold Value by more than 5 dB	Very Low

Construction Traffic

10.23. The Design and Manual for Roads and Bridges (DMRB) LA111 states that the magnitude of impact at noise sensitive receptors for construction traffic is assessed against a change in the Basic Noise Level (BNL). An increase equal to or greater than 3dB in the BNL would be an indication of a medium to high adverse impact for a duration exceeding 10 or more days or nights in any 15 consecutive days or nights, or a total number of days exceeding 40 in any 6 consecutive months.

[5] *British Standards Institute (2014), BS5228-1:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites. Part 1:Noise.*

10.24. Construction traffic data has been provided by BWB Consulting for the peak year 2026. An assessment has been undertaken based on the principles of DMRB, for the peak year 2026 with and without the construction vehicles.

10.25. The magnitude of the impact of construction traffic is classified in accordance with the descriptors in Table 10.5.

Table 10.5: Construction Traffic Noise Magnitude of Impact

Increase in BNL of closest public road used for construction traffic (dB)	**Magnitude of Impact**
Greater than or equal to 5.0	High
Greater than or equal to 3.0 and less than 5.0	Medium
Greater than or equal to 1.0 and less than 3.0	Low
Less than 1.0	Very Low

10.26. Once the slips are in operation after the first year of construction, followed by completion of the A47 Link Road, then construction traffic will be focused on the strategic road network to avoid unnecessary impacts on local roads.

Construction vibration

Effects on humans

10.27. Construction vibration has the potential to impact upon occupants of buildings within the vicinity of the works. BS 5228-2 Code of practice for noise and vibration control on construction and open sites Part 2:Vibration[6] provides guidance on the perception of vibration within occupied buildings and provides a simple method of determining annoyance alongside evaluation of cosmetic damage associated with vibration.

10.28. The potential impact depends on the type of activity, ground conditions, and distance to NSRs. As part of the Proposed Development, it is anticipated that piled foundations will be necessary in some areas, and this will be determined at the detailed design stage. Notwithstanding this, a qualitative assessment has been undertaken to determine the likely impact at set distances upon key sensitive receptors from the proposed plant under

[6] *British Standards Institute (2014), BS5228-1:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites. Part 2:Vibration.*

the worst-case scenario.

10.29. The following criteria set out in Table 10.6, was adopted and is based upon the guidance on effects of vibration levels applicable to human perception as presented within BS 5228. The corresponding vibration ranges and associated magnitude of effect ratings adopted for the purpose of this assessment have also been included within Table 10.6.

Table 10.6: Magnitude of effect applicable to construction vibration – Applicable to human perception

Vibration level	Effect	Magnitude of effect
X >10.0 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level	High
1.0 X < 10.0 mm/s	Onset of complaints in residential environments	Medium
0.3 ≤ X < 1.0 mm/s	Onset of perceptibility in residential	Low
X < 0.3 mm/s	Unlikely to be perceptible in residential environments	Very Low

Effects on buildings

10.30. In addition to human annoyance, building structures may be damaged by high levels of vibration. BS 6472-1:2008: Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting[7] states that '*the likelihood of building damage is very low even when vibration levels are well above perception thresholds*'. Consequently, if vibration levels are controlled to those relating to annoyance, then it is highly unlikely that buildings will be damaged by construction vibration levels.

Completed development assessment

Noise from fixed plant, equipment and noise break-out from buildings

10.31. It is anticipated that there may be fixed plant and equipment associated with the Proposed Development that may have the potential to generate noise. There may also be noise break-out from proposed buildings. However, at this stage, details of the proposed type, number and precise location of any such plant or the nature of its operation are not available. In the absence of detailed information, it is appropriate to specify suitable noise

[7] *British Standards Institute (2008) BS6472-1-2008 Guide to evaluation of human exposure to vibration in buildings.*

control limits to which any plant and operations should conform. These limits, as detailed in Table 10.42, should include any appropriate corrections for acoustic characteristics, in accordance with BS 4142 Methods for rating and assessing industrial and commercial sound[8].

10.32. It is considered that the rating level of fixed plant noise sources should not exceed the prevailing background sound level when measured at the nearest NSRs. The cumulative effect of all external plant and activities should be specified so that the rating level is less than or equal to the lowest prevailing background sound level.

10.33. Therefore, the approach taken specifies suitable mechanical and electrical plant item noise limits for the site in accordance with the above.

Table 10.7: Magnitude of effect applicable to noise from fixed plant, equipment and noise break-out

Difference between rating level ($L_{Ar,Tr}$) and background sound level ($L_{A90,T}$)	**Magnitude of impact**
≥+9	High
+4 to +8	Medium
0 to +3	Low
≤-1	Very Low

Subject to a lower cut-off of 35 dB as a rating level in accordance with BS 4142:1997 (See paragraph 9.94)

+ indicates rating level above background sound level

- indicates rating level below background sound level

Noise from HGV deliveries and service yard activities including the intermodal rail facility

10.34. In order to determine the magnitude of impact from HGVs arriving, loading/unloading and departing and service yard activities, including the intermodal rail facility, an assessment in accordance with BS 4142 has been adopted, and Table 10.7 sets out the criteria against

[8] *British Standards Institute (2014+A1:2019), BS4142 Methods for rating and assessing industrial and commercial sound.*

which this potential noise impact will be assessed.

10.35. In addition to the criterion detailed in Table 10.7, BS 4142 goes onto state that '*the significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs*'.

10.36. Therefore, to determine the resultant effect as a result of operational noise, sound rating levels have been compared to the existing noise climate at each receptor. The effect is determined by the change in noise level, with changes of 3dB being only just perceptible under laboratory conditions. This relates to noise that is continuous and similar in nature to the existing noise, however using the rating level, rather than the specific level, accounts for this.

Operational maximum noise levels

10.37. The potential effects of operational maximum noise levels from the operational phase of the HNRFI will be assessed in accordance with World Health Organisation (WHO 1999) Guidelines for community noise[9] and WHO Environmental Noise Guidelines for the European Region (2018)[10].

Table 10.8: Magnitude of effect applicable to L_{AFmax} levels

Exceedance of criterion	**Magnitude of impact**
Exceedance of criterion by more than 5 dB	High
Exceedance of criterion up to 5 dB	Medium
Equal to or below the criterion by up to 5 dB	Low
Below the criterion by more than 5 dB	Very Low

Noise from on-site rail movements

10.38. As rail movements within the site will mainly be associated with shunting movements, which will be low speed, the noise source will be assessed in accordance with BS

[9] *World Health Organisation (WHO) (1999), Guidelines for Community Noise.*

[10] *World Health Organisation (2018), Environmental Noise Guidelines for the European Region.*

4142:2014+A1:2019.

Noise from off-site rail movements

10.39. There are a number of indicators that can be used to measure noise from the operation of a railway, and it is therefore important to identify those which most closely correlate with people's response when exposed to rail noise. The consensus, which is backed-up by a number of studies and is reflected in legislation, standards and guidance, is that annoyance correlates best with the measure of equivalent continuous sound level (L_{Aeq}). This is the continuous sound level, which would give the same noise energy as received from fluctuating noise.

10.40. The assessment of noise from off-site rail movements has considered the change in noise level between the baseline scenario and a 'future' scenario, for the daytime and night-time periods. The predicted noise levels have been calculated in accordance with CRN, based on the types of trains using the line. The assessment will assume a change in the absolute ($L_{Aeq,T}$) noise level. The assessment will be undertaken at a notional distance 25m from the existing line in accordance with CRN.

10.41. A change in the noise level of 3dB $L_{Aeq,T}$ or greater is generally considered to result in a noticeable change, and has been adopted when assessing the potential impact of HS2. The Guidelines for Environmental Noise Impact Assessment (IEMA)[11] includes an impact classification for determining the impact from the change in sound levels. The adopted criteria is shown below in Table 10.9, and is based on the IEMA guidelines taking into account other pertinent guidance.

Table 10.9: Impact scale for comparison of future noise against existing noise

Change in noise level dB (A)	Subjective response	Magnitude of impact
10.0+	Noticeable and disruptive	High
3.0 to 9.9	Noticeable and potentially intrusive, particularly at higher end of scale	Medium
1.0 to 2.9	Noticeable but unlikely to be intrusive	Low

[11] *Institute of Environmental Management and Assessment, Guidelines for Environmental Noise Impact Assessment, Version 1.2 (November 2014).*

Change in noise level dB (A)	Subjective response	Magnitude of impact
0.1 to 0.9	Unlikely to be noticeable	Very Low

Vibration from off-site rail movements

10.42. Potential impacts as a result of off-site vibration from additional rail movements will be assessed in accordance with BS 6472-1:2008: Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting[12]. The criteria set is detailed below in Table 10.10.

Table 10.10: Magnitude of impact for vibration as a result of proposed rail movements

Night-time Vibration Dose Value (VDV), $m/s^{1.75}$	Daytime Vibration Dose Value (VDV), $m/s^{1.75}$	Magnitude of impact
>0.51	>1.6	High
0.26 – 0.51	0.80 – 1.6	Medium
0.13 – 0.25	0.20 – 0.79	Low
<0.13	<0.20	Very Low

Development generated road traffic

10.43. An increase in road traffic due to the Proposed Development has the potential to increase the road traffic noise levels at NSRs in the vicinity of the Proposed Development for both the short-term and the long-term. The assessment includes the A47 Link Road within the 'with development' scenario and the impacts have been assessed cumulatively, to provide a robust assessment.

10.44. Traffic data has been provided as 18-hour Annual Average Weekday Traffic (AAWT) by

10 BS 6472-1:2008: Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting

BWB for the following scenarios:

- 2026 Opening Year without the Proposed Development;
- 2026 Opening Year with the Proposed Development and with infrastructure;
- 2036 Future Year without the Proposed Development; and,
- 2036 Future Year with the Proposed Development and with infrastructure.

10.45. Committed developments have been included within the scenarios and are detailed within the Transport Assessment (document reference 6.2.8.1) (TA).

10.46. The DMRB LA111 assessment methodology recommends that the magnitude of noise changes from a project should be classified into levels of impact. LA 111 considers how the magnitude of change can be affected by whether a noise level change occurs in the short term (e.g., as a result of a sudden opening of a scheme), or in the long term (e.g., gradually over time, such as that associated with natural traffic growth).

10.47. LA 111 details a methodology for assessing and managing the noise and vibration effects associated with the construction, improvement, use and maintenance of all major trunk roads. Although not strictly relevant to the Proposed Development, the principles of the guidance have been adopted as a basis for the assessment in the absence of any other, specific guidance. It is worth noting that the guidance also aligns with the IEMA Guidelines.

10.48. Road traffic noise levels in terms of $L_{A10,18h}$ over the daytime period (06:00-24:00 hours) have been predicted based on traffic data provided by the project's transport consultant, and in line with guidance contained within the CRTN[13].

10.49. The magnitude of change has then been assessed in general accordance with the guidance contained in LA 111, in particular, the criteria contained in that document.

10.50. A number of assessment year scenarios and comparisons have been considered, to assess the potential effects of operational road traffic noise in the short-term and long-term. These are detailed below:

- Comparison 1: opening year without the Proposed Development vs. opening year with the proposed development (short-term change); and
- Comparison 2: future year without the proposed development vs. future year (opening year plus 10 years) with the proposed development (long-term change).

10.51. The first comparison above identifies the short-term change in traffic related noise as a result of the Proposed Development, and the second comparison identifies the long-term change in traffic related noise, solely as a result of the Proposed Development.

10.52. In line with the relevant impact tables from DMRB, the magnitude of impact is assessed

[13] *Department for Transport/Welsh Office (1998), Calculation of Road Traffic Noise (CRTN)*

against the criteria found in Tables 10.11 and 10.12 below.

Table 10.11: Magnitude of noise impacts in the short term

Short term noise change (dB $L_{A10,18hr}$)	**Magnitude of impact**
≥5	High
3 to 4.9	Medium
1 to 2.9	Low
<1	Very Low

Table 10.12: Magnitude of noise impacts in the long term

Long term noise change (dB $L_{A10,18hr}$)	**Magnitude of impact**
≥10	High
5 to 9.9	Medium
3 to 4.9	Low
<3	Very Low

10.53. The process for determining whether significant effects are likely to arise due to operational road traffic noise begins with determining the magnitude of noise change in the short-term.

10.54. Changes of medium magnitude or above are considered to be significant, whilst changes of low magnitude or below are considered to be not significant. Where the magnitude of change in the short-term is very low at noise sensitive buildings, it is concluded that the noise will not cause changes to behaviour or response to noise and so will not give rise to a likely significant effect. For noise sensitive receptors where the magnitude of impact in the short-term is low, medium or high, the initial assessment of significance can then be modified, if necessary, through consideration of a combination of other contextual factors or local circumstances to determine final significance. These other indicators can include:

- whether the short-term change is towards the bottom or top of the short-term noise band change;
- the long-term change, with and without the Proposed Development;
- the absolute noise level – in this regard the daytime and night-time SOAEL are 68 dB $L_{A10,18h}$ (façade) and 55 dB $L_{Aeq,8h}$ (free-field) respectively;
- receptor specific circumstances such as:
    - whether the highest noise change affects a blank façade or a façade without a habitable room window;
    - the length of façade affected, relative to the whole building; and
    - whether benefits affect some façades to off-set adverse effects elsewhere (and vice versa).
- whether the Proposed Development is likely to alter the acoustic character of the area; and
- the likely perception of residents.

10.55. The emphasis when considering these other indicators is whether the changes in noise would likely lead to changes in behaviour and response.

Assessment of tranquillity

10.56. A methodology has been devised for undertaking a tranquillity assessment in relation to the Proposed Development.

10.57. There are several existing methods which have been developed for assessing tranquillity, however it is still a topic of much discussion and research. Therefore, there is no standard approach which has been adopted, and any assessment method is open to interpretation and can be defined on a case-by-case basis.

10.58. Sharps Redmore have recently published literature titled 'Tranquil Spaces – Measuring the tranquillity of public spaces'[14]. Amongst others, this details two methods for assessing tranquillity, the 'University of Bradford Method' and 'The Campaign to Protect Rural England Method'.

10.59. The Bradford Method considers two factors: road traffic noise level and visual appearance. There are a few limitations associated with the method, including the exclusion of noise sources other than road traffic.

10.60. The Campaign to Protect Rural England (CPRE) have previously produced a tranquillity map, although it is worth noting that this has since been withdrawn. A tranquillity score is

[14] *Tranquil Spaces - Measuring the tranquility of public spaces, Sharps Redmore Press, 2019.*

derived considering different features which can be heard and/or seen, with each one being weighted differently. Although this method is more robust than the Bradford Method, it is not without limitations. The main one being that the tranquillity score is assigned to a 500m by 500m area, over which the noise levels can vary significantly. Therefore, this method is not considered to be suitable for the purposes of assessing the tranquillity of the Proposed Development site as the resolution is too low.

10.61. The Natural Tranquillity Method is a new methodology proposed within Tranquil Spaces – Measuring the tranquillity of public spaces. It is based on several parameters which are used to predict tranquillity, and although early results are promising, it is acknowledged within the text that further research is required to account for the character of man-made sounds, which can potentially skew the results due to the subjectivity of the method. Therefore, this method has not been adopted for this assessment.

10.62. Because there is no accepted method, an assessment has been undertaken to determine the change in noise level as a result of the Proposed Development to determine the level of impact. The assessment considered the existing ambient noise levels measured in the vicinity of the site, in accordance with NTT2814 – Hinckley Survey Method Statement_Issue_P02. The noise levels associated with the Proposed Development have been calculated at the receptors shown in Figure 6.3.10.1 and added to the ambient noise levels measured in the vicinity of these areas to predict the change in overall noise level. It is acknowledged that other considerations such as visual aspects, can also impact tranquillity and this will be considered within the ES.

10.63. To determine the impact, the change in the absolute noise level has been determined as a result of operational noise levels associated with the Proposed Development and development generated road traffic. The adopted criteria is shown below in Table 10.13.

Table 10.13: Impact from change in sound levels

Sound level change dB $L_{Aeq,T}$ **T = either 16hr day or 8hr night**	**Magnitude of impact**
≥ 10dB	High
≥ 5.0dB and < 10dB	Medium
≥ 3.0dB and < 5dB	Low
≥ 0dB and < 3dB	Very Low

Assessment inputs

10.64. For the construction phase, source noise data has been taken from BS 5228 Annex C which details current sound level data on site equipment and site activities, and BWB source data where data was not available within BS 5228.

10.65. For the operational phase source inputs, data has been taken from the following sources:

- BWB Consulting archive noise data for HGV passbys, dock leveller and level loading processes, tug passbys, tug activity and refrigeration processes.
- Noise and vibration impact assessment undertaken to support the DCO application for the Northampton Gateway Rail Freight Interchange, particularly Appendix 8.5 – Summary of assumptions for SRFI operational activities[15]. The application was consented in October 2019 by the SoS, and therefore it is considered that the assumptions made were robust. The document can be found in Appendix 6.2.10.6.
- Noise data for rubber tracked gantry cranes and Class 66 trains were taken from the Daw Mill Colliery Proof of Evidence of Simon Stephenson on Noise[16]. The author has extensive experience in the assessment of noise from port and freight handling developments. The document can be found in Appendix 6.2.10.7.
- Noise data for reach stackers were taken from East Midlands Gateway – Rail Freight Terminal Noise Assessment in relation to DCO Requirement 22, shown in Appendix 10.8[17].
- Noise data for the reefers has been taken from Carrier Transicold Container Refrigeration Unit Technical Specifications, shown in Appendix 6.2.10.9.[18]
- To establish the existing baseline regarding rail movements on the existing line, Realtimetrains[19] has been used to determine the existing number of movements of both passenger and freight trains and have been confirmed by Baker Rose.
- The noise levels from existing and proposed noise levels associated with the rail line have been calculated based on source levels detailed within CRN.
- The existing baseline noise environment has been characterised based on the results

[15] *Appendix 8.5 Summary of Assumptions for SRFI Operational Activities.*

[16] *Proof of Evidence of Simon Stephenson on Noise, Daw Mill Colliery, Tamworth Road, Arley (PINS ref no: APP/R3705/W/16/3149827, RPS Report No. JAT8968-REPT-01-Ro) 26th December 2017.*

[17] East Midlands Gateway – Rail Freight Terminal – Noise Assessment in relation to DCO Requirement 22, REF VC-103151_EN-RP-0001 R00 December 2019

[18] Carrier Transicold Container Refrigeration Unit Technical Specifications Model 69NT40-541-500 August 2014

[19] [redacted]

of a baseline noise survey undertaken by BWB in 2021.

- Traffic data for the Proposed Development has been provided by BWB and the methodology is detailed in Chapter 8.

Identifying sensitive receptors

10.66. The nearest NSRs to the Main HNRFI Site are located in all directions from the Main HNRFI Site and are detailed below in Table 10.14 and shown in Figure 6.3.10.1. NSRs to be included within the study area have been defined in accordance with the details in paragraphs 10.7 and 10.8.

Table 10.14: Identified noise sensitive receptors

NSR Number	Address	Grid Coordinates		Bearing from site	Distance to nearest Site boundary (Approx.)
		Easting	Northing		
1	Bridge Farm	445503	295302	Within site boundary	Adjacent
2	27 Bridle Path Road, Elmesthorpe, Leicester LE9 7SA	445734	295743	North	350m
3	Bridle Path Road, Elmesthorpe, Leicester LE9 7SA	445779	295811	North	390m
4	Bridle Path Road, Elmesthorpe, Leicester LE9 7SA	445841	295791	North	345m
5	Billington Farm, Billington Road East	446094	295922	North	335m
6	Billington Road East	446118	295903	North	330m

NSR Number	Address	Grid Coordinates		Bearing from site	Distance to nearest Site boundary (Approx.)
		Easting	Northing		
7	Billington Road East	446189	295845	North	240m
8	Billington Road East	446184	295920	North	300m
9	Woodfield Stables, Burbage Common Road	446779	295337	East	Adjacent
10	Langton Farm, Burbage Common Road, Leicester LE9 7SE	447009	295380	North	Adjacent
11	Burbage Common Road, Leicester LE9 7SE	447057	295517	North	300m
12	Highgate Lodge Farm, Station Road, Stoney Stanton, Leicester LE9 4LU	447509	294748	East	515m
13	Red Hill Farm, Hinckley Road, Sapcote, Leicester LE9 4LT	447089	294205	East	310m
14	Averley House Farm, Hinckley Road, Sapcote, Leicester LE9 4LH	446672	293883	South East	135m

NSR Number	Address	Grid Coordinates		Bearing from site	Distance to nearest Site boundary (Approx.)
		Easting	Northing		
15	Aston Firs Caravan Park, Smithy Lane, Sapcote, Leicester LE9 4LH	446207	293989	South	Adjacent
16	Castlewood Park, Aston Firs, Smithy Lane, Leicester LE9 4JZ	445797	294011	South	Adjacent
17	Rosevale Park, Smithy Lane, Leicester LE9 4JZ	445907	294043	South	Adjacent
18	Aston Firs SSSI	445486	294041	South	Adjacent
19	Burbage Common and Woods	445011	294938	South and west	Adjacent
20	Basset Cottage, Burbage Common, Hinckley LE10 3DD	444934	295231	North west	Adjacent
21	Hissar House Farm, Leicester Road,	445020	295819	North	80m
22	Church View Fields Farm, Leicester Road,	445136	295833	North	160m
23	Proposed Crematorium (18/00751/DEEM),	445102	296152	North	200m

NSR Number	Address	Grid Coordinates		Bearing from site	Distance to nearest Site boundary (Approx.)
		Easting	Northing		
	land east of Leicester Road, Hinckley LE10 3PR				
24	Billington Rough Dwelling	446213	295629	North	45m
25	Billington Road East	446339	295866	North East	180m
26	Billington Road East	446431	295824	North East	100m
27	Houston Lodge, Burbage Common Road	444684	295390	North	160m
28	Dwellings off Leicester Road	444784	295635	North	Adjacent

10.67. Where there are multiple receptors at a given location, the assessment considers the highest predicted levels in the vicinity of that receptor, as a worst case.

Receptor sensitivity

10.68. In accordance with the principles of EIA, the sensitivity of receptors to noise or vibration impacts during either construction or operational phases are defined in Table 10.15.

Table 10.15: Sensitivity/Value of receptor

Sensitivity/Value of resource/receptor	Description	Example of receptor usage
Very High	Receptors where noise or vibration will significantly	Auditoria/studios and specialist medical/teaching

Sensitivity/Value of resource/receptor	Description	Example of receptor usage
	affect the function of a receptor	centres, or laboratories with highly sensitive equipment
High	Receptors where people or operations are particularly susceptible to noise or vibration. Sensitive ecological receptors known to be vulnerable to the effects of noise or vibration.	Residential; Quiet outdoor areas used for recreation; Conference facilities; Schools/educational facilities in the daytime; Hospitals/residential care homes; Libraries; and Ecologically sensitive areas for example Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Sites of Special Scientific Interest (SSSI), such as Aston Firs.
Medium	Receptors moderately sensitivity to or vibration where it may cause some distraction or disturbance	Offices; Restaurants; and Sports grounds when spectator or noise is not a normal part of the event and where quiet conditions are necessary (e.g., tennis, golf).
Low	Receptors where distraction or disturbance of people from noise or vibration is minimal	Residences and other buildings not occupied during working hours; Factories and working

Sensitivity/Value of resource/receptor	Description	Example of receptor usage
		environments with existing high noise levels; and Sports grounds when spectator or noise is a normal part of the event.

Characterisation of effect

Significance of effects

10.69. The significance of effect resulting from each individual potential impact type above is derived from the characterisation of the effect, the magnitude of the impact and the sensitivity or value of the affected receptor using the matrix presented in Table 10.16 below.

Table 10.16: Classification of effects

Sensitivity/Value of resource/receptor	Magnitude of impact			
	High	**Medium**	**Low**	**Very low**
Very high	Major	Major	Moderate	Minor
High	Major	Moderate	Minor	Negligible
Medium	Moderate	Minor	Negligible	Negligible
Low	Minor	Negligible	Negligible	Negligible

10.70. With respect to the Classification of Effects outcomes from Table 10.16, effects of negligible and minor are insignificant, whereas effects of moderate and major are significant, in terms of this EIA.

Significance criteria

10.71. The following terminology has been used in the assessment to define effects:

- adverse – detrimental or negative effects to an environmental resource or receptor;
- negligible – imperceptible effects to an environmental resource or receptor; or
- beneficial – advantageous or positive effect to an environmental resource or receptor.

10.72. Where adverse or beneficial effects are identified, these have been assessed against the following significance scale:

- minor – slight, very short or highly localised effect of no significant consequence;
- moderate – limited effect (by extent, duration or magnitude), which may be considered significant; or
- major – considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

10.73. Effects can also be characterised as temporary or permanent and either short-term, medium term or long-term depending on the duration of the effect. Short-term effects are defined as temporary effects related to a specific construction event of no more than a year's duration. Medium term effects are defined as temporary effects of a longer duration, such as those arising over an extended period of construction, ranging from one year to the full construction period. Long-term effects are defined as permanent effects arising from the operation of the HNRFI.

Construction phase

10.74. Any impacts associated with the construction of the Proposed Development are likely to be short or medium term and temporary in nature. The significance of any impacts is identified in accordance with relevant guidance.

Operational phase

10.75. Any impacts associated with the operational phase of the Proposed Development are likely to be long term in nature. The impact of the Proposed Development is determined regarding the change in existing noise levels at nearest NSRs to the Proposed Development.

Assumptions and limitations

10.76. At this stage, there is inherently a degree of uncertainty over the final layout of the site, including where primary noise sources are to be located. Therefore, reasonable assumptions based on the parameters plan and illustrative masterplan have been made.

10.77. Furthermore, final selection of fixed plant and equipment is not currently known, as is usual for this stage. This will be dealt with in the following sections.

10.78. The proposed earthworks have been included within the modelling from an acoustics perspective.

10.79. The assumptions and limitations associated with the traffic data are detailed within Chapter 8.

10.80. Trip generation data for the site during the operational phase is highly robust and has been ratified by the Transport Working Group (TWG). The TWG are representatives of the major highway and planning authorities and meet on a regular basis to discuss transport and highways input to the DCO. These have been forecast from existing distribution sites in the Midlands for HGVs. Car trips have been based on a worst case from Swan Valley, which is a distribution centre that has limited public transport access and is heavily car dependent. Further detail can be found in Chapter 8.

10.81. Traffic data has been supplied for the baseline year (2019), which is considered to be sufficiently representative of current baseline road traffic conditions. Details of this validation procedure are provided in the TA (document reference 6.2.8.1). The traffic data supplied for the year 2036 represent the year of completion for the Proposed Development and are considered sufficiently representative of the traffic 15 years after the opening year. It is understood that after 2041, there will be no material increase in the traffic associated with the site, as it will have reached capacity. Further detail is provided in ES Chapter 8: *Transport and Traffic*.

10.82. Where traffic links have not been supplied specifically at the approach to and exit from roundabouts (i.e. where traffic speeds are likely to reduce), speeds have been limited to 48kph. Where speeds below 20 kph have been provided, these have been increased to 20 kph.

RELEVANT LAW, POLICY AND GUIDANCE

10.83. In considering a Nationally Significant Infrastructure Project (NSIP), the Planning Inspectorate (PINS) is guided by the National Policy Statement for National Networks[20] and by other material considerations.

10.84. A full description of relevant policy, standards and guidance in provided in Appendix 6.2.10.2 and includes the following documents.

National Planning Policy

- National Policy Statement (NPS) for National Networks.
- National Planning Policy Framework (NPPF)[21];

[20] *National Policy Statement for National Networks (2014)*

[21] *Communities and Local Government (2021), National Planning Policy Framework.*

- Noise Policy Statement for England (NPSE)[22]; and
- National Planning Practice Guidance (NPPG)[23].

Local Planning Policy

- Blaby District Local Plan and Core Strategy[24];
  - Blaby Green Space Strategy[25];
  - Local Plan (Delivery) Development Plan Document[26];
- Blaby Landscape and Settlement Character Assessment[27];
- Planning Guidance Note – Noise[28];
- Hinckley and Bosworth Borough Council Site Allocations and Development Management Policies[29];
- Rugby Local Plan[30]; and
- Harborough Local Plan[31].

Other Relevant Policy, Standards and Guidance

- British Standard 7445-1:2003 Description and measurement of environmental noise:

[22] *Department for Environment, Food and Rural Affairs (2010); Noise Policy Statement for England (NPSE)*

[23] *Ministry of Housing, Communities and Local Government (MHCLG) (2014), Planning Practice Guidance.*

[24] *Blaby District Council (2013) Adopted Core Strategy.*

[25] *Blaby Green Space Strategy 2012.*

[26] *Blaby District Council Local Plan (Delivery) Development Plan Document, February 2019.*

[27] *Blaby Landscape and Settlement Character Assessment, Final report January 2020.*

[28] *Planning Guidance Note – Noise 2019.*

[29] *Hinckley and Bosworth Borough Council Site Allocations and Development Management Policies DPD, July 2016.*

[30] *Rugby Borough Council (2019) Rugby Borough Council Local Plan 2011-2031.*

[31] *Harborough District Council (2019) Harborough Local Plan 2011-2031.*

Guide to quantities and procedures[32].

- British Standard 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites parts 1: Noise (BS 5228).
- British Standard 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites parts 2: Vibration (BS 5228).
- WHO Guidelines for community noise (1999).
- WHO Environmental Noise Guidelines for the European Region (2018).
- British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings (BS 8233)[33];
- British Standard 4142:2014+A1:2019 Method for rating and assessing industrial and commercial sound (BS 4142).
- IEMA Guidelines for environmental noise impact assessment.
- Highways England (2019) Design Manual for Roads and Bridges (DMRB) LA 111 Noise and vibration Revision 2.
- Calculation of road traffic noise (CRTN).
- Calculation of rail noise (CRN).
- DEFRA Additional railway noise source terms for Calculation of Railway Noise[34].
- British Standard 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings; and,
- Public Health England – Noise and Health[35].

[32] *British Standard 7445-1:2003 Description and measurement of environmental noise: Guide to quantities and procedures.*

[33] *British Standards Institute (2014), BS8233 Guidance on noise insulation and noise reduction for buildings.*

[34] *Additional railway noise source terms for Calculation of Railway Noise 1995.*

[35] *Public Health England – Noise and Health.*

BASELINE CONDITIONS

Site context

10.85. The Proposed Development site currently comprises open agricultural land and is located to the north-east of Hinckley.

10.86. The Proposed Development is predominately agricultural land. To the north of the site lies the Leicester to Hinckley railway with the villages of Elmesthorpe and Earl Shilton beyond. To the south of the Main HNRFI Site lies the M69 Motorway with the villages of Sapcote and Stoney Stanton to the east. To the west of the Main HNRFI Site lies Burbage Wood, Aston Firs and Freeholt Wood with Hinckley beyond. Agricultural uses predominate the land to the east of the site.

Baseline noise and vibration survey

10.87. A baseline noise and vibration assessment has previously been undertaken by Hydrock and was used to inform the PEIR in agreement with BDC and HBBC. In the intervening time, an updated baseline survey has been undertaken by BWB, and is detailed below.

10.88. A baseline noise survey has been undertaken to determine the prevailing noise conditions at locations representative of NSRs associated with or in proximity to the Proposed Development.

10.89. Long-term noise monitoring was undertaken to cover both a weekday and weekend period at four Noise Monitoring Positions (NMP) considered representative of NSRs. Short-term monitoring was undertaken at two MMPs in accordance with the shortened procedure detailed within CRTN. The monitoring locations are identified in Figure 6.3.10.2. At each location the ambient ($L_{Aeq,T}$), background (LA90) and maximum (L_{AFmax}) sound pressure levels were measured continuously throughout the survey.

10.90. Vibration monitoring was undertaken at one position near to the existing rail line.

10.91. The monitoring locations are detailed below.

Noise Monitoring Position 1 (NMP1)

10.92. Noise monitoring was undertaken at NMP1, which is considered representative of the existing noise climate in the vicinity of NSRs off Burbage Common Road to the east of the Proposed Development. Noise monitoring commenced at 16:00 hours on Wednesday 21st April 2021, finishing at 10:00 hours on Thursday 29th April 2021. Measurement equipment at NMP1 was established in free-field conditions at a height of 1.5m above local ground level. During periods of attendance the noise climate at NMP1 was noted to be dominated by road traffic on the M69 and natural sources eg. birdsong.

Noise Monitoring Position 2 (NMP2)

10.93. Noise monitoring was undertaken at NMP2 which is considered representative of the existing noise climate at nearby NSRs off Smithy Lane. Noise monitoring commenced at

13:00 hours on Wednesday 21st April 2021, finishing at 22:00 hours on Tuesday 27th April 2021. Measurement equipment at NMP2 was established in free-field conditions at a height of 1.5m above local ground level. During periods of attendance the noise climate at NMP2 was noted to be dominated by road traffic on the M69, with other notable contributions being that of natural sources eg. birdsong.

Noise Monitoring Position 3 (NMP3)

10.94. Noise monitoring was undertaken at NMP3, which is considered representative of the existing noise climate at Burbage Common Woods. Noise monitoring commenced at 11:00 hours on Wednesday 21st April 2021, finishing at 12:00 hours on Thursday 29th April 2021. Measurement equipment at NMP3 was established in free-field conditions at a height of 1.5m above local ground level. During periods of attendance the noise climate at NMP3 was noted to be dominated by distant road traffic on the M69, train pass-bys on the rail line, overhead aircraft and natural sources eg. birdsong.

Noise Monitoring Position 4 (NMP4)

10.95. Noise monitoring was undertaken at NMP4, which is considered representative of the existing noise climate at nearby NSRs to the north of the rail line most notably at Bridge Farm and NSRs off Billington Road East. Noise monitoring commenced at 16:00 hours on Wednesday 21st April 2021, finishing at 12:00 hours on Thursday 29th April 2021. Measurement equipment at NMP4 was established in free-field conditions at a height of 1.5m. During periods of attendance the noise climate at NMP3 was noted to be dominated by distant road traffic on the M69, train pass-bys on the rail line and natural sources eg. birdsong.

10.96. Short-term monitoring has also been undertaken at two locations in accordance with the shortened measurement procedure detailed within CRTN. The locations are as follows;

Noise Monitoring Position 5 (NMP5)

10.97. Noise monitoring was undertaken at NMP5, which is considered representative of the existing noise climate at NSR15. Noise monitoring commenced at 10:04 hours and ended at 13:04 hours on Wednesday 20th July 2022. Measurement equipment at NMP5 was established in free-field conditions at a height of 1.5m. The noise environment was dominated by distant constant road noise from the M69, infrequent dominant road noise from the B4669/M69 slip road and natural sources.

Noise Monitoring Position 6 (NMP6)

10.98. Noise monitoring was undertaken at NMP6, which is considered representative of the existing noise climate on Leicester Road. Noise monitoring commenced at 13:39 hours and ended at 16:39 hours on Wednesday 20th July 2022. Measurement equipment at NMP6 was established in free-field conditions at a height of 1.5m. The noise environment was dominated by road noise from the B4668.

Vibration Monitoring Position 1 (VMP1)

10.99. Vibration monitoring was undertaken at one location adjacent to the existing rail line commencing at 14:20 hours on Wednesday 20th July, finishing at 11:03 hours on Friday 22nd July 2022. Vibration equipment was established circa. 12m from the nearside rail of the closest trainline located in the rail corridor to the north of the Proposed Development. VDV and PPV transducers were fixed to ground spikes which were submerged into soft ground at the measurement position. The built-in spirit level confirmed that the transducer was flat. Transducers were orientated such that the X-axis was parallel to the train tracks.

Measurement Equipment

10.100. The baseline noise survey was undertaken using the Class 1 specification noise measurement equipment detailed in Table 10.17. Equipment was calibrated using a portable calibrator immediately before and after the measurements with no significant drift in calibration observed. The sound level meters, pre-amplifiers and microphones were calibrated to traceable standards at an accredited laboratory within the 24 months prior to the measurements. The portable calibrators were calibrated within the 12 months preceding the date of the survey.

Table 10.17: Noise Monitoring Equipment

Measurement Position	Equipment	Make & Model	Serial Number	Calibration Due Date
NMP1	Sound Level Meter	01dB - Cube	11165	18/02/2023
	Microphone	GRAS – 40CD	287995	
NMP2	Sound Level Meter	01dB – Cube	11118	09/12/2021
	Microphone	GRAS – 40CD	161814	
NMP3	Sound Level Meter	01dB – Cube	10688	04/03/2022
	Microphone	GRAS – 40CD	224126	
NMP4	Sound Level Meter	01dB – Cube	11111	09/12/2021

Measurement Position	Equipment	Make & Model	Serial Number	Calibration Due Date
	Microphone	GRAS – 40CD	287790	
NMP5 and 6	Sound Level Meter	Svan 971	72616	20/06/2024
	Pre-Amplifier	Svan SV18	72283	
	Microphone	ACO Pacific 7052E	69463	
NMP1,2,3 and 4	Calibrator	01dB-Stell Cal 21	35054817	11/02/2022
NMP5 and 6	Calibrator	SV33A	73421	20/06/2023

10.101. Vibration monitoring was undertaken using the equipment detailed in Table 10.18 below.

Table 10.18: Vibration Monitoring Equipment Used at VMP1

Manufacturer	Model	Serial Number	Date of Calibration
01dB	Orion	10257	07/10/2021

Meteorological Conditions

10.102. Weather conditions during the long-term monitoring are detailed below in Table 10.19. This has been summarised from data available on Wunderground[36] for the Burbage weather station.

[36] [redacted]

Table 10.19: Summary of weather conditions during long-term noise survey

Date	Temperature (°C)			Humidity (%)		Wind speed (ms^{-1})			Precipitation (mm)
	Avg.	Min.	Max.	Min.	Max.	Avg.	Max.	Direction	Total
21/04/2021	9	3	13	49	89	2	6	NE	0.0
22/04/2021	8	0	15	29	92	1	5	East	0.0
23/04/2021	10	1	17	27	87	1	5	SSE	0.0
24/04/2021	10	4	16	35	87	1	5	ENE	0.0
25/04/2021	7	3	13	47	94	2	5	NE	0.0
26/04/2021	8	3	14	40	81	1	4	ENE	0.0
27/04/2021	8	4	13	54	91	1	3	South	0.0
28/04/2021	8	4	12	47	94	2	7	NE	5.5
29/04/ 2021	7	2	12	38	92	1	4	NNE	0.0

10.103. Weather conditions throughout the survey between 21st April and 27th April were conducive to environmental noise monitoring, it being dry with negligible wind (<5ms^{-1}).

10.104. Weather conditions between the morning on 28th April at 01:30 to the afternoon at 1400 hours were changeable with periods of rain, and therefore these periods have been removed from the following summary.

Measurement results

10.105. A summary of measured noise levels at each position is presented in Tables 10.20, 10.21, 10.22 and 10.23. Full results for all four monitoring locations are provided in Appendix 6.2.10.10.

Table 10.20: Summary of measured sound pressure levels at NMP1

Day and Date	Measured sound pressure levels, dB(A)				
	Daytime (0700 – 2300)		Night-time (2300 – 0700)		
	$L_{Aeq,1h}$[1]	$L_{A90,1h}$[2]	$L_{Aeq,15m}$[1]	$L_{A90,15m}$[2]	$L_{Amax,f}$[3]
Wednesday 21/04/2021	57	54	56	49	71
Thursday 22/04/2021	56	53	56	50	68
Friday 23/04/2021	57	55	53	46	71
Saturday 24/04/2021	55	52	50	41	65
Sunday 25/04/2021	54	50	52	44	65
Monday 26/04/2021	56	53	53	48	63
Tuesday 27/04/2021	54	50	54	48	64
Wednesday 28/04/2021	57*	54*	51*	46*	-

[1] Logarithmic average sound pressure levels during measurement period

[2]Representative $L_{A90,T}$ value to be used following statistical analysis, including maximum, minimum, mode, median and mean Highest L_{Afmax} sound pressure level during measurement period

[3] Highest measured $L_{AF,max}$

** Periods affected by adverse weather have been removed*

Table 10.21: Summary of measured sound pressure levels at NMP2

Day and date	Measured sound pressure levels, dB(A)				
	Daytime (0700 – 2300)		Night-time (2300 – 0700)		
	$L_{Aeq,1h}$[1]	$L_{A90,1h}$[2]	$L_{Aeq,15m}$[1]	$L_{A90,15m}$[2]	$L_{Amax,f}$[3]
Wednesday 21/04/2021	56	53	56	48	78
Thursday 22/04/2021	56	53	56	47	79
Friday 23/04/2021	56	52	58	44	81
Saturday 24/04/2021	56	52	55	43	80
Sunday 25/04/2021	54	51	55	44	79
Monday 26/04/2021	55	52	53	45	78
Tuesday 27/04/2021	54	49	-	-	-

[1] *Logarithmic average sound pressure levels during measurement period*

[2] *Representative $L_{A90,T}$ value to be used following statistical analysis, including maximum, minimum, mode, median and mean Highest L_{Afmax} sound pressure level during measurement period*

[3] *Highest measured $L_{AF,max}$*

Table 10.22: Summary of measured sound pressure levels at NMP3

Day and date	Measured sound pressure levels, dB(A)				
	Daytime (0700 – 2300)		Night-time (2300 – 0700)		
	$L_{Aeq,1h}$[1]	$L_{A90,1h}$[2]	$L_{Aeq,15m}$[1]	$L_{A90,15m}$[2]	$L_{Amax,f}$[3]
Wednesday 21/04/2021	60	40	56	40	84
Thursday 22/04/2021	58	40	56	40	82
Friday 23/04/2021	58	41	56	39	92
Saturday 24/04/2021	56	39	43	35	63
Sunday 25/04/2021	52	38	47	35	67
Monday 26/04/2021	58	36	57	40	83
Tuesday 27/04/2021	57	37	58	37	86
Wednesday 28/04/2021	56*	39*	58*	35*	-

Day and date	Measured sound pressure levels, dB(A)				
	Daytime (0700 – 2300)		Night-time (2300 – 0700)		
	$L_{Aeq,1h}$[1]	$L_{A90,1h}$[2]	$L_{Aeq,15m}$[1]	$L_{A90,15m}$[2]	$L_{Amax,f}$[3]

[1] Logarithmic average sound pressure levels during measurement period

[2]Representative $L_{A90,T}$ value to be used following statistical analysis, including maximum, minimum, mode, median and mean Highest L_{Afmax} sound pressure level during measurement period

[3] Highest measured $L_{AF,max}$

** Periods affected by adverse weather have been removed*

Table 10.23: Summary of measured sound pressure levels at NMP4

Day and date	Measured sound pressure levels, dB(A)				
	Daytime (0700 – 2300)		Night-time (2300 – 0700)		
	$L_{Aeq,1h}$[1]	$L_{A90,1h}$[2]	$L_{Aeq,15m}$[1]	$L_{A90,15m}$[2]	$L_{Amax,f}$[3]
Wednesday 21/04/2021	59	43	57	42	84
Thursday 22/04/2021	61	44	58	42	92
Friday 23/04/2021	60	44	56	40	83
Saturday 24/04/2021	58	42	44	37	62
Sunday 25/04/2021	54	41	50	37	65
Monday 26/04/2021	60	41	59	41	85
Tuesday 27/04/2021	59	39	60	40	85
Wednesday 28/04/2021	59*	49*	60*	38*	-

[1] Logarithmic average sound pressure levels during measurement period

[2]Representative $L_{A90,T}$ value to be used following statistical analysis, including maximum, minimum, mode, median and mean Highest L_{Afmax} sound pressure level during measurement period

[3] Highest measured $L_{AF,max}$

** Periods affected by adverse weather have been removed*

10.106. On review of the measured noise levels at NMP4, the ambient noise level ($L_{Aeq,T}$) measured during the night-time on Saturday 24th April is lower than that measured during any of the other night-time periods. A review of the measured trace indicates that there were no trains on the rail line during the night-time period between 2300 hours and 0700 hours. Although it is acknowledged that there may be periods when trains do not run during the night-time period on a Saturday, it is not considered 'typical' of the night-time noise level.

10.107. A baseline noise survey was undertaken by Hydrock in 2018 at similar measurement positions adopted for the current noise survey. A review has been undertaken of the noise levels measured at the same location as NMP4 in 2018. This indicates that the ambient noise level measured on a Saturday night is similar to that measured for the remainder of the week.

10.108. Based on the above, the ambient noise level measured during the night-time on Saturday at NMP4 is not considered 'typical' of ambient noise levels in the area and has therefore been removed from the following assessment. The ambient noise level measured on a Sunday night, which includes train pass-bys is considered to be more representative of typical conditions whilst still taking account of lower noise levels over the weekend period. The $L_{A90,T}$ is unaffected, and is in line with remaining periods and the results of the previous noise survey undertaken by others.

10.109. The noise measurement data from NMP5 and NMP6 have been used to determine the $L_{A10,18hr}$ noise level in accordance with the shortened measurement procedure contained within the Department of Transport Welsh Office Calculation of Road Traffic Noise (CRTN) whereby the $L_{A10,18hr}$ level can be determined by subtracting 1 dB from the measured $L_{A10,3hr}$ noise level.

10.110. In accordance with guidance from BS 8233, the $L_{Aeq,16hr}$ noise level can be determined by subtracting 2 dB from the measured or derived $L_{A10,18hr}$ noise level, provided the noise climate at the measurement position is dominated by road traffic.

Table 10.24: Measured and derived sound pressure levels at NMP5

Start time	Duration	dB $L_{Aeq,1hr}$	dB $L_{A10.1hr}$	dB $L_{A90,1hr}$	dB $L_{Af,max}$
10:04	1 - hour	52	54	49	76
11:04	1 - hour	52	53	49	74
12:04	1 - hour	51	53	49	61
dB $L_{A10,3h}$	53				
dB $L_{A10,18h}$	52				
Daytime dB $L_{Aeq,16h}$	50				
Night-time dB $L_{Aeq,8h}$	43[1]				

[1]*Calculated using the equation 0.9*$L_{A10,18h}$-3.77 in accordance with TRL Guidance*

Table 10.25: Measured and derived sound pressure levels at NMP6

Start time	Duration	dB $L_{Aeq,1h}$	dB $L_{A10,1h}$	dB $L_{A90,1h}$	dB $L_{Af,max}$
13:39	1 - hour	67	71	54	89
14:39	1 - hour	68	71	55	90
15:39	1 - hour	68	72	57	84
dB $L_{A10,3h}$	71				
dB $L_{A10,18h}$	70				

Daytime dB $L_{Aeq,16h}$	68
Night-time dB $L_{Aeq,8h}$	59[1]

[1]*Calculated using the equation 0.9*$L_{A10,18h}$-3.77 in accordance with TRL Guidance*

10.111. The results of the vibration monitoring are shown below in Table 10.26.

Table 10.26: Summary of measured VDV and PPV at VMP1

Period	Maximum VDV in each axis ($ms^{-1.75}$)		
	x-axis	y-axis	z-axis
Daytime	0.01	0.01	0.05
Night-time	0.01	0.00	0.04

Future baseline

10.112. The noise levels across the Main HNRFI Site are dominated by noise from road traffic on the surrounding road network. For the noise levels to increase by 3dB, which is widely accepted to be just perceptible, there would need to be a doubling of the existing flows. A review has been undertaken of the traffic data provided by the Transport Consultant, which indicates that there will be up to a 4dB increase on the B4669 and slip roads associated with the M69, and up to a 6dB increase at the roundabout associated with junction 2 of the M69.

Sensitivity of receptors

10.113. In accordance with the criteria detailed in Table 10.16, the sensitivity of all the identified existing sensitive receptors from Table 10.15 will be identified as high.

POTENTIAL SIGNIFICANT ENVIRONMENTAL EFFECTS OF THE PROPOSALS

10.114. With respect to the Classification of Effects outcomes from Table 10.16, effects of negligible and minor are not significant, whereas effects of moderate and major are significant, in terms of this EIA.

Embedded Mitigation

Demolition and Construction

10.115. No embedded mitigation is proposed at the construction phase with respect to noise and vibration.

Completed Development

10.116. As the illustrative masterplan has evolved, loading bays and service yard areas have been removed from the northern facades of Units 7, 8 and 9, with these areas now fully screened from receptors to the north.

10.117. Bunding is proposed adjacent to the A47 Link Road as it passes Bridge Farm, and this has been included within the earthworks model, incorporated within the noise model.

Construction phase

10.118. This section discusses the potential noise and vibration effects on sensitive receptors arising during the construction phase of the Proposed Development.

10.119. Noise and vibration levels experienced by local receptors during such works depend upon several variables, the most significant of which are:

- the noise generated by plant or equipment used on site, generally expressed as sound power levels (L_w) or the vibration generated by the plant;
- The periods of use of the plant on site, known as on-time;
- The distance between the noise/vibration source and the receptor;
- The noise attenuation due to ground absorption, air absorption and barrier effects;
- In some instances, the reflection of noise due to the presence of hard surfaces such as the sides of buildings; and
- the nature of the ground with respect to vibration transmission.

10.120. Key construction related activities associated with the Proposed Development are likely to include, but are not limited to:

- Demolition, excavation and substructure works (including piling, although the need for this and locations are not yet known);
- drainage works;
- superstructure and building envelopes;

- fitting out; and
- hard landscaping/highways infrastructure.

Construction noise

10.121. Specific details of activities and associated plant are not available at this stage. In terms of the potential noise effects, excavation/earthworks/regrading using heavy plant is likely to be the source of the main impacts at nearby NSRs. The construction and fitting out of the new buildings are likely to result in lower noise levels.

10.122. Notwithstanding this, Table 10.27 sets out the key construction activities which have been assumed including the plant type, number and assumed utilisation (percentage 'on-time') used in the prediction of noise levels. These were taken from BS 5228 Annex C which details current sound level data on site equipment and site activities, and BWB source data where data was not available in BS 5228.

Table 10.27: Assumed construction plant details

Element	Construction phase/activity	Plant type (BS 5228 ref data)	Sound pressure level dB at 10m	Number of plant	Assumed percentage 'on-time'
1	Site preparation works including demolition, earthworks	Tracked Excavator [C2.19]	77	10	50
		Wheeled Loader [C2.28]	76	10	50
		Dump Truck [C2.30]	79	15	50
		Diesel Generator [C4.79]	64	3	100
2	Foundation works involving concreting plant, trucks and	Poker Vibrator [C4.33]	78	4	75

Element	Construction phase/activity	Plant type (BS 5228 ref data)	Sound pressure level dB at 10m	Number of plant	Assumed percentage 'on-time'
	lorries	Concrete pump and a cement mixer truck [C4.24]	67	4	50
		Concrete mixer truck [C4.18]	75	10	75
		Tracked excavators [C2.19]	77	3	50
		Dump truck [C2.30]	79	2	50
		Vibratory Plate [C2.41]	80	4	50
		Vibro-displacement rig [C3.27]	80	4	75
		Lorry Arriving [BWB source data]	66	1	25
3	Building erection works involving lorries, tracked cranes and hand-held tools	Lorry Arriving [BWB source data]	66	8	25

Element	Construction phase/activity	Plant type (BS 5228 ref data)	Sound pressure level dB at 10m	Number of plant	Assumed percentage 'on-time'
		Dump truck [C2.30]	79	2	50
		Diesel Generator [C4.79]	64	2	100
		Mobile telescopic crane [C4.45]	82	2	50
		Tracked excavators [C2.19]	77	7	50
		Hand-held nail gun [C4.95]	73	10	10
		Compressor for mini piling [C3.19]	75	4	80
4	Road surfacing including asphalt paving equipment and lorries	Asphalt paver and tipping lorry [C5.30]	75	2	100
		HGV pass-by [BWB source data]	66	2	100

10.123. The likely noise effects were predicted at the NSRs located closest to the site boundaries,

as it is assumed that the impact will be less for those receptors located further away. These predictions were undertaken based upon assumed construction methodologies, including the types and numbers of proposed plant. The predictions have followed the methodology contained within BS 5228 Part 1 and are in terms of the $L_{Aeq,T}$ over the core working day. The assessment considered both an 'average' case scenario and a 'worst-case' scenario, which take the form of the following:

- average case scenario – Construction plant operating in the approximate centre point of the closest area of construction to each NSR; and
- worst-case scenario – Construction plant operating at the closest point to a given NSR.

10.124. Predictions were carried out to determine noise levels likely to be generated by each of the above activities. For the purpose of these predictions, the intervening ground between the construction noise sources and the receivers is considered to be 50% acoustically absorbent. Where screening exists due to existing buildings, a screening correction of 10dB has been included. It has also been assumed that no construction activities will be undertaken on Burbage Common Road, between the Main HNRFI Site and the B581.

10.125. For the worst-case scenario, it has been assumed that stages 1, 2 and 4 could take place within 5m of the Main DCO limits. For stage 3, the distance has been measured to the closest area of hard standing associated with the proposed units, as shown on the illustrative masterplan.

10.126. For the average case scenario, it has been assumed that the site preparation and foundation works could be associated with the proposed roads, where these elements are closest to the NSRs. For NSRs that cover a large area, such as NSRs 15 to 19, the area closest to each phase of the construction area has been considered. The location of NSRs is shown on Figure 6.3.10.1.

10.127. Table 10.28 sets out the predicted unmitigated construction noise levels at a selection of the nearest NSRs, for the average and worst-case situations as described above. In accordance with BS 5228, caution needs to be given when calculating noise levels at distances greater than 300m, due to the increasing effects of meteorological conditions. Therefore, receptors which are located at a greater distance than 300m from the site boundary have not been included within the following assessment.

10.128. The assessment criterion was adopted in accordance with the ABC method as detailed in BS 5228, based on the daytime measured noise levels as detailed in Tables 10.20 to 10.23. The measured ambient noise levels are below 65dB at all locations, when rounded to the nearest 5dB. Where measured data is not available, the lower criterion of 65dB has been applied. The highlighted cells show the NSRs where the 65dB criterion is predicted to be exceeded due to construction noise. The resultant level at the NSR is a free-field level.

Table 10.28: Predicted unmitigated average/worst-case construction phase noise levels

NSR	Phase of construction works							
	Average case (dB $L_{Aeq,T}$)				Worst-case (dB $L_{Aeq,T}$)			
	1	2	3	4	1	2	3	4
1	66	66	*	55	72	72	50	60
9**	58	58	55	46	84	84	69	73
10	*	*	*	*	56	56	48	44
14	*	*	*	*	66	66	57	54
15**	58	58	55	46	90	90	59	79
16	*	*	*	*	62	62	*	50
17	*	*	*	*	90	90	*	79
18**	58	58	55	46	90	90	58	79
19**	58	58	55	46	78	78	*	66
20	59	59	*	47	87	87	*	75
21	63	63	*	51	73	73	*	61
22	59	59	*	47	63	63	*	52
24**	58	58	55	46	79	79	65	67

NSR	Phase of construction works							
	Average case (dB $L_{Aeq,T}$)				Worst-case (dB $L_{Aeq,T}$)			
	1	2	3	4	1	2	3	4
26**	58	58	*	46	67	67	59	55

**Where construction activities are predicted to be undertaken at a distance greater than 300m, the results are not reported. However, at distances greater than 300m, the noise levels are likely to be below the lower criteria of 65dB.*

*** A distance of 300m has been assumed for these receptors, however it is likely that construction activities will take place at a greater distance for the majority of the time.*

10.129. For works outside the daytime hours of 7am – 7pm as considered in BS 5228-1, additional limit values should be agreed with BDC and HBBC. As a conservative approach, based on the lower threshold limit being applied for the main daytime works, the interim Saturday morning limit value and the evening (after 7pm) and Sunday/Bank Holiday value could both be a lower limit of 55 dB L_{Aeq}.

10.130. The unmitigated effect of construction noise is likely to be a temporary, major adverse at worst for NSRs, based on construction taking place close to NSRs. However, for most receptors, for the average case scenarios, the noise levels are predicted to be below the criterion of 65dB, resulting in a temporary, minor adverse effect. For NSRs 1, there is predicted to be slight exceedance of the criterion resulting in a temporary, moderate adverse impact.

10.131. However, the above assessment is based on both an average and worst-case scenario and does not take in account any screening afforded by onsite buildings once they are built out or any mitigation. It is possible that the effect could be lower than this, and any major adverse effect would be short-term.

10.132. It is acknowledged that the construction phase is likely to be undertaken over a period of up to 10 years. However, it is considered unlikely that construction would take place close to receptors over a prolonged period. For the average case scenario, exceedances are predicted for elements 1 and 2, which relate to ground preparation. It is unlikely that these elements would take place for a significant amount of time without some screening being afforded by other phases of the Proposed Development as it is built out.

10.133. Based upon the above, recommendations for appropriate mitigation are presented in the mitigation measures section below.

Construction traffic

10.134. An assessment of construction traffic has been undertaken based on construction traffic data provided by BWB Consulting for the peak year 2026. The roads included within the assessment are those which are likely to experience at least a 25% increase in total vehicles or at least a 2% increase in HGVs as a result of the Proposed Development. This equates to around a 1dB increase in the noise level and therefore should be scoped into the assessment, in accordance with DMRB.

10.135. Road traffic noise calculations were carried out in accordance with CRTN, being undertaken for a notional receptor location 10m from the edge of the carriageway of each road considered, and 1.5m above ground level. A notional receptor was used because the change in road traffic noise level adjacent to any given road will be the same at all distances where noise from that route is dominant. Traffic noise calculations were undertaken to establish the change in weekday daytime $L_{A10,18h}$ noise level for the peak year 2026.

10.136. Road traffic speeds have been applied based on information provided by the Transport Consultant. Roads which are predicted to have low flows (i.e less than 1,000 vehicles) have been removed from the assessment as these are outside the scope of CRTN. The assessment is based on one-way or two-way flows for each link, dependant on the road type.

10.137. For all road links assessed in the peak year of 2026, the predicted increase is up to +0.6dB which in accordance with DMRB is likely to result in a temporary, negligible, adverse effect during the daytime as a result of the construction traffic for the peak year 2026. The results of the assessment are shown in Appendix 6.2.10.11.

Construction vibration

10.138. In order to determine the potential impact from vibration during the construction phase, groundborne vibration calculations were performed for typical site preparation/construction activities/machinery based on the empirical prediction procedures presented within BS 5228-2:2009 and Transport Research Laboratory RR 246 Traffic induced vibrations in buildings[37] (applicable to HGV induced vibration).

10.139. Such predictions were performed in order to determine the possible distances at which the adopted magnitude of effect criteria may be registered. In this regard, the following groundborne vibration levels and associated distances were identified for a sample of typical construction vibration sources.

10.140. It should be noted that there may be a variety of different potential vibration generating activities employed during construction phase other than those presented below, although it is considered that those presented represent some of the worst that could be encountered. The data presented within Table 10.29 are general in nature and not

[37] *Transport Research Laboratory RR 246 Traffic induced vibrations in buildings*

specific to any one site; however, the vibration levels and associated distances can be used to determine the typical distances at which specific impacts may be registered.

Table 10.29: Predicted ground-borne vibration levels applicable to typical vibration generating site preparation/construction activities

Operation	Distance (m)	Peak Particle Velocity (PPV) (mm/s)
Rotary bored piling – auger hitting base	45	0.3
	14	1.0
	1.4	10
Rotary bored piling – driving case	75	0.3
	23	1.0
	2.3	10
HGVs[1]	50	0.3[2]
	17	1.0[2]
	2.5	10[2]

[1] *Assume max height/depth of surface defect of 50mm, max speed of 30km/h, and that surface defect occurs at both wheels.*

[2] *Where alluvium soils are present, higher vibration levels can be expected.*

10.141. Based on a worst-case receptor distance of 25m from any proposed works, the impact magnitude of potential vibration effects can be determined. The above activities are likely to result in a temporary minor, adverse effect at the majority of NSRs, which would result in vibration levels between 0.3mm/s and 1.0mm/s. For NSRs 1, 9, 10, 15 through 19 and 24, which are located either within or adjacent to the Main HNRFI Site, there is the potential for a temporary, moderate adverse effect to be experienced should proposed works be undertaken at distances closer than 25m. However, should any vibration generating works be undertaken close to the Main HNRFI Site boundary, any

effect would be short-term and temporary in nature.

10.142. Given the likely setback distances and techniques, it is likely that any effect would be limited to a temporary, negligible adverse effect for the majority of the NSRs, which would result in vibration levels less than 0.3mm/s. Outline recommendations are provided in order to minimise the effects of vibration upon existing nearby NSRs.

Completed development

10.143. The Proposed Development has the potential to impact on nearby NSRs. The assessment has considered the following:

- noise from HGV movements, loading/unloading operations, lorry park and service yard areas, including SRFI operations, which includes on-site rail movements and loading/unloading operations using gantry cranes and reach stackers;
- noise from fixed plant and equipment on the Proposed Development, including the proposed energy centre;
- noise from proposed off-site rail movements;
- vibration from off-site rail movements;
- noise from road traffic once the development is operational, including noise from the proposed A47 Link Road;
- The effect of operational noise on re-routed public rights of way; and
- The effect of operational noise on local tranquillity.

Noise model

10.144. To assess the potential noise impacts from noise associated with the operational phase of the HNRFI on NSRs, a noise model has been created using CadnaA© noise modelling software to establish the potential future noise levels from proposed operations.

10.145. The noise model was generated applying the following methodology:

- For industrial/commercial noise sources, the noise model was set to apply the noise prediction methodology set out in ISO 9613-2: Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation[38];
- Mapping of the Site and the surrounding area was calibrated into the noise model based on known Ordinance Survey grid reference points;

[38] *ISO 9613-2: Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.*

- Indicative ground topography was approximated using Lidar data at 2m;
- Future indicative on Site topography has been provided by the project engineers and included within the model;
- Off-site buildings which would provide screening to the Site have been incorporated as reflective façades;
- To reflect the local ground cover with the Proposed Development in place, ground absorption was set to G = 0.5 (50% acoustically absorptive ground). The absorption was set to 1.0 (100% acoustically absorptive ground) for the area between the SRFI and receptors to the north;
- The model was set to include second order reflected noise from solid structures;
- An illustrative layout has been incorporated into the noise model in order to account for screening that is provided by the development itself; and
- Units 5 and 8 have been modelled at a height of 28m, and the remaining units have been modelled at a height of 22m.

Noise from HGV movements, loading/unloading operations and service yard areas, including SRFI operations

10.146. Activities associated with HGV movements, the loading/unloading of vehicles onsite, and SRFI operations have been assessed in accordance with BS 4142.

10.147. Noise from HGV movements and deliveries were included in the model using noise data from a library of historical measurement data, which has been collected during surveys undertaken at similar developments. The masterplan indicates that units will incorporate both dock levellers and entry level doors, therefore this has been considered when selecting the noise data to be used within the assessment. The noise levels used within the assessment are presented in Tables 10.30, 10.31, 10.32, 10.33, and 10.34.

Table 10.30: Summary of historic loading and unloading noise data used in the assessment – Dock leveller

Description	**Time**	**L_{Aeq} at 10m (dB(A))**
Daytime		
HGV arriving	2 minutes	51
Loading/unloading noise	43 minutes	54

Description	**Time**	**L_{Aeq} at 10m (dB(A))**
HGV departing	1 minute	46
HGV Decoupling	1 minute	34
Total		**56 dB $L_{Aeq,1h}$**
Night-time		
HGV arriving	2 minutes	57
Loading/unloading noise	12 minutes	55
HGV Decoupling	1 minute	46
Total		**59dB $L_{Aeq,15m}$**

Table 10.31: Summary of historic loading and unloading noise data used in the assessment – Entry level door

Description	**Time**	**L_{Aeq} at 10m (dB(A))**
Daytime		
HGV Delivery including arriving/departing, impact noise and cargo being wheeled	46 minutes	58
HGV Decoupling	1 minute	34
Total		**58 dB $L_{Aeq,1h}$**
Night-time		

Description	Time	L_{Aeq} at 10m (dB(A))
HGV Delivery including arriving/departing, impact noise and cargo being wheeled	14 minutes	59
HGV Decoupling	1 minute	46
Total		**60 dB $L_{Aeq,15m}$**

Table 10.32: Summary of historic HGV passby noise data used in the assessment

Source	Measurement Distance (m)	Measurement Duration (s)	dB $L_{Aeq,T}$	dB $L_{Af,max}$
HGV pass-by*	5	6	73	78

* *This data has also been used for refrigerated HGVs*

Table 10.33: Summary of historic tug activity data used within the assessment

Source	Measurement Distance (m)	Measurement Duration (s)	dB $L_{Aeq,T}$	dB $L_{Af,max}$
Tug activity	7	66	76	94

Table 10.34: Summary of historic tug pass-by noise data used within the assessment

Source	Measurement Distance (m)	Measurement Duration (s)	dB $L_{Aeq,T}$	dB $L_{Af,max}$
Tug passby	3	10	74	82

10.148. Deliveries and HGV movements have been included in the noise model using the following:

- Noise from deliveries have been included in the model as a point source with a height of 1.5m.

- The noise from HGV and tug passbys have been included within the model as a line source with a height of 1.5m.

- Fridge packs associated with chilled HGVs have been included in the noise model as a line noise with a height of 4m.

- For the daytime and night-time periods, the number of HGVs used within the assessment for the whole site is based on the worst-case hour provided by the Transport Consultant. There is predicted to be 522 (1500-1600) two-way movements in a worst-case hour during the daytime, and 354 (0600-0700) two-way movements in a worst-case hour during the night-time. Out of these, the number of HGV movements associated with the rail port element is 156 two-way movements during a worst-case hour during the daytime (1600-1700) and 117 two-way movements during a worst-case hour during the night-time (0600-0700).

- The peak hour associated with the rail port has been subtracted from the peak hour associated with the whole development to determine the number of HGV movements associated with the B8 use. The total number of movements has been divided up between the units based on the total percentage of delivery bays associated with each unit. The bay occupancy has been assumed to be half of the two-way movements. This ensures that each movement is accounted for and provides a realistic distribution to each unit based on the number of delivery bays. The assumed number of deliveries and bay occupancy for each unit are shown below in Table 10.35 for the daytime and night-time periods. The total number of movements for the night-time has been divided by four to approximate a 15-minute period.

Table 10.35: Number of assumed deliveries and bay occupancy to each unit

Unit	Daytime		Night-time	
	Assumed number of pass-bys per hour during the daytime	**Assumed number of occupied bays per hour during the daytime**	**Assumed number of pass-bys per 15m during the night-time**	**Assumed number of occupied bays per 15 minutes during the night-time**
1	61	30	10	5
2	18	9	3	1

Unit	Daytime		Night-time	
	Assumed number of pass-bys per hour during the daytime	Assumed number of occupied bays per hour during the daytime	Assumed number of pass-bys per 15m during the night-time	Assumed number of occupied bays per 15 minutes during the night-time
3	20	10	3	2
4	32	16	5	3
5	22	11	4	2
6	96	48	16	8
7	37	19	6	3
8	27	14	4	2
9	52	26	8	4
Rail Terminal	156	-	117	-

- For the purposes of the model, a single unit of activity associated with the B8 units is defined as a complete HGV departure and return cycle, whereby one HGV enters the SRFI and parks, one tug picks up the trailer from the HGV, takes it to the unit dock where it is loaded, and returns the trailer to a parking space and one HGV starts up, picks up another trailer and leaves the SRFI, all within the same hour during the daytime, and 15 minute period during the night-time.

- The noise levels from tug pass-bys have been corrected for distance to 10m and time based on the assumed number of pass-bys associated with each unit. These have been included in the model as a line source at a height of 1.5m.

- The number of tug pass-bys and associated activity is the same as the number of HGV movements and bay occupancy.

10.149. For HGVs associated with the rail terminal, the following assumptions have been made;

- Of the total movements, 70% of the total rail terminal movements will enter and exit the SRFI via the A47 Link Road, and 30% of the total movements will serve the SRFI internally, 15% of which will make use of the lorry park area.
- Of the total rail terminal movements, 85% of these will be for ambient goods and 15% will be for chilled goods, and therefore these will have a refrigerated element associated with them.
- The movements associated with the 85% will enter and exit the rail terminal using the rail returns road. Of the total movements, the remaining 15% will be refrigerated tugs and will serve the Proposed Development itself, accessing the units via the Railport Estate Road Link between units 7 and 8.
- The movements around the rail terminal have assumed to be one-way. It has been assumed that HGVs accessing the container stacks would not complete a circuit around the terminal but would instead access the required stack and then loop back round. As there are 4 container stacks, it has been assumed that 25% of the ambient movements would service each stack.
- Three of the four container stacks have connectivity to the frame to serve reefers. Therefore, of the total chilled movements, it has been assumed that 33% of the movements would serve each of the three reefer stacks.
- Noise associated with the lorry park area has been included within the model as point sources to include the arrival/departure of each HGV as detailed in Table 10.30.

10.150. For HGV movements, the calculations detailed in BS 5228 Part 1, for calculating sound power levels (SWL) from mobile plant and haulage routes have been used, which are reproduced in equations (a) and (b) below.

(a) SWL = LAmax@10m + 28

(b) L_{Aeq} = SWL – 33 +10log(Q) – 10log(V) – 10log (d)

Where Q is the flow (number of vehicles per hour);

V is the average spend of the vehicles in km/h, assumed to be 48km/h; and

D is the distance (m) of the receiver position, assumed to be 10m.

10.151. In the absence of specific data, the following sources have also been included within the assessment, detailed below in Table 10.36.

Table 10.36: Adopted noise emission data used in the assessment

Equipment	Sound power L_{WA} dBA	Modelled height	Assumed number of sources		Assumed % on-time
			Day	Night	
Reach stacker[1]	104	2m	8	4	50
Reach Stacker within the Rail Returns Area [1]	108	2m	1	1	50
RTG crane engine[2]	109	28m	3	3	50
RTG crane exhaust[2]	105	28m	3	3	50
Class 66 idling or pulling away[2]	106	4m	10	10	10

[1] Data obtained from East Midlands Gateway – Rail Freight Terminal Noise Assessment

[2] Date obtained from RPS Proof of Evidence of Simon Stephenson on Noise

10.152. Octave band levels for the equipment are shown below in Table 10.37. Where necessary, $L_{Aeq,T}$ noise levels have been corrected for distance to 10m and the sound pressure for each octave converted to SWLs, using the following equation.

$$SWL = L_{Aeq}@10m + 28$$

Table 10.37: Octave band sound power levels (SWLs) for sources

Source	Octave band sound power levels (L_w dB)							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Delivery noise- Dock leveller	99	90	85	85	86	84	83	83
Delivery noise – Entry level door	88	85	83	83	85	79	73	67
HGV pass-by	116	102	94	93	97	92	91	84
Tug pass-by	105	103	101	102	97	92	87	79
Tug activity	114	107	101	100	100	95	91	84
Reach stacker (SANY G Class)	105	105	104	100	96	99	88	81
Reach Stacker within the rail returns area (ECH: SANY SDCY80K/100K)	109	109	108	104	100	103	92	85
RTG crane engine	105	113	110	106	103	100	95	90
RTG crane exhaust	109	119	109	91	84	82	76	70
Class 66 idle or pulling away	116	104	101	105	102	95	90	76

10.153. It is understood that there will be a number of refrigerated/chilled containers associated with the Proposed Development. To account for these, 150 reefer containers have been included within the noise model, across 4 container stacks, up to a maximum of 5 high. It has been assumed that each container is 2.6m high and that the refrigeration source

will be at a height of 1.3m for each container. The source data used within the assessment is detailed below in Table 10.38. In the absence of octave data, the source has been included within the model at a single frequency of 500Hz, in line with ISO9613.

Table 10.38: Summary of historic reefer container data used in the assessment

Source	Measurement Distance (m)	dB $L_{Aeq,T}$
Reefer	1.5	78

10.154. The assessment is based on the following assumptions:

- The site will operate for the whole 24-hour period.
- For the daytime, each delivery event includes the HGV arriving and leaving, and for the night-time, it is assumed that the HGV will not arrive and leave within the same 15-minute period. The number of HGV passbys is based upon the provisional data provided by the Transport Consultant and described above.
- It has been assumed that there will be dock levellers and entry level loading bays associated with each unit. It has been assumed that entry level bays are located towards the ends of the delivery areas of each unit.
- It has been assumed that a class 66 locomotive will be used to shunt wagons on the sidings. This has been modelled as 10-point sources spread on the proposed sidings, each with an on-time of 10% to account for the slow movement of the train.
- All the visits would be for loading/unloading purposes.
- All the above operations happen during each of the deliveries/collections to the site, as a worst-case.

10.155. Based on the above information, the predicted daytime and night-time noise levels have been calculated at the NSRs, as identified in Table 10.14 without any mitigation in place. The noise level from operations at the Proposed Development site have been modelled in external garden areas at a height of 1.5m during the daytime, and at first floor facades during the night-time. For NSRs 15, 16 and 17, the night-time levels have been predicted at ground floor facades.

10.156. For NSRs that have been identified as farms, the assessment has been undertaken at the residential elements. It is considered that NSRs 18 and 19 are not sensitive during the night-time, therefore this period has not been considered for theses receptors.

10.157. A penalty of 2dB has been applied to account for tonality associated with the gantry

cranes which is likely to be just perceptible at NSRs 1 through 8, 19, 20, 25 and 26. A 4dB penalty has been applied at NSR24, to account for tonality which is likely to be clearly perceptible.

10.158. A penalty of 3dB has been applied to account for impulsivity associated with the Proposed Development which is likely to be just perceptible at NSRs 2 through 8, 15 through 20, 25 and 26. A 6dB penalty has been applied at NSR24, to account for impulsivity which is likely to be clearly perceptible.

10.159. To account for impulsivity at NSRs 9 and 10, a penalty of 6dB and 3dB has been applied respectively.

10.160. Given the intervening distance between the Proposed Development and NSRs 12 through 14, and the presence of the M69, it is considered that any character associated with HGV deliveries is unlikely to be noticeable against the existing noise climate at these NSRs. Therefore, no penalties have been applied.

10.161. Although operations will include activities which are individually intermittent, it is considered that many of these operations will overlap, which will give the impression of the site operating consistently.

10.162. The L_{A90} value used for each period is the lowest calculated L_{A90} value reported in Tables 10.20 to 10.23.

10.163. The BS 4142 assessment for the weekday and weekend daytime and night–time periods is shown below in Tables 10.39, 10.40, 10.41, and 10.42 below. From a review of available aerial photography, NSRs 5 and 9 do not appear to have any residential elements associated with them and are therefore not considered to be a sensitive receptor during the night-time.

Table 10.39: Operational noise assessment – Weekday daytime (0700-2300)

NSR	Description					
	Specific noise level (dB L_s)	**Acoustic correction feature**	**Rating level (dB $L_{A,Tr}$)**	**Background (dB L_{A90})**	**Excess over background**	**Magnitude of impact**
1	49	+2	51	39	+12	**High**
2	50	+5	55	39	+16	**High**

NSR	Description					
	Specific noise level (dB L_s)	Acoustic correction feature	Rating level (dB $L_{A,Tr}$)	Background (dB L_{A90})	Excess over background	Magnitude of impact
3	48	+5	53	39	+14	**High**
4	50	+5	55	39	+16	**High**
5	49	+5	54	39	+15	**High**
6	49	+5	54	39	+15	**High**
7	51	+5	56	39	+17	**High**
8	49	+5	54	39	+15	**High**
9	50	+6	56	50	+6	**Medium**
10	50	+3	53	50	+3	**Low**
11	45	-	45	50	-5	**Very Low**
12	29	-	29	50	-21	**Very Low**
13	27	-	27	50	-23	**Very Low**
14	40	-	40	49	-9	**Very Low**
15	43	+3	46	49	-3	**Very Low**
16	42	+3	45	49	-4	**Very Low**

NSR	Description					
	Specific noise level (dB L_s)	**Acoustic correction feature**	**Rating level (dB $L_{A,Tr}$)**	**Background (dB L_{A90})**	**Excess over background**	**Magnitude of impact**
17	42	+3	45	49	-4	**Very Low**
18	42	+3	45	36	+9	**High**
19	50	+5	55	36	+19	**High**
20	44	+5	49	36	+13	**High**
24	57	+10	67	39	+28	**High**
25	52	+5	57	39	+18	**High**
26	49	+5	54	39	+15	**High**

10.164. During the daytime on a weekday, noise levels associated with the operation of the SRFI are between -24 and +28 dB above the measured background sound levels during the daytime, dependent on the NSR.

10.165. The unmitigated effect of operational noise associated with the SRFI is likely to be a permanent, major adverse effect at worst for NSRs located closest to the Proposed Development during the daytime on a weekday. For NSR 9, the effect is predicted to be permanent, moderate adverse. For NSR 10, the effect is predicted to be permanent, minor adverse and for NSRs 12 through to 17, the effect is predicted to be permanent, negligible adverse. The above effects are dependent on context, which is discussed further below.

Table 10.40: Operational noise assessment – Weekday, night-time (2300-0700)

NSR	Description					
	Specific noise level (dB L_s)	Acoustic correction feature	Rating level (dB $L_{A,Tr}$)	Background (dB L_{A90})	Excess over background	Magnitude of impact
1	52	+2	54	38	+16	**High**
2	51	+5	56	38	+18	**High**
3	48	+5	53	38	+15	**High**
4	50	+5	55	38	+17	**High**
5	-	-	-	-	-	-
6	50	+5	55	38	+17	**High**
7	50	+5	55	38	+17	**High**
8	48	+5	53	38	+15	**High**
9	-	-	-	-	-	-
10	40	+3	43	46	-3	**Very Low**
11	46	-	46	46	0	**Low**
12	36	-	36	46	-10	**Very Low**
13	37	-	37	46	-9	**Very Low**

NSR	Description					
	Specific noise level (dB L_s)	**Acoustic correction feature**	**Rating level (dB $L_{A,Tr}$)**	**Background (dB L_{A90})**	**Excess over background**	**Magnitude of impact**
14	40	-	40	44	-4	**Very Low**
15	42	+3	45	44	+1	**Low**
16	39	+3	42	44	-2	**Very Low**
17	40	+3	43	44	-1	**Very Low**
18	-	-	-	-	-	-
19	-	-	-	-	-	-
20	43	+5	48	37	+11	**High**
24	57	+10	67	38	+29	**High**
25	49	+5	54	38	+16	**High**
26	49	+5	54	38	+16	**High**

10.166. During the night-time on a weekday, noise levels associated with the operation of the SRFI are between -10 and +29 dB above the measured background noise levels during the night-time, dependent on the NSR.

10.167. The unmitigated effect of operational noise associated with the SRFI is likely to be a permanent, major adverse effect at worst for NSRs located closest to the Proposed Development during the night-time on a weekday. For NSRs located further away from the Proposed Development, the effect is likely to be permanent, minor adverse and permanent, negligible adverse. The above effects are dependent on context.

Table 10.41: Operational noise assessment – Weekend daytime (0700-2300)

NSR	Description					
	Specific noise level (dB L_s)	Acoustic correction feature	Rating level (dB $L_{A,Tr}$)	Background (dB L_{A90})	Excess over background	Magnitude of impact
1	49	+2	51	41	+10	**High**
2	50	+5	55	41	+14	**High**
3	48	+5	53	41	+12	**High**
4	50	+5	55	41	+14	**High**
5	49	+5	54	41	+13	**High**
6	49	+5	54	41	+13	**High**
7	51	+5	56	41	+15	**High**
8	49	+5	54	41	+13	**High**
9	50	+6	56	50	+6	**Medium**
10	50	+3	53	50	+3	**Low**
11	45	-	45	50	-5	**Very Low**
12	29	-	29	50	-21	**Very Low**
13	27	-	27	50	-23	**Very Low**

NSR	Description					
	Specific noise level (dB L_s)	**Acoustic correction feature**	**Rating level (dB $L_{A,Tr}$)**	**Background (dB L_{A90})**	**Excess over background**	**Magnitude of impact**
14	40	-	40	51	-11	**Very Low**
15	43	+3	46	51	-5	**Very Low**
16	42	+3	45	51	-6	**Very Low**
17	42	+3	45	51	-6	**Very Low**
18	42	+3	45	38	+7	**Medium**
19	50	+5	55	38	+17	**High**
20	44	+5	49	38	+11	**High**
24	57	+10	67	41	+26	**High**
25	52	+5	57	41	+16	**High**
26	49	+5	54	41	+13	**High**

10.168. During the daytime on a weekend, noise levels associated with the operation of the SRFI are between -24 and +26 dB above the measured background noise levels during the daytime, dependent on the NSR. Therefore, at worst, there will be a permanent, major adverse effect, depending on context.

10.169. The unmitigated effect of operational noise associated with the SRFI is likely to be a permanent, major adverse effect at worst for NSRs located closest to the Proposed Development during the daytime on a weekend. For NSRs 9 and 18, the effect is likely to be permanent, moderate adverse. For the majority of NSRs located further away from the Proposed Development, the effect is likely to be permanent, negligible adverse. The

above effects are dependent on context.

Table 10.42: Operational noise assessment – Weekend, night-time (2300-0700)

NSR	Description					
	Specific noise level (dB L_s)	Acoustic correction feature	Rating level (dB $L_{A,Tr}$)	Background (dB L_{A90})	Excess over background	Magnitude of impact
1	52	+2	54	37	+17	**High**
2	51	+5	56	37	+19	**High**
3	48	+5	53	37	+16	**High**
4	50	+5	55	37	+18	**High**
5	-	-	-	-	-	-
6	50	+5	55	37	+18	**High**
7	50	+5	55	37	+18	**High**
8	48	+5	53	37	+16	**High**
9	-	-	-	-	-	-
10	40	+3	43	41	+2	**Low**
11	46	-	46	41	+5	**Medium**
12	36	-	36	41	-5	**Very Low**
13	37	-	37	41	-4	**Very Low**

NSR	Description					
	Specific noise level (dB L_s)	**Acoustic correction feature**	**Rating level (dB $L_{A,Tr}$)**	**Background (dB L_{A90})**	**Excess over background**	**Magnitude of impact**
14	40	-	40	43	-3	**Very Low**
15	42	+3	45	43	+2	**Low**
16	39	+3	42	43	-1	**Very Low**
17	40	+3	43	43	0	**Low**
18	-	-	-	-	-	-
19	-	-	-	-	-	-
20	43	+5	48	35	+13	**High**
24	57	+10	67	37	+30	**High**
25	49	+5	54	37	+17	**High**
26	49	+5	54	37	+17	**High**

10.170. During the night-time on a weekend, noise levels associated with the operation of the SRFI are between -5 and +30 dB above the measured background noise levels during the night-time, dependent on the NSR.

10.171. The unmitigated effect of operational noise associated with the SRFI is likely to be a permanent, major adverse at worst for NSRs located closest to the Proposed Development during the night-time on a weekend. For NSR 11, the effect is likely to be permanent, moderate adverse. For the majority of NSRs located further away from the Proposed Development, the effect is likely to be permanent, minor adverse and permanent, negligible adverse.

10.172. The above effects are dependent on context, which is discussed below.

Context

10.173. The results of the assessment indicate that adverse impacts may be experienced at NSRs during the periods under consideration. However, BS 4142 states that '*the significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs*'. Therefore, the context has been considered below for those receptors that may experience adverse impacts as a result of operational noise associated with the Proposed Development.

10.174. BS 4142 goes on to state that 'where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background'.

10.175. The sound rating levels have been compared to the existing noise climate at each receptor where an adverse impact is predicted, for the daytime and night-time for both the weekday and weekend periods.

Table 10.43: Increase in ambient noise levels – Weekday

Increase in noise level due to operational noise from the SRFI – Weekday, dB								
NSR	**Daytime (0700 – 2300)**				**Night-time (2300 – 0700)**			
	Rating level	**Ambient level**	**Rating + ambient**	**Increase**	**Rating level**	**Ambient level**	**Rating + ambient**	**Increase**
1	51	59.2	59.8	**+0.6**	54	56.2	58.2	**+2.0**
2	55	59.2	60.6	**+1.4**	56	56.2	59.1	**+2.9**
3	53	59.2	60.1	**+0.9**	53	56.2	57.9	**+1.7**
4	55	59.2	60.3	**+1.4**	55	56.2	58.7	**+2.5**
5	54	59.2	60.3	**+1.1**	-	-	-	**-**
6	54	59.2	60.3	**+1.1**	55	56.2	58.7	**+2.5**

Increase in noise level due to operational noise from the SRFI – Weekday, dB								
NSR	**Daytime (0700 – 2300)**				**Night-time (2300 – 0700)**			
	Rating level	**Ambient level**	**Rating + ambient**	**Increase**	**Rating level**	**Ambient level**	**Rating + ambient**	**Increase**
7	56	59.2	60.9	**+1.7**	55	56.2	58.7	**+2.5**
8	54	59.2	60.3	**+1.1**	53	56.2	57.9	**+1.7**
9	56	53.6	58	**+4.4**	-	-	-	**-**
10	53	53.6	56.3	**+2.7**	43	52.5	53	**+0.5**
11	45	53.6	54.2	**+0.6**	46	52.5	53.4	**+0.9**
18	45	57.4	57.6	**+0.2**	-	-	-	**-**
19	55	57.4	59.4	**+2.0**	-	-	-	**-**
20	49	57.4	58.0	**+0.6**	48	55.5	56.2	**+0.7**
24	67	59.2	67.7	**+8.5**	67	56.2	67.3	**+11.1**
25	57	59.2	61.2	**+2.0**	54	56.2	58.2	**+2.0**
26	54	59.2	60.3	**+1.1**	54	56.2	58.2	**+2.0**

10.176. Table 10.43 shows that for the majority of NSRs, the existing ambient noise levels are predicted to increase by up to 2.9dB during the weekday daytime and night-time as a result of the proposed operations of the SRFI.

10.177. This level of change is considered marginal and would barely be perceptible to the human ear with changes of 3dB only just perceptible under conditions 'in the field' (i.e.

in practical or 'real world' conditions). This relates to noise that is continuous and similar in nature to the existing noise, however using the rating level, rather than the specific level accounts for this. As such, an increase of 2.9dB is considered to be low, which is likely to result in a permanent, minor adverse effect, when context is taken into consideration.

10.178. For NSRs 9 and 24 the existing ambient noise levels is predicted to increase significantly. Therefore, this is likely to result in a permanent, major adverse effect at worst.

Table 10.44: Increase in ambient noise levels – Weekend

Increase in noise level due to operational noise from the SRFI – Weekend, dB								
NSR	**Daytime**				**Night-time**			
	Rating level	**Ambient level**	**Rating + ambient**	**Increase**	**Rating level**	**Ambient level**	**Rating + ambient**	**Increase**
1	51	53.7	55.6	**+1.9**	54	50.1	55.5	**+5.4**
2	55	53.7	57.4	**+3.7**	56	50.1	57.0	**+6.9**
3	53	53.7	56.4	**+2.7**	53	50.1	54.8	**+4.7**
4	55	53.7	57.4	**+3.7**	55	50.1	56.2	**+6.1**
5	54	53.7	56.9	**+3.2**	-	-	-	**-**
6	54	53.7	56.9	**+3.2**	55	50.1	56.2	**+6.1**
7	56	53.7	58.0	**+4.3**	55	50.1	56.2	**+6.1**
8	54	53.7	56.9	**+3.2**	53	50.1	54.8	**+4.7**
9	56	54.4	58.3	**+3.9**	-	-	-	**-**
10	53	54.4	56.8	**+2.4**	43	49.6	50.5	**+0.9**

Increase in noise level due to operational noise from the SRFI – Weekend, dB								
NSR	**Daytime**				**Night-time**			
	Rating level	**Ambient level**	**Rating + ambient**	**Increase**	**Rating level**	**Ambient level**	**Rating + ambient**	**Increase**
11	45	54.4	54.9	**+0.5**	46	49.6	51.2	**+1.6**
18	45	51.8	52.6	**+0.8**	-	-	-	**-**
19	55	51.8	56.7	**+4.9**	-	-	-	**-**
20	49	51.8	53.6	**+1.8**	48	46.9	50.5	**+3.6**
24	67	53.7	67.2	**+13.5**	67	50.1	67.1	**+17.0**
25	57	53.7	58.7	**+5.0**	54	50.1	55.5	**+5.4**
26	54	53.7	56.9	**+3.2**	54	50.1	55.5	**+5.4**

10.179. Table 10.44 shows that for the majority of NSRs during the daytime on a weekend, the existing ambient noise levels are predicted to increase by up to 3.9dB as a result of the proposed operation of the SRFI.

10.180. As discussed above, this level of change is considered marginal, and would barely be perceptible to the human ear. As such, an increase of 3.9dB is considered to be low, which is likely to result in a permanent, minor adverse effect when context is taken into consideration.

10.181. For NSRs 1 through 8 and NSRs 24 through 26 during the night-time, and NSRs 9 and 19 during the daytime, the existing ambient noise levels are predicted to increase significantly. Therefore, this is likely to result in a permanent, major adverse effect at worst.

10.182. It is worth noting that the assessment is based on a worst-case 1-hour period for the daytime and 15-minute period for the night-time. Therefore, it is considered reasonable that for other periods, the impacts will be less than those stated above.

10.183. Further consideration has been given to mitigation measures required to allow an appropriate level of protection to existing receptors further in this Chapter.

NSRs 21 to 23 and 27 and 28

10.184. As requested by HBBC during consultation, the resultant operational noise levels associated with the SRFI have also been predicted at NSRs 21, 22 and 23. Although long-term monitoring has not been undertaken in the vicinity of these receptors, the resultant noise levels are provided for reference purposes.

10.185. Due to the distance between the HRNFI and the receptors, it is considered that any character associated with the SRFI is not likely to be noticeable, therefore a penalty in accordance with BS4142 has not been applied.

Table 10.45: Operational noise levels at NSRs 21, 22, 23, 27 and 28 Daytime and Night-time

Description	Daytime (0700 – 2300)					Night-time (2300 – 0700)				
	NSR 21	NSR 22*	NSR 23	NSR 27	NSR 28	NSR 21	NSR 22*	NSR 23**	NSR 27	NSR 28
Specific sound level ($L_{Aeq,T}$) without mitigation	41	45	40	38	39	40	42	-	34	35

*It is unclear where the residential elements of the farm are, therefore a receptor point has been used in the farmyard at a height of 4m.
**Not considered to be sensitive during the night-time.

10.186. The resultant levels at these NSRs are significantly below the predicted ambient noise levels calculated at ML6. It is therefore considered that noise from the SRFI is unlikely to result in adverse impacts at these receptors, and further consideration to mitigation is not required.

Assessment of operational maximum noise levels

10.187. An assessment has been undertaken to determine the impact of transient event noise such as bangs, at nearby NSRs during the night-time. The highest L_{AFmax} noise levels are likely to result from reach stackers and/or cranes handling containers.

10.188. The criterion adopted for the assessment is based on a free-field external level of 60dB L_{AFmax} which should not be exceeded. Based on an open window providing approximately 15dB reduction, in accordance with BS 8233, this would result in an internal level of 45dB $L_{AF,max}$ which is not to be exceeded more than 10-15 times per night, in accordance with WHO Guidelines.

10.189. The following sources have been taken from Appendix 8.5 of the ES chapter for

Northampton Gateway[39], and have been included within the noise model as point sources. The point source has been moved along where it could operate and the worst-case levels for each NSR have been reported.

Table 10.46: Source data for maximum noise levels

Source	Modelled height (m)	Equivalent maximum octave band sound power levels (L_w dB)							
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Gantry crane – spreader impact	20	102	116	115	115	111	106	100	92
Reach stacker – container placement	20	120	122	121	120	116	115	106	102

10.190. The predicted noise levels at the facades of the closest NSRs are detailed below in Table 10.47. As NSRs 5 and 9 are not considered to be sensitive during the night-time, these receptors have not been included within the following assessment.

Table 10.47: Predicted L_{AFmax} noise level at each receptor

NSR	Source	Predicted external $L_{AF,max}$	Level above 60dB L_{AFmax} criterion	Magnitude of impact
1	Spreader impact	61	+1	**Medium**
	Container placement	64	+4	**Medium**
2	Spreader impact	56	-4	**Low**

[39] Appendix 8.5 Summary of assumptions for SRFI operational activities

NSR	Source	Predicted external $L_{AF,max}$	Level above 60dB L_{AFmax} criterion	Magnitude of impact
	Container placement	61	+1	**Medium**
3	Spreader impact	52	-8	**Very Low**
	Container placement	58	-2	**Low**
4	Spreader impact	55	-5	**Low**
	Container placement	61	+1	**Medium**
6	Spreader impact	56	-4	**Low**
	Container placement	61	+1	**Medium**
7	Spreader impact	59	-1	**Low**
	Container placement	64	+4	**Medium**
8	Spreader impact	55	-5	**Low**
	Container placement	61	+1	**Medium**
10	Spreader impact	31	-29	**Very Low**
	Container placement	52	-8	**Very Low**
11	Spreader impact	41	-19	**Very Low**
	Container placement	57	-3	**Low**

NSR	Source	Predicted external $L_{AF,max}$	Level above 60dB L_{AFmax} criterion	Magnitude of impact
20	Spreader impact	51	-9	**Very Low**
	Container placement	56	-4	**Low**
24	Spreader impact	67	+7	**High**
	Container placement	70	+10	**High**
25	Spreader impact	57	-3	**Low**
	Container placement	64	+4	**Medium**
26	Spreader impact	58	-2	**Low**
	Container placement	65	+5	**Medium**

10.191. During the night-time, noise levels associated with impulsive noise are between -29 and +10 dB above the adopted criteria dependent on the NSR and noise source.

10.192. The unmitigated effect of impulsive noise associated with spreader impact is likely to be permanent, major adverse for NSR24 during the night-time. For NSR1, the unmitigated effect is likely to be permanent, moderate adverse. For remaining NSRs, the unmitigated effect is likely to be permanent, minor adverse at worst.

10.193. The unmitigated effect of impulsive noise associated with container placement is likely to be a permanent, major adverse at worst for NSR 24 during the night-time. For NSRs 1, 2, 4, 6, 7, 8, 25 and 26, the effect is likely to be permanent, moderate adverse. For the remaining NSRs, the effect is likely to be permanent, minor adverse and permanent, negligible adverse.

Noise from fixed plant, equipment and break-out noise

10.194. It is anticipated that there may be fixed plant and equipment associated with the Proposed Development that may have the potential to generate noise. This includes break-out noise from the proposed units due to noise generation internally. However, at

this stage, details of the proposed type, number and precise location of any such plant or the nature of its operation are not available. In the absence of detailed information, it is appropriate to specify suitable noise control limits to which any plant, equipment and break-out noise should conform. These limits should include any appropriate corrections for acoustic characteristics, in accordance with BS 4142.

10.195. In the absence of a specific criteria, it is considered that the rating level of fixed plant noise sources should not increase the prevailing background sound level when measured at the nearest NSRs. The cumulative effect of all external plant should be specified so that the rating level is less than to the lowest prevailing background sound level.

10.196. Noise from external plant on the development site should therefore be designed to achieve the noise level limits shown in Table 10.48. It is assumed that if the limits are met at these receptors, then the limits will also be achieved at receptors located further away.

10.197. .

10.198. The HNRFI will include an energy centre incorporating an electricity substation connected to the local electricity distribution network and a gas-fired combined heat and power plant with an electrical generation capacity of up to 10 MW, supported by a 20 MW standby generator. The energy centre will also incorporate a 20 MW battery storage facility to provide electrical supply resilience. Noise from this source would also be subject to the noise limits detailed in Table 10.48.

Table 10.48: Noise limits from fixed plant

NSR	Rating level limit to be achieved (dB $L_{Ar,Tr}$)			
	Weekday		Weekend	
	Daytime (0700-2300)	Night-time (2300-0700)	Daytime (0700-2300)	Night-time (2300-0700)
1	39	40	41	37
2	39	40	41	37
3	39	40	41	37
4	39	40	41	37

NSR	Rating level limit to be achieved (dB $L_{Ar,Tr}$)			
	Weekday		Weekend	
	Daytime (0700-2300)	Night-time (2300-0700)	Daytime (0700-2300)	Night-time (2300-0700)
5	39	40	41	37
6	39	40	41	37
7	39	40	41	37
8	39	40	41	37
9	50	-	50	-
10	50	46	50	41
12	50	46	50	41
13	50	46	50	41
14	49	44	51	43
15	49	44	51	43
16	49	44	51	43
17	49	44	51	43
18	36	37	38	35

NSR	Rating level limit to be achieved (dB $L_{Ar,Tr}$)			
	Weekday		Weekend	
	Daytime (0700-2300)	Night-time (2300-0700)	Daytime (0700-2300)	Night-time (2300-0700)
19	36	37	38	35
20	36	37	38	35
24	39	40	41	37
25	39	40	41	37
26	39	40	41	37

10.199. For context, to achieve a level of 35dB at NSR24, which is located approximately 45m from the Main HNRFI Site boundary, the item of fixed plant could have a maximum rated noise level of up to 71dB measured at 1m. A typical air handling unit produces a noise level of between 57dB (A) and 67dB (A) at 1m dependant on the model. It is therefore considered that with careful selection of plant, the above limits can be achieved.

10.200. Should an item of plant be located closer to a receptor, the noise level from the plant would need to be lower or located on the screened side of the buildings. Notwithstanding this, given the location of the proposed units and the distances to the NSRs, the above plant limits should be achieved.

10.201. The above rating level limits apply at least 3.5 metres from the façade of any residential property i.e., in free-field conditions. The rating level limits apply at the boundary of NSRs 18 and 19.

10.202. In accordance with BS 4142, the assessment of plant noise emissions should include appropriate rating corrections for tonal, irregular or intermittent plant where applicable, before comparison with the above limits.

10.203. Once the detailed nature of such future uses is confirmed, noise from any fixed plant,

equipment and break-out noise can be considered to ensure that the above limits can be met.

10.204. It should be noted that the derived rating level limits would be applicable to the total noise from the simultaneous operation of all external plant, equipment and break-out noise serving the Proposed Development. As such, noise emissions from individual sources will need to be lower than the given limit, although the exact limit for each individual source will be dependent upon its type, noise characteristics, location etc. This issue is best addressed during the detailed design stage.

10.205. Should the limits set out in Table 10.48 be met, it is likely that any effect would be limited to a permanent, minor adverse effect at worst.

Noise from off-site rail movements

10.206. The change in noise level as a result of the additional rail movements has been calculated based on the existing and proposed train movements.

10.207. Realtimetrains[40] has been used to provide the baseline for the existing movements at the current time on a weekday. This provides a comprehensive timetable detailing the scheduled and actual train movements on a given line for the previous seven days. The movements have been confirmed to be correct by the projects Rail Consultant.

10.208. The study area is defined earlier in this Chapter. A typical daytime and night-time period have been used as a basis for the assessment, and a number of assumptions have been made regarding the types of trains using the line, the speed and the length. These are detailed below in Table 10.49.

Table 10.49: Assumptions regarding existing trains

Train type	Assumed speed (Kph)	Assumed composition	No. of daytime two-way movements based on known movements	No. of night-time two-way movements based on known movements
Turbostar Class 170	120	2 carriages	64	5
Class 66 with disc braked freight vehicles	105	1 locomotive and 25 wagons	41	21

[40] *http://www.realtimetrains.co.uk*

10.209. It is understood that there will be a maximum of 16 intermodal train movements per day, which will result in an additional 32 one-way movements. In the absence of detailed information, it is assumed that the movements will be spread evenly throughout the day. This results in 21 movements during the daytime (0700-2300) and 11 movements during the night-time (2300-0700).

10.210. As CRN does not include current rail stock, reference has also been made to the additional guidance published by DEFRA '*Additional railway noise source terms for Calculation of Railway Noise 1995*'.

10.211. The noise levels have been calculated in accordance with CRN at a notional receptor 25m from the existing line. A notional receptor was used because the change in rail noise adjacent to any rail line will be the same at all distances where noise from that route is dominant. The composition of the proposed freight trains has been assumed to be the same as those detailed in Table 10.49. The results are shown below in Table 10.50.

Table 10.50: Predicted change in rail traffic noise levels as a result of the additional movements

Period	Calculated Noise Level, dB $L_{Aeq,T}$			Change
	Existing	Proposed	Existing + proposed	
16-hour daytime	62.3	58.7	63.9	+1.6
8-hour night-time	61.8	58.9	63.6	+1.8

10.212. The highest change is predicted to be +1.8dB during the night-time period. Therefore for the effect is likely to be permanent, negligible adverse. It is important to note at this stage that the additional trains using the line are not dependant on the HNRFI being brought forward and the capacity and running of the trains will be managed by third parties. With the Proposed Development in place, the additional trains will stop at the HNRFI instead of continuing on the line. As speed is a determining factor in the noise level produced by the train, (i.e a lower speed results in a lower noise level), it is likely that the Proposed Development will provide a betterment, than the noise level presented in the 'proposed' column in Table 10.50. This is when considering noise from additional train movements on the existing line, due to the trains travelling at a lower speed to access the HRNFI.

Vibration from off-site rail movements

10.213. The baseline vibration monitoring which has been undertaken of the existing rail line indicates there will be a maximum VDV of 0.05m/s$^{1.75}$ ((z -axis) during the daytime period, and a maximum VDV of 0.04m/s$^{1.75}$ (z-axis) during the night-time period.

10.214. The existing line is used by both passenger and freight trains, and as previously discussed, there will be an additional maximum of 16 intermodal train movements. These additional trains are not dependant on the Proposed Development being brought forward and the running of these trains will be managed by third parties. Therefore, the vibration impacts from the additional trains are outside the scope of this assessment.

10.215. Notwithstanding this, the existing VDV levels are low and fall within the threshold criteria for 'low probability of adverse comment' as set out in BS 6472:2008. Given that the existing line will be located between the HRNFI and the nearest receptors, and that the nearest dwelling to the Proposed Development is located approximately 90m from the proposed sidings, rail vibration is currently at levels considered to be low, to the extent whereby the additional vibration generated by the Proposed Development is likely to result in a low level. Therefore, the effect of vibration as a result of train movements on the sidings, is likely to remain as permanent, negligible adverse at all receptors, and mitigation is not required.

10.216. It is acknowledged that there are other receptors located further away, which will be closer to the existing line than 90m, however any vibration impacts as a result of additional train movements at these receptors should be assessed by others.

Off-site road traffic noise impacts

10.217. The results of the traffic assessment were used as the basis for determining the change in road traffic noise levels that would result from development generated road traffic on the surrounding roads.

Noise model

10.218. A 3D digital acoustic model of the site and the surrounding area has been generated using acoustic modelling software CadnaA®. The model has been informed by the following:

- Traffic data supplied by Transport Consultant, BWB, for the baseline year (2019); the year of opening for the development (2026) and the year in the future when the development is established (2036).
- Topographical data for the existing ground levels across the Proposed Development and surrounding area, obtained from LIDAR data of 2m resolution, publicly available from the Department for Environment Food and Rural Affairs (DEFRA).
- Topographical data for the proposed ground levels across the Proposed Development, supplied by Infrastructure Engineers, BWB.

- Alignments for the proposed highways, supplied by Infrastructure Engineers, BWB.
- Ordnance Survey (OS) base mapping data

10.219. The heights of residential properties within the model have been set at 8m unless noted as being single storey. Single storey properties have been modelled at a height of 4m. The heights of non-sensitive buildings have been determined using online mapping sources. All buildings have been set to be acoustically reflective.

10.220. The model assumes a ground absorption coefficient of 1 (i.e. acoustically absorptive conditions) for the do minimum scenarios (i.e. scenarios without the Proposed Development), to reflect the largely rural ground cover across the Site and surrounding area. For the do something scenarios (i.e. with the Proposed Development), the ground cover across the Proposed Development has been modelled with a ground absorption coefficient of 0 (i.e. acoustically reflective conditions), to reflect the areas of hard standing across the site.

10.221. Noise levels from road traffic within the model have been calculated using the CRTN methodology. As the CRTN methodology predicts noise levels in terms of the dB $L_{A10,18h}$, corrections are required in order to derive the daytime and night-time average equivalent noise levels in line with the BS 8233 criteria. In order to calculate the daytime (07:00 – 23:00 hours) $L_{Aeq,16h,}$ 2 dB has been subtracted from the predicted dB $L_{A10,18h}$. TRL method 3 was used to convert the predicted dB $L_{A10,\ 18h}$ value into the night-time (23:00 – 07:00) dB $L_{Aeq,8h}$ value.

10.222. Units 5 and 8 have been modelled at a height of 28m, and the remaining units have been modelled at a height of 22m.

Model calibration

10.223. The digital acoustic model has been calibrated by comparing the acoustic model outputs based on the traffic data for the baseline year (2019) and the measurements obtained from the baseline noise survey, as summarised in the Baseline Conditions Section of this Chapter.

10.224. The measurement positions used in the calibration of the model are provided below.

- NMP1– in proximity to Burbage Common Road;
- NMP2 – in proximity to Smithy Lane;
- NMP5 – in proximity to Junction 2 of the M69; and
- NMP6 – in proximity to Leicester Road (B4668).

10.225. Table 10.51 presents the measured daytime ambient noise levels ($L_{Aeq,16hr}$) and night-time ambient noise levels ($L_{Aeq,8hr}$) at the long-term measurement positions, along with the predicted noise levels at the corresponding locations in the model.

Table 10.51: Acoustic model calibration

Measurement Location		**Daytime ambient noise level (dB)**	**Night-time ambient noise level (dB)**
		($L_{Aeq,16h}$)	**($L_{Aeq,8h}$)**
NMP1 In proximity Burbage Common	Measured (A)	56	54
	Predicted (B)	59	56
	Difference (A-B)	-3	-2
NMP2 In proximity to Smithy Lane	Measured (C)	55	56
	Predicted (D)	58	57
	Difference (C-D)	-3	-1
NMP5* In proximity to Junction 2 of the M69	Measured (G)	47	-
	Predicted (H)	54	-
	Difference (G-H)	-7	-
NMP6* In proximity to Leicester Road (B4668)	Measured (I)	65	-
	Predicted (J)	66	-
	Difference (I-J)	-1	-

** Measurements at these locations took place over separate 3-hour periods in accordance with the shortened measurement procedure set out in CRTN. Consequently, there are no measurements which took place during the night-time periods. The daytime ambient noise levels have been determined by applying a -3 dB correction to the L10,3h road traffic noise level (this includes a -1 dB correction to*

convert the L10,3h to a L10,18h in accordance with CRTN and a further -2 dB correction to convert the L10,18h to a LAeq,16h value, in accordance with BS 8233).

10.226. It can be seen that the predicted noise levels within the model are in excess of those measured by between 1 and 7 dB, across the four measurement positions during the daytime. However, the daytime ambient noise levels at NMP5 and NMP6 have been derived from measurements over a shorter time period and as such may be considered less reliable than those at NMP1 and NMP2, which were obtained over a greater survey duration. The predicted daytime ambient noise levels at NMP1 and NMP2 are 3 dB higher than those which were measured.

10.227. During the night-time, the predicted night-time ambient noise levels at NMP1 and NMP2 are between 1 and 2 dB higher than those which were measured.

10.228. Given that the predicted noise levels within the baseline model are in excess of those which were measured at the stated locations, it is considered that the predicted noise levels within the model represent a robust assessment case.

Assessment of impacts

10.229. This assessment considers the permanent operational road traffic noise effects of the Proposed Development on existing NSRs. The assessment has been based on the change in road traffic noise level arising from the operation of the Proposed Development for the following scenarios:

- Comparison 1: opening year without the Proposed Development vs. opening year with the Proposed Development (short-term change); and
- Comparison 2: future year without the Proposed Development vs. future year with the Proposed Development (long-term change).

10.230. All road traffic noise predictions have been undertaken in accordance with the calculation methodology presented in the CRTN and Appendix A of DMRB LA111 and using traffic data provided by BWB as detailed in the Transport Chapter (8).

10.231. The noise levels are calculated at the façade of buildings during the daytime (1m from the external façade) and free-field levels incident on the façade of buildings during the night-time. All levels are calculated at a default height of 4m relative to the surrounding ground level, with the exception of properties which are single storey. For these properties, noise levels have been calculated at a height of 1.5m relative to the surrounding ground level.

10.232. Where a building is predicted to experience different changes in noise level on different façades, the result on the façade experiencing the greatest magnitude of noise change has been reported in line with the guidance contained in the DMRB LA 111.

10.233. Noise contour maps have also been produced for with and without the Proposed Development and are shown in Figures 6.3.10.5 and 6.3.10.6 for the short-term and

Figures 6.3.10.8 to 6.3.10.9 for the long-term. Noise contours have also been produced for the short-term and long-term scenarios to show the difference between the 'with' and 'without' development scenarios. These are shown in Figures 6.3.10.7 for the short-term and 6.3.10.10 for the long-term.

10.234. The predicted short-term change in noise level (i.e. Comparison 1) at residential and other sensitive receptors within the study area are presented in Table 10.52 below.

Table 10.52: Sensitive receptors, short-term noise changes

Change in noise level		**Magnitude of effect**	**Number of properties**
Increase in noise level $L_{A10,18h}$	0.1 – 0.9 dB	Negligible	55
	1.0 – 2.9 dB	Minor Adverse	59
	3.0 – 4.9 dB	Moderate Adverse	3
	≥ 5 dB	Major Adverse	4
No change	0 dB	None	1
Decrease in noise level $L_{A10,18h}$	0.1 – 0.9 dB	Negligible Beneficial	1
	1.0 – 2.9 dB	Minor Beneficial	0
	3.0 – 4.9 dB	Moderate Beneficial	0
	≥ 5 dB	Major Beneficial	0

10.235. The effects of the change in road traffic noise level at all receptors within the study area range from, negligible beneficial to permanent, major adverse in the short-term.

10.236. Of the 123 residential properties located within the study area, 116 are predicted to experience a minor adverse, or negligible noise effect, or no effect in the short-term.

10.237. The four residential receptors predicted to experience a major adverse effect are located in the following areas:

- One receptor within the traveller's site, along Smithy Lane, nearest to Junction 2 of the

M69. This receptor is also above the daytime and night-time Significant Observed Adverse Effect Level (SOAEL) (see paragraph 10.51 for details) in the year of opening both with and without the Proposed Development.

- One receptor at Bridge Farm, to the east of the proposed A47 Link Road. However, this receptor is below the daytime and night-time SOAEL in the year of opening both with and without the Proposed Development.

- Two receptors at the traveller's site along Leicester Road (B4668) on the opposite side of the highway to Hinckley Town Tennis Club. Both receptors are below the daytime and night-time SOAEL in the year of opening both with and without the Proposed Development.

10.238. The three residential receptors predicted to experience a moderate adverse effect are located in the following areas:

- Three receptors within the travellers site, along Smithy Lane, nearest to Junction 2 of the M69. These receptors are also above the daytime and night-time SOAEL in the year of opening both with and without the Proposed Development.

10.239. The predicted long-term change in noise level (i.e. Comparison 2) at residential and other sensitive receptors within the study area are presented in Table 10.53 below.

Table 10.53: Sensitive receptors, long-term noise changes

Change in noise level		Magnitude of effect	Number of properties
Increase in noise level $L_{A10,18h}$	≤ 3 dB	Negligible	114
	3.0 – 4.9 dB	Minor Adverse	4
	5.0 – 9.9 dB	Moderate Adverse	2
	≥ 10 dB	Major Adverse	1
No change	0 dB	None	2
Decrease in noise level $L_{A10,18h}$	≤ 3 dB	Negligible Beneficial	0
	3.0 – 4.9 dB	Minor Beneficial	0
	5.0 – 9.9 dB	Moderate Beneficial	0
	≥ 10 dB	Major Beneficial	0

10.240. The effects of the change in road traffic noise level at all receptors within the study area range from, no change to permanent, major adverse in the long-term.

10.241. Of the 123 residential properties located within the study area, 120 are predicted to experience a minor adverse, or negligible noise effect, or no effect in the long-term.

10.242. The residential receptor predicted to experience a major adverse effect is located in the traveller's site along Leicester Road (B4668) on the opposite side of the highway to Hinckley Town Tennis Club. This receptor is below the daytime and night-time SOAEL in the future year both with and without the Proposed Development.

10.243. The two residential receptors predicted to experience a moderate adverse effect are located in the following areas:

- One receptor within the traveller's site, along Smithy Lane, nearest to Junction 2 of the M69. This receptor is also above the daytime and night-time SOAEL in the year of

opening both with and without the Proposed Development.

- One receptor at Bridge Farm, to the east of the proposed A47 Link Road. This receptor is below the daytime and night-time SOAEL in the year of opening both with and without the Proposed Development.

Summary

10.244. In light of the above, for 116 properties within the study area, there is likely to be a negligible to minor adverse direct, short-term effect as a result of operational road traffic noise, which is considered not significant.

10.245. For three properties within the study area, there is likely to be a moderate adverse direct, short-term effect as a result of operational road traffic noise, which is considered significant.

10.246. For four properties within the study area, there is likely to be a major adverse direct, short-term effect as a result of operational road traffic noise, which is considered significant.

10.247. In the long-term, for 120 properties within the study area, there is likely to be a negligible to minor adverse direct, long-term effect as a result of operational road traffic noise, which is considered not significant.

10.248. For two properties within the study area, there is likely to be a moderate adverse direct, long-term effect as a result of operational road traffic noise, which is considered significant.

10.249. For one property within the study area, there is likely to be a major adverse direct, long-term effect as a result of operational road traffic noise, which is considered significant.

Noise on new and re-routed PRoWs

10.250. The existing Public Right of Way (ProW) which currently follows Smithy Lane, will be re-routed adjacent to the M69 as a result of the Proposed Development. During consultation, BDC requested that consideration be given to the new sensitive receptors created through the rerouting of the PRoW, and that noise along this route would likely be in excess of 55dB given the location adjacent to the M69.

10.251. A review of available mapping indicates that there is an existing bridle way on the opposite side of the motorway, adjacent to the south bound carriageway, and this will join up with the re-routed footpath. The re-routed bridleway will be subject to similar noise levels from road traffic associated with the M69 as those on the existing bridleway adjacent to the south bound carriageway. Therefore, it is considered that the noise levels should be acceptable.

10.252. Noise from the operation of the HRNFI has been predicted on the re-routed footpath adjacent to the M69. The results indicate that noise levels would be between 37dB and 60 dB L_s. In order to quantify road traffic noise levels as a result of road traffic on the

M69, the latest available DEFRA[41] road traffic noise map has been reviewed. Whilst the mapping is produced at a strategic level and therefore not accurate enough to design against, it does provide an indication of likely noise levels from major road traffic sources.

10.253. The latest DEFRA road traffic noise map indicates noise levels in the vicinity of the re-routed footpath would be between 65dB and 69.9dB $L_{Aeq,16h}$. This is below the noise levels predicted by the HRNFI and therefore noise associated with the HRNFI is unlikely to result in an adverse impact for receptors using the re-routed footpath.

10.254. A new footpath is proposed adjacent to the A47 Link Road. The results of the noise modelling indicate that noise levels along the route would be subject to noise levels between 48dB $L_{Aeq, 16h}$ and 72dB $L_{Aeq,16h,}$ depending on the location. However, the existing footpath which passes through Freeholt Woods provides an alternative route, away from the footpath adjacent to the A47 Link Road. A tranquillity assessment of this area has been undertaken and is detailed below.

Assessment of tranquillity

10.255. Although various approaches have been put forward in the past to determine the impact of a development on tranquillity, there is no industry standard approach. Therefore, the assessment methodology draws on multiple sources such as local open space policies, BS 8233:2014, WHO Guidelines (1999) and IEMA Guidelines.

10.256. The site is currently defined as countryside in accordance with the Blaby District Local Plan and further defined as wooded farmland in accordance with the Blaby Landscape and Settlement Character Assessment.

10.257. The Blaby Landscape and Settlement Character Assessment identifies most of the site as Aston Flamville Wooded Farmland, with Elmesthorpe Floodplain located to the north of the railway line. Stoney Stanton to the south is defined as rolling farmland.

10.258. The site is bordered by Burbage Common and Woods which is designated as a Local Nature Reserve. Part of this and the adjacent Aston Firs woodland is also designated as a Site of Special Scientific Interest (SSSI).

10.259. HBBC Allocations, Designations and Development Management DPD provides a detailed review of the boundaries of the countryside. Most of the site has been designated as Countryside except for Aston Firs which is designated as a SSSI and areas of Burbage Common which are designated as a nature reserve. In addition, the Hinckley and Bosworth Landscape Character Assessment identifies areas of Burbage Common as rolling farmland.

10.260. There are several footpaths across the site and within the surrounding areas, most notably through the adjoining woodland to the west. In addition, the Proposed Development site is accessible by walkers and members of the general public.

10.261. In accordance with the Blaby Green Space Strategy and The Blaby Landscape and

[41] Strategic Noise Maps available at [redacted]

Settlement Character Assessments, it is considered that the tranquillity assessment should ensure that significant effects are minimised from new development in the area.

10.262. To determine the impact, the change in the absolute noise level has been determined as a result of operational noise levels associated with the Proposed Development, including road traffic on the proposed A47 Link Road.

10.263. Tranquillity is dependent on a combination of noise impact and visual impact and therefore consideration has been given to the context in which people will experience the soundscape. Figure 6.3.11.15 shows the illustrative landscape strategy. This indicates a number of measures to provide visual separation between the areas of interest and the application site, which should soften any impacts on perceived tranquillity. For wooded areas, there will be limited visibility due to self-screening and therefore any perceived effect is likely to be limited to a change in noise.

10.264. The assessment has been undertaken for the daytime periods only, as this is when the area will be used by members of the public. The noise levels as a result of the Proposed Development, including HGV movements, loading/unloading activities, operations associated with the SRFI facility and road traffic associated with the A47 Link Road have been predicted at Burbage Common Woods, Aston Firs and Freeholt Wood. The lowest measured 16-hour L_{Aeq} noise levels measured at NMP3 for the weekday and weekend have been used to establish the baseline noise levels. A noise level of 57dB $L_{Aeq,T}$ has been used for the daytime period on a weekday and 52dB $L_{Aeq,T}$ has been used for the daytime on a weekend.

10.265. For Aston Firs and Freeholt Wood, the lowest measured 16-hour L_{Aeq} noise levels measured at NMP2 for the weekday and weekend have been used to establish the baseline noise levels. A noise level of 54dB $L_{Aeq,T}$ has been used for the daytime period on a weekday weekend. The results are shown below in Table 10.54.

Table 10.54: Predicted change in absolute noise level

NSR	Daytime 16-hour period (0700 – 2300)			Resultant future noise level dB $L_{Aeq,16h}$	Change, dB
		Existing measured level – dB $L_{Aeq,16h}$	Future contribution from Proposed Development – Calculated dB $L_{Aeq,16h}$		
	Weekday	57	57	60	+3.0

NSR	Daytime 16-hour period (0700 – 2300)	Existing measured level – dB $L_{Aeq,16h}$	Future contribution from Proposed Development – Calculated dB $L_{Aeq,16h}$	Resultant future noise level dB $L_{Aeq,16h}$	Change, dB
Burbage Common Woods	Weekend	52		58.2	+6.2
Aston Firs	Weekday	54	48	55	+1.0
	Weekend				
Freeholt Wood	Weekday	54	57	58.8	+4.8
	Weekend				

10.266. Table 10.54 shows that for Aston Firs during a weekday and weekend, the effect on tranquillity will be permanent negligible adverse, in accordance with Table 10.13.

10.267. The resultant effect at Freeholt Woods on a weekday and weekend, and Burbage Common Woods on a weekday as a result of operational noise will be permanent, minor adverse. A moderate adverse effect is predicted at Burbage Common Woods on a weekend.

10.268. Review of the resultant noise levels at Aston Firs indicates that the levels are below the upper guideline value of 55dB $L_{Aeq,16h}$ for external areas in accordance with WHO guidelines and BS 8233. It also considered that the noise levels across the majority of the nature reserves will also be below 55dB $L_{Aeq,T}$. Therefore, the amenity of visitors to these areas will be protected.

10.269. It is recognised that some areas of Burbage Common Wood may experience noise levels above those predicted above, particularly where the woods are in close proximity to the proposed link road. However, for the majority of the woods, the noise levels will be lower than those stated above.

10.270. It is also worth noting that a review of the noise model indicates that the proposed noise levels are dominated by road traffic on the proposed link road. As the site is already surrounded by busy roads, and the background noise levels are characterised by road traffic, it is considered that the resultant noise levels will not be out of character.

10.271. Based on the above, with the exception of Burbage Common Woods on a weekend, it is considered that the resultant effect will be permanent, minor adverse, and further consideration to mitigation is not required at this time. A moderate, adverse impact is likely to remain at Burbage Common Woods on a weekend, and consideration is given to mitigation further in this Chapter.

PROPOSED MITIGATION

10.272. Where the assessments have identified effects greater than 'minor adverse', consideration has been given to further mitigation measures, in addition to any embedded mitigation measures.

10.273. Effects of negligible and minor are insignificant, whereas effects of moderate and major are significant, in terms of this EIA.

Construction noise and vibration

10.274. The preferred approach for controlling construction noise and vibration is to reduce levels at source where possible, but with due regard to practicality. Sometimes a greater noise level may be acceptable if the overall construction time, and therefore length of disruption, is reduced.

10.275. All work outside 0700 and 1900-hours Monday to Friday will be subject to reasonable notice to BDC and HBBC as appropriate. Night-time working will be restricted to specific circumstances.

10.276. Mitigation measures will include the following provisions:

- Ensure all processes are in place to minimise noise before works begin and should ensure Best Practicable Means in accordance with the Control of Pollution Act[42] are being achieved throughout the demolition and construction programme.
- Ensure that modern plant is used, complying with the latest European Commission noise emission requirements.
- Selection of inherently quiet plant where possible.
- Use of hoarding, where required and practicable, to assist in the screening of noise

[42] *Control of Pollution Act, 1974.*

generation from low-level sources.

- Hydraulic techniques for breaking to be used in preference to percussive techniques where practical.
- Use of rotary bored rather driven piling techniques, where appropriate.
- Off-site pre-fabrication to be used, where practical.
- All plant and equipment to be used for the works to be properly maintained, silenced where appropriate, operated to prevent excessive noise and switched off when not in use.
- Plant to be certified to meet relevant current legislation as defined by BS 5228 standards.
- All Contractors to be made familiar with current legislation and the guidance in BS 5228 (Parts 1 and 2), which should form a prerequisite of their appointment.
- Loading and unloading of vehicles, dismantling of site equipment such as scaffolding or moving equipment or materials around the site to be conducted in such a manner as to minimise noise generation and where practical to be conducted away from NSRs.
- Careful consideration should be given to planning construction traffic haul routes within the Site and along local roads close to existing sensitive receptors, to minimise reversing movements and to minimise the number of construction vehicles during peak traffic flows on local roads. Construction traffic will be managed by the contractor under the Construction Traffic Management Plan (CTMP); and,
- Noise complaints should be reported to the Contractor and immediately investigated.

10.277. Method statements regarding construction management, traffic management, and overall site management should be prepared in accordance with best practice and relevant British Standards, to minimise impacts of construction works. One of the key aims of such method statements is to minimise disruption to local residents and businesses during the construction phase.

10.278. Consultation and communication with the local community throughout the construction period also serves to publicise the works schedule, giving warning to residents regarding periods when higher levels of noise may occur during specific operations, and providing them with lines of communication where complaints can be addressed. Dissemination of such information is likely to encourage the community to be more tolerant of short-term disturbance with potential long-term benefits of the proposals.

10.279. A Construction Environmental Management Plan (CEMP) will also be prepared and put in place to ensure best practicable measures are adopted with regards to each phase of the proposals. A framework CEMP will be submitted with this ES. This should also help to ensure that the noise and vibration impacts relating to construction activities are

minimised.

10.280. In addition, it is recommended that the construction contractor be a member of the 'Considerate Constructors Scheme', which is an initiative open to all contractors undertaking building work.

10.281. With the proposed mitigation in place, it is considered that the effects of construction noise and vibration would be reduced at existing NSRs to between temporary, minor adverse significance and temporary, moderate adverse significance at worst.

Construction Traffic

10.282. The resultant effect as a result of construction traffic would be temporary, negligible adverse. Therefore, no further consideration of mitigation measures is warranted.

Completed development

Noise from HGV movements, loading/unloading operations and service yard areas, including SRFI operations

10.283. Rating levels associated with HGV movements, loading/unloading operations and service yard areas, including SRFI operations are predicted to be above the measured background noise levels for several NSRs, particularly during the night-time on a weekend. Therefore, further consideration has been given to mitigation measures.

10.284. Due to the height of the gantry cranes, a barrier of significant height would be required to remove line of sight to the nearest NSRs. Therefore, consideration has been given to plant selection and noise control options further in this section, to control the noise at source. Considering this, the noise associated with the gantry cranes and associated character correction have been removed from the following assessment.

10.285. To mitigate noise from HGV movements, loading/unloading operations and service yard areas, including SRFI operations, at receptors located to the north of the Proposed Development, several options have been explored. These include the location, height and extent of acoustic barriers. As a result of this, it has been identified that, dependant on location around the Site, acoustic barriers above 6m in height do not provide a significant reduction in the noise level.

10.286. In accordance with NPS for National Networks, local impacts as a result of the SRFI should be minimised and 'a good design should meet the principal objectives of the scheme by eliminating or substantially mitigating the identified problems by improving operational conditions and simultaneously minimising adverse impacts. It should also mitigate any existing adverse impacts wherever possible'. It goes onto state that 'the project should demonstrate good design through optimisation of scheme layout to minimise noise emissions and, where possible, the use of landscaping, bunds or noise barriers to reduce noise transmission. The project should also consider the need for the mitigation of impacts elsewhere on the road and rail networks that have been identified as arising from the development, according to Government policy'.

10.287. Therefore, to minimise the effect, the following are likely to be required, shown on Figure 6.3.10.4:

- a stepped acoustic barrier of between 2m and 3m in height on the northern boundary, to mitigate impacts on residential receptors.
- a 6m high acoustic barrier adjacent to NSR9 to mitigate impacts on residential receptors; and
- a 4m high acoustic barrier on the north-eastern boundary, to mitigate impacts on residential receptors.

10.288. It is considered that with the proposed acoustic barriers in place, impulsive noise associated with the proposed operations close to the ground are unlikely to be perceptible. Therefore, no penalty for impulsivity has been included within the following assessment.

10.289. The barriers have been included within the noise model and the resultant levels predicted at NSRs where an adverse impact has previously been identified following consideration of the context. Tables 10.55 through to Table 10.58 outlines the BS 4142 assessment with the proposed mitigation in place.

Table 10.55 - Operational noise assessment, with mitigation – Weekday, daytime (0700-2300)

NSR	Description					
	Specific noise level (dB L_s)	**Acoustic correction feature**	**Rating level (dB $L_{A,Tr}$)**	**Background (dB L_{A90})**	**Excess over background**	**Magnitude of impact**
1	47		47	39	+8	**Medium**
2	47		47	39	+8	**Medium**
3	44		44	39	+5	**Medium**
4	46		46	39	+7	**Medium**
5	45		45	39	+6	**Medium**

NSR	Description					
	Specific noise level (dB L_s)	Acoustic correction feature	Rating level (dB $L_{A,Tr}$)	Background (dB L_{A90})	Excess over background	Magnitude of impact
6	45		45	39	+6	**Medium**
7	47		47	39	+8	**Medium**
8	45		45	39	+6	**Medium**
9	44		44	50	-6	**Very Low**
19	48		48	36	+12	**High**
24	50		50	39	+11	**High**
25	47		47	39	+8	**Medium**
26	45		45	39	+6	**Medium**

10.290. During the daytime on a weekday, with mitigation in place, noise levels associated with the operation of the SRFI are between -6 and +12 dB above the measured background noise levels during the daytime, dependent on the NSR.

10.291. The mitigated effect of operational noise associated with the SRFI is likely to be a permanent, major adverse at worst for NSRs located closest to the Proposed Development during the daytime on a weekday. For NSRs 1 through 8, 25 and 26, the effect is predicted to be permanent, moderate adverse effect. For NSR 9, the effect is predicted to be permanent, negligible adverse. The above effects are dependent on context, which is discussed further below.

Table 10.55: Operational noise assessment, with mitigation – weekday, night-time (2300-0700)

NSR	Description					
	Specific noise level (dB L_s)	Acoustic correction feature	Rating level (dB $L_{A,Tr}$)	Background (dB L_{A90})	Excess over background	Magnitude of impact
1	47		47	38	+9	**High**
2	44		44	38	+6	**Medium**
3	41		41	38	+3	**Medium**
4	43		43	38	+5	**Medium**
5			-	-	-	-
6	43		43	38	+5	**Medium**
7	43		43	38	+5	**Medium**
8	42		42	38	+4	**Medium**
24	47		47	38	+9	**High**
25	43		43	38	+5	**Medium**
26	44		44	38	+6	**Medium**

10.292. During the night-time on a weekday, with mitigation in place, noise levels associated with the operation of the SRFI are between +3 and +9 dB above the measured background noise levels during the night-time, dependent on the NSR.

10.293. The mitigated effect of operational noise associated with the SRFI is likely to be a

permanent, major adverse at worst for NSRs located closest to the Proposed Development during the night-time on a weekday. For NSRs 2 through 4, 6 through 8 and 25 and 26, the effect is predicted to be permanent, moderate adverse. The above effects are dependent on context.

Table 10.56: Operational noise assessment, with mitigation – Weekend daytime (0700-2300)

NSR	Description					
	Specific noise level (dB L_s)	Acoustic correction feature	Rating level (dB $L_{A,Tr}$)	Background (dB L_{A90})	Excess over background	Magnitude of impact
1	47		47	41	+6	**Medium**
2	47		47	41	+6	**Medium**
3	44		44	41	+3	**Low**
4	46		46	41	+5	**Medium**
5	45		45	41	+4	**Medium**
6	45		45	41	+4	**Medium**
7	47		47	41	+6	**Medium**
8	45		45	41	+4	**Medium**
9	44		44	50	-6	**Very Low**
19	48		48	38	+10	**High**
24	50		50	41	+9	**High**

NSR	Description					
	Specific noise level (dB L_s)	Acoustic correction feature	Rating level (dB $L_{A,Tr}$)	Background (dB L_{A90})	Excess over background	Magnitude of impact
25	47		47	41	+6	**Medium**
26	45		45	41	+4	**Medium**

10.294. During the daytime on a weekend, with mitigation in place, noise levels associated with the operation of the SRFI are between -6 and +10 dB above the measured background noise levels during the daytime, dependent on the NSR.

10.295. The mitigated effect of operational noise associated with the SRFI is likely to be a permanent, major adverse at worst dependent on the NSRs during the daytime on a weekend. For NSRs 1, 2, 4 through 8, 25 and 26, the mitigated effect is likely to be permanent, moderate adverse. For the remaining NSRs, the effect is predicted to be permanent, minor adverse and permanent, negligible adverse effect. The above effects are dependent on context.

Table 10.57: Operational noise assessment, with mitigation – Weekend, night-time (2300-0700)

NSR	Description					
	Specific noise level (dB L_s)	Acoustic correction feature	Rating level (dB $L_{A,Tr}$)	Background (dB L_{A90})	Excess over background	Magnitude of impact
1	47		47	37	+10	**High**
2	44		44	37	+7	**Medium**
3	41		41	37	+4	**Medium**

NSR	Description					
	Specific noise level (dB L_s)	**Acoustic correction feature**	**Rating level (dB $L_{A,Tr}$)**	**Background (dB L_{A90})**	**Excess over background**	**Magnitude of impact**
4	43		43	37	+6	**Medium**
5			-	-	-	-
6	43		43	37	+6	**Medium**
7	43		43	37	+6	**Medium**
8	42		42	37	+5	**Medium**
24	47		47	37	+10	**High**
25	43		43	37	+6	**Medium**
26	44		44	37	+7	**Medium**

10.296. During the night-time on a weekend, with mitigation in place, noise levels associated with the operation of the SRFI are between +4 and +10 dB above the measured background noise levels during the night-time, dependent on the NSR.

10.297. The mitigated effect of operational noise associated with the SRFI is likely to be a permanent, major adverse at worst for NSRs 1 and 24 during the night-time on a weekend. For NSRs 2 through 4, 6 through 8, 25 and 26, the resultant effect is predicted to be permanent, moderate adverse.

10.298. As previously discussed, the impact is dependent on context, and therefore the sound rating levels have been compared to the existing noise climate at each receptor detailed above, for the daytime and night-time for both the weekday and weekend periods.

Table 10.58: Predicted increase in ambient noise levels with mitigation - Weekday

Increase in noise level due to operational noise from the SRFI with mitigation- Weekday, dB								
NSR	**Daytime (0700 – 2300)**				**Night-time (2300 – 0700)**			
	Rating level	**Ambient level**	**Rating + ambient**	**Increase**	**Rating level**	**Ambient level**	**Rating + ambient**	**Increase**
1	47	59.2	59.5	**+0.3**	47	56.2	56.7	**+0.5**
2	47	59.2	59.5	**+0.3**	44	56.2	56.5	**+0.3**
3	44	59.2	59.3	**+0.1**	41	56.2	56.3	**+0.1**
4	46	59.2	59.4	**+0.2**	43	56.2	56.4	**+0.2**
5	45	59.2	59.4	**+0.2**	-	-	-	**-**
6	45	59.2	59.4	**+0.2**	43	56.2	56.4	**+0.2**
7	47	59.2	59.5	**+0.3**	43	56.2	56.4	**+0.2**
8	45	59.2	59.4	**+0.2**	42	56.2	56.4	**+0.2**
9	44	53.6	54.1	**+0.5**	-	-	-	**-**
19	48	57.4	57.9	**+0.5**	-	-	-	**-**
24	50	59.2	59.7	**+0.5**	47	56.2	56.7	**+0.5**
25	47	59.2	59.5	**+0.3**	43	56.2	56.4	**+0.2**
26	45	59.2	59.4	**+0.2**	44	56.2	56.5	**+0.3**

Table 10.59: Predicted increase in ambient noise levels with mitigation - Weekend

Increase in noise level due to operational noise from the SRFI with mitigation- Weekend, dB								
NSR	**Daytime**				**Night-time**			
	Rating level	**Ambient level**	**Rating + ambient**	**Increase**	**Rating level**	**Ambient level**	**Rating + ambient**	**Increase**
1	47	53.7	54.5	**+0.8**	47	50.1	51.8	**+1.7**
2	47	53.7	54.5	**+0.8**	44	50.1	51.1	**+1.0**
3	44	53.7	54.1	**+0.4**	41	50.1	50.6	**+0.5**
4	46	53.7	54.4	**+0.7**	43	50.1	50.9	**+0.8**
5	45	53.7	54.2	**+0.5**	-	-	-	**-**
6	45	53.7	54.2	**+0.5**	43	50.1	50.9	**+0.8**
7	47	53.7	54.5	**+0.8**	43	50.1	50.9	**+0.8**
8	45	53.7	54.2	**+0.5**	42	50.1	50.7	**+0.6**
9	44	54.4	54.8	**+0.4**	-	-	-	**-**
19	48	51.8	53.3	**+1.5**	-	-	-	**-**
24	50	53.7	55.2	**+1.5**	47	50.1	51.8	**+1.7**
25	47	53.7	54.5	**+0.8**	43	50.1	50.9	**+0.8**
26	45	53.7	54.2	**+0.5**	44	50.1	51.1	**+1.0**

10.299. Tables 10.58 and 10.59 show that for all NSRs, the existing ambient noise levels are predicted to increase by up to +1.7dB during the weekday and weekend daytime and night-time as a result of the proposed operations of the SRFI, with mitigation in place.

10.300. Table 10.58 indicates that for the daytime and night-time periods on a weekday, the increase in noise levels is predicted to be between +0.1dB and +0.5dB.

10.301. Table 10.59 indicates that for the daytime period on a weekend, the increase in noise levels is predicted to be between +0.4dB and +1.5dB. For the night-time period, the increase ranges between +0.5dB and +1.7dB.

10.302. As previously discussed, this level of change is considered marginal, and would barely be perceptible to the human ear with changes of 3dB only just perceptible under normal conditions. This relates to noise that is continuous and similar in nature to the existing noise, however by using the rating level, rather than the specific level accounts for this. As such, an increase of 1.7dB is low, which is likely to result in a permanent, minor adverse effect, when context is taken into consideration, which is not a significant effect.

10.303. It is also worth noting that during the daytime, the rating levels at NSRs, as a worst case-achieve the lower guideline value of 50dB $L_{Aeq,T}$ for garden areas in accordance with WHO guidelines and BS 8233. Furthermore, assuming a 15dB loss through a partially opened window as per guidance contained within BS 8233, this would result in internal levels of up to 35dB $L_{Aeq,T}$. This would achieve the internal noise level criteria set out in BS 8233, when considering noise associated with the SRFI facility.

10.304. The rating levels at the NSRs would only marginally exceed the recommended internal noise level in bedrooms during the night-time, assuming a 15dB loss through a partially opened window.

10.305. It is therefore considered with the implementation of acoustic barriers, as shown on Figure 6.3.10.10, and consideration to the existing noise climate, the resultant impacts at nearby NSRs will be low.

10.306. Any barrier should have a minimum surface density of 15kg/m^2 and form a continuous unbroken barrier with no gaps at the bottom. There are a range of suitable barrier solutions available that can meet this specification.

10.307. Notwithstanding the above, the exact heights and extents of the acoustic barriers are subject to final road and rail alignments and final finished levels on site. Therefore, the exact heights and extents should be confirmed at detailed design.

NSRs 21, to 23, 27 and 28

10.308. NSRs 21 to 28 are located within the administrative area of HBBC. The resultant operational noise levels associated with the SRNFI have been predicted at these receptors, with mitigation in place and without noise associated with the gantry cranes. The resultant noise levels are shown below in Table 10.60, and are for reference purposes only.

Table 10.60: Operational noise levels at NSRs 21, 22 and 23, 27 and 28 Daytime and Night-time

Description	Daytime (0700 – 2300)					Night-time (2300 – 0700)				
	NSR 21	NSR 22*	NSR 23	NSR 27	NSR 28***	NSR 21	NSR 22*	NSR 23**	NSR 27	NSR 28***
Specific sound level, (dB, $L_{Aeq,T}$)	39	41	37	38	39	35	36	-	34	35

*It is unclear where the residential elements of the farm are, therefore a receptor point has been used in the farmyard at a height of 4m.
**Not considered to be sensitive during the night-time.
*** Predicted at a receptor point at 1.5m in height

10.309. These receptors are located further away from the HNRFI than other receptors considered within the assessment. Although it is not possible to quantify the existing noise climate in this area, these receptors are located much closer to Leicester Road and the A47, and therefore it is likely that the existing background noise levels will be high.

10.310. The specific noise levels predicted at NSRs 21 to 28 are no worse than what is currently predicted at remaining receptors and therefore the impacts are likely to be no greater than those identified for remaining receptors.

Gantry cranes

10.311. As previously discussed, it is recommended that careful consideration is given to the selection of the gantry cranes. The assessment has included the use of Rubber Tyre Gantry Cranes (RTG), which are diesel powered. These can be made much quieter by the implementation of suitable acoustic enclosures around the engines and a high-performance silencer on the exhaust. This specification can be included when purchasing the plant, and it is understood that noise levels can be up to 10dB quieter than has been assumed in the assessment, see Appendix 10.7.

10.312. A 10dB reduction has been applied to each of the crane engines and crane exhausts. With all sources operating and the proposed boundary mitigation in place, the results indicate that the predicted increase in noise levels at all of the NSRs remain unchanged (less than 1dB). The largest increase in the overall level is at NSR 24, where a 2.5dB increase is predicted, however it is considered that this is unlikely to be perceptible. Therefore, the residual effect is likely to remain at permanent, minor adverse for all receptors.

10.313. Other options include rail mounted gantry (RMG) cranes and/or hybrid cranes. RMG cranes utilise an electric engine rather than a diesel one, and a hybrid crane is powered from lithium polymer batteries. These types of cranes, which can be further supplemented by enhanced acoustic enclosures, will result in SWLs of 100dB or less. This is much lower than the type assumed within this assessment.

Assessment of operational maximum noise levels

10.314. The $L_{AF,max}$ level as a result of reach stackers and/or cranes handling containers has been recalculated with the proposed mitigation in place. The $L_{AF,max}$ has been calculated for those receptors where an exceedance of the criteria was predicted. The results are shown below in Tables 10.61.

Table 10.61: Predicated L_{AFmax} noise level at NSRs with mitigation

NSR	Source	Predicted external L_{AFmax}	Level above 60dB L_{AFmax} criterion	Magnitude of impact
1	Spreader Impact	61	+1	**Medium**
	Container placement	64	+4	**Medium**
2	Container placement	60	0	**Low**
4	Container placement	59	-1	**Low**
6	Container placement	60	0	**Low**
7	Container placement	63	+3	**Medium**
8	Container placement	61	+1	**Medium**
24	Spreader impact	65	+5	**Medium**
	Container placement	68	+8	**High**
25	Container placement	62	+2	**Medium**
26	Container Placement	65	+5	**Medium**

10.315. During the night-time, noise levels associated with impulsive noise are between -1 and +8 dB above the adopted criteria dependent on the NSR and noise source.

10.316. The mitigated effect of impulsive noise associated with spreader impact at NSRs 1 and 24 is likely to be permanent, moderate adverse.

10.317. The mitigated effect of impulsive noise associated with container placement is likely to remain as permanent, major adverse at worst for NSR 24 during the night-time. For NSRs 1, 7, 8, 25 and 26, the likely effect remains permanent, moderate adverse. For the remaining NSRs, the likely effect has been reduced to permanent, minor adverse.

10.318. The resultant L_{AFmax} levels from the operation of the SRFI are predicted to be above the adopted criteria for the NSRs, with mitigation in place. However, it is worth noting that exceedances are only predicted when the source is operating near the receptor, and the model does not account for any screening provided by container stacks or other sources. It is therefore considered that the above presents a worst-case scenario and that for most of the time, the L_{AFmax} levels at the NSRs will be lower than those predicted above.

10.319. Notwithstanding the above, it is understood that 'soft dock' technology would be implemented on reach stackers and gantry cranes which allows containers to be positioned accurately using cameras and gentle positioning onto stacks and trailers. This will significantly reduce noise levels associated with container placement, and therefore the above is very much a worse-case scenario which is unlikely to be realised.

Noise from fixed plant, equipment and break-out noise

10.320. Noise limits have been derived at the nearest NSRs. Provided that these limits are achieved, the resultant effect is likely to be minor adverse at worst. Therefore, no further consideration of mitigation measures is warranted.

Noise from off-site rail movements

10.321. The increase in noise levels as a result of additional rail movements associated with the Proposed Development are predicted to result in a minor, adverse impact. Therefore, no further consideration of mitigation measures is warranted.

Vibration from off-site rail movements

10.322. Following a vibration survey of the existing line, it is considered that the resultant effect as a result of the train movements on the sidings, would be permanent, negligible adverse. Therefore, no further consideration of mitigation measures is warranted.

Off-site road traffic noise impacts

10.323. As stated in paragraphs 10.226 to 10.234, the Proposed Development is likely to result in major or moderate adverse effects at seven receptors. These receptors are located within the traveller's site, along Smithy Lane, nearest to Junction 2 of the M69; at Bridge Farm; and at the traveller's site along Leicester Road (B4668) on the opposite side of the highway to Hinckley Town Tennis Club.

10.324. In line with the NPSE, significant adverse impacts (i.e. noise levels above the SOAEL) should be avoided and mitigated and minimised through the effective management and

control of environmental noise, within the context of Government policy on sustainable development. Consequently, mitigation measures have been identified to minimise the adverse effects.

10.325. Note that significant forms of mitigation have been embedded within the design of the Proposed Development, based on iterative design development and recommendations made by an acoustic consultant. The embedded mitigation incorporates earth bunds up to 5m in height on either side of the proposed A47 Link Road, where feasible.

10.326. The following additional mitigation measures have been proposed, which are shown on Figure 6.3.10.4:

- A 3.5m high acoustic barrier has been incorporated into the 3D noise model along the north-eastern and south-eastern boundary of the traveller's site along Leicester Road (B4668) on the opposite side of the highway to Hinckley Town Tennis Club. This is proposed as a means of reducing noise from the proposed A47 Link Road.

- An acoustic barrier ranging between 4 and 6m in height has been incorporated into the 3D noise model along the north-eastern and south-eastern boundary of the traveller's site, along Smithy Lane, nearest to Junction 2 of the M69. This is proposed as a means of reducing noise from the proposed A47 Link Road.

- A 1.8m high acoustic barrier adjacent to the A47 to protect Burbage Common.

10.327. The road traffic noise predictions at the receptors within the study area have been re-calculated within the noise model, including the new barriers summarised above.

10.328. Noise contour maps have also been produced for with the Proposed Development, with mitigation, and are shown in Figures 6.3.10.11 and 6.3.10.12 for the short-term and long-term respectively. Noise contours have also been produced for the short-term and long-term scenarios to show the difference between the 'with' and 'without' development scenarios with mitigation in place. These are shown in Figures 6.3.10.13 for the short-term and 6.3.10.14 for the long-term.

10.329. The results for the short-term are presented in Table 10.62 below.

Table 10.62: Sensitive receptors; short-term noise changes with mitigation

Change in noise level		Magnitude of effect	Number of properties
Increase in noise level $L_{A10,18h}$	0.1 – 0.9 dB	Negligible	62
	1.0 – 2.9 dB	Minor Adverse	53
	3.0 – 4.9 dB	Moderate Adverse	0
	≥ 5 dB	Major Adverse	1
No change	0 dB	None	6
Decrease in noise level $L_{A10,18h}$	0.1 – 0.9 dB	Negligible	1
	1.0 – 2.9 dB	Minor Beneficial	0
	3.0 – 4.9 dB	Moderate Beneficial	0
	≥ 5 dB	Major Beneficial	0

10.330. Following the inclusion of the proposed mitigation measures, there is one property which is predicted to experience a major adverse effect in the short-term. This is the property at Bridge Farm, to the east of the proposed A47 Link Road.

10.331. There are no properties which are predicted to experience a moderate adverse effect in the short-term.

10.332. Of the 123 properties located within the study area, 122 are predicted to experience a low, or negligible noise impact, or no change in the short-term. This is equivalent to a negligible to minor adverse direct, short-term effect as a result of operational road traffic noise, which is considered not significant.

10.333. The results for the long-term are presented in Table 10.63 below.

Table 10.63: Sensitive receptors; long-term noise changes with mitigation

Change in noise level		Magnitude of effect	Number of properties
Increase in noise level $L_{A10,18h}$	≤ 3 dB	Negligible	118
	3.0 – 4.9 dB	Minor Adverse	2
	5.0 – 9.9 dB	Moderate Adverse	1
	≥ 10 dB	Major Adverse	0
No change	0 dB	None	2
Decrease in noise level $L_{A10,18h}$	≤ 3 dB	Negligible	0
	3.0 – 4.9 dB	Minor Beneficial	0
	5.0 – 9.9 dB	Moderate Beneficial	0
	≥ 10 dB	Major Beneficial	0

10.334. Following the inclusion of the proposed mitigation measures, there are no properties which are predicted to experience a major adverse effect in the short-term.

10.335. There is one property which is predicted to experience a moderate adverse effect in the short-term. This is the property at Bridge Farm, to the east of the proposed A47 Link Road.

10.336. Of the 123 properties located within the study area, 122 are predicted to experience a low, or negligible noise impact, or no change in the short-term. This is equivalent to a negligible to minor adverse direct, short-term effect as a result of operational road traffic noise, which is considered not significant.

10.337. For the property at Bridge Farm, there is already significant embedded mitigation in the form of a 5m high earth bund, located between the A47 Link Road (i.e. the dominant source of noise) and the property. It is unlikely that increases in the height of this bund or the inclusion of an acoustic barrier at the crest of the bund would result in sufficient reductions in noise level, such that the property would experience effects which are not

significant. It is important to note, however, that daytime and night-time noise levels at this property do not exceed the SOAEL, rather, noise levels are predicted to fall between the LOAEL and SOAEL. In line with the NPSE, noise levels between the LOAEL and SOAEL should be mitigated and minimised as far as is practicable. This has been achieved through the inclusion of the embedded mitigation measures set out above. Consequently, no further mitigation measures are considered feasible.

Tranquillity

10.338. The future contribution from the Proposed Development has been predicted with the proposed mitigation in place, adjacent to the A47 Link Road. The results are shown below in Table 10.64. Figure 6.3.10.15 shows the noise propagation across the site from operational noise and the A47 Link Road, with mitigation in place.

Table 10.64: Resultant daytime noise levels at NSRs as a result of the A47 Link Road, with mitigation

NSR	Daytime 16-hour period (0700 – 2300)			Resultant future noise level dB $L_{Aeq,16h}$	Change dB
		Existing measured level – dB $L_{Aeq,16h}$	Future contribution from Proposed Development – Calculated dB $L_{Aeq,16h}$		
Burbage Common Woods	Weekday	57	55	59.1	+2.1
	Weekend	52		56.8	+4.8

10.339. The resultant effect at Burbage Common Woods on a weekday and weekend with mitigation in place will be permanent, minor adverse.

10.340. As previously discussed, as the site is already surrounded by busy roads, and the background noise levels are characterised by road traffic, it is considered that the resultant noise levels will not be out of character. It is recognised that some areas of Burbage Common Woods may experience noise levels above those predicted above, particularly where the woods are in close proximity to the proposed link road.

10.341. It is also worth noting that the above assessment has included cranes with the higher noise level to consider a worse-case scenario.

RESIDUAL ENVIRONMENTAL EFFECTS

10.342. Effects of negligible and minor are insignificant, whereas effects of moderate and major are significant, in terms of this EIA.

Construction phase

10.343. With the proposed mitigation in place, it is considered that the effects of construction noise and vibration would be reduced at existing NSRs to between temporary, minor adverse significance and temporary, moderate adverse significance at worst.

Completed development

Noise from HGV movements, loading/unloading operations and service yard areas, including SRFI operations

10.344. It is considered that with the proposed mitigation in place, and considering the context, in accordance with BS 4142, the residual effect is likely to be permanent, minor adverse.

Noise from fixed plant, equipment and break-out noise

10.345. Noise level limits were derived at the nearest NSRs. Provided that these limits are achieved, the residual effect is likely to be permanent, minor adverse at worst.

Noise from off-site rail movements

10.346. The predicted noise impact from additional rail movements indicates that there will be, at worst, a permanent, minor adverse effect at NSRs and mitigation is not required. Therefore, the residual effect remains at permanent, negligible adverse.

Vibration from off-site rail movements

10.347. Following a vibration survey of the existing line, it is considered that the resultant effect as a result of the train movements on the sidings, would be permanent, negligible adverse.

Off-site road traffic noise impacts

10.348. The predicted noise impact from development generated traffic with mitigation in place, indicates that there will be between a minor adverse and negligible adverse effect at the majority of NSRs during the daytime in the short-term. The noise impact at NSR1 indicates that there will be a major, adverse effect from development generated road traffic with mitigation in place in the short-term.

Tranquillity

10.349. With mitigation in place, and when the context is taken into account, it is considered that the change in noise level, and considering the context, the residual effect is likely to be permanent, negligible and permanent, minor adverse.

CUMULATIVE AND IN-COMBINATION EFFECTS

Construction phase

10.350. The construction phase assessment has considered existing sensitive receptors surrounding the Proposed Development. It is considered that any impact will be lower at existing sensitive receptors located at a greater distance than those identified. With the exception of the proposed crematorium (18/00751/DEEM) and Rear of Gamekeepers Lodge (19/01303/FUL), due to the distance between the Proposed Development and the other committed developments, it is considered unlikely that the cumulative effects of construction noise will be significant.

10.351. Although the above identified developments are located within 160m of the Site boundary, given the potential temporary, moderate adverse noise effects of construction predicted at sensitive receptors from the Proposed Development, it is anticipated that these committed developments would be subject to the same best practice measures, such as those detailed in the CEMP for this Development. Therefore, the cumulative effect of construction noise is likely to remain as temporary, moderate adverse at worst.

Completed development

10.352. The traffic data, provided by the Transport Consultant, includes committed developments in the area. The assessment has considered the cumulative effects of road traffic at NSRs, and the assessment indicates that there will not be a significant effect at the majority of receptors. A major, adverse effect is likely at NSR1 due to noise from the A47 Link Road.

10.353. It is understood that part of the site could be operational while the wider site is being built out. Given the distances between NSRs and the Main HNRFI Site, and that as the site is built out it will provide some screening from construction/operational noise, it is considered that the cumulative effects will be minor, adverse.

CLIMATE CHANGE

10.354. Climate change is unlikely to alter the findings of this assessment or have an adverse impact on noise in the future.

SUMMARY AND CONCLUSIONS

10.355. This assessment has considered the potential impact of noise and vibration at noise sensitive receptors (NSRs) during the construction and operational phase of the Proposed Development.

10.356. In order to define baseline noise conditions, a noise survey was undertaken in April 2021,

and the results have been used as a basis for the assessment. Long-term unattended daytime and night-time ambient noise measurements were undertaken at four locations considered to be representative of NSRs in the vicinity of the Proposed Development. Short-term monitoring was undertaken at two locations in accordance with the shortened procedure detailed within CRTN.

10.357. Based upon a preliminary quantitative assessment of potential noise during the construction phase, it is considered that, at worst, temporary, major adverse effects could arise without mitigation at the nearest existing NSRs. Such impacts should be minimised where possible by adopting best practicable means through the CEMP, in order to specifically identify potential impacts and appropriate mitigation based upon site specific information as the project progresses. With appropriate mitigation in place, residual effects would be reduced to temporary, moderate adverse at worst for existing NSRs.

10.358. The effects of construction vibration will need to be managed through the CEMP, based upon specific details of the construction works required once available.

10.359. The effects of construction traffic are predicted to be temporary, negligible adverse at worst for existing NSRs.

10.360. The operational phase assessment has considered noise from fixed plant, equipment and break-out noise associated with the Proposed Development, noise associated with HGV deliveries and SRFI operations to the Proposed Development site, and the change in noise levels at NSRs due to additional rail movements, the proposed A47 Link Road and development generated road traffic.

10.361. For noise associated with HGV deliveries including SRFI operations, library data for HGV movements, loading/unloading activities and rail movements has been used, together with assumptions regarding operations, building layout and usage. With appropriate mitigation in place, including acoustic barriers, the residual effect would be a permanent, minor adverse at worst.

10.362. Noise level limits have been derived at the nearest NSRs for fixed plant and equipment to achieve. Provided that these limits are achieved, the resultant effect is likely to be permanent, minor adverse at worst.

10.363. The predicted noise impact from additional rail movements indicates that there will be, at worst, a permanent, minor adverse effect at NSRs and mitigation is not required.

10.364. Following a vibration survey of the existing line, it is considered that the resultant effect as a result of the train movements on the sidings, would be permanent, negligible adverse.

10.365. The results of a tranquillity assessment, which considers the change in noise levels and the absolute noise level at Burbage Common Woods, Aston Firs and Freehold Woods, indicates that there would be a permanent, minor adverse effect at worse.

10.366. Tables 10.65 and 10.66 provide a summary of effects and mitigation, respectively.

Table 10.65 - Summary of effects

Description of impact	Inherent mitigation measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional mitigation measures	Residual effect	Proposed monitoring
Temporary Impact Construction Noise	N/A	High	High	Major, adverse	CEMP and industry best practice	Temporary minor, adverse and temporary moderate, adverse. A moderate adverse effect is significant.	N/A
Temporary Impact Construction Vibration –	N/A	Medium	High	Moderate adverse	CEMP and industry best practice	Temporary, moderate adverse, which is significant	N/A
Temporary Impact Construction Traffic	N/A	Very Low	High	Negligible adverse	CEMP and industry best practice	Permanent, negligible adverse which is not significant	N/A
Permanent Impact Noise from HGV movements, loading/unloading operations and service yard areas, including SRFI operations –	Loading bays and service yard areas associated with Units 7, 8 and 9 are fully screened from receptors to the north.	High	High	Major, adverse	Acoustic barriers to the north and east of the site	Permanent, minor adverse, which is not significant	N/A

Description of impact	Inherent mitigation measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional mitigation measures	Residual effect	Proposed monitoring
Permanent Impact Noise from fixed plant, equipment and break-out noise	N/A	Low	High	Minor, adverse	Noise level limits were set at the NSRs	Permanent, minor adverse, which is not significant	N/A
Permanent Impact Noise from off-site rail movements	N/A	Low	High	Minor, adverse	N/A	Permanent, minor, adverse which is not significant	N/A
Permanent Impact Vibration from off-site rail movements	N/A	Very Low	High	Negligible adverse	N/A	Permanent, negligible, adverse which is not significant	N/A
Permanent Impact Off-site road traffic noise impacts	Earth bunds up to 5m in height	High	High	Major adverse	Acoustic barriers adjacent to the A47 Link Road	Permanent minor, adverse and permanent, negligible adverse at majority of receptors, which is not significant Short-term major, adverse	N/A

Description of impact	Inherent mitigation measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional mitigation measures	Residual effect	Proposed monitoring
						at NSR1, which is significant.	
Permanent Impact Tranquillity	N/A	Medium	High	Moderate, adverse	Additional barriers adjacent to the A47 Link Road	Permanent minor, adverse and permanent, negligible adverse which is not significant	N/A

Table 10.66 – Summary of mitigation

Description of impact	Effect	Mitigation measures adopted as part of the project	Secured by	Responsible party
Temporary Impact Construction Noise	Temporary minor, adverse and temporary moderate, adverse	CEMP and industry best practice	Secured by requirement	Contractor
Temporary Impact Construction Vibration –	Temporary, moderate adverse	CEMP and industry best practice	Secured by requirement	Contractor
Temporary Impact Construction Traffic	Permanent, negligible adverse	CEMP and industry best practice	Secured by requirement	Contractor

Description of impact	Effect	Mitigation measures adopted as part of the project	Secured by	Responsible party
Permanent Impact Noise from HGV movements, loading/unloading operations and service yard areas, including SRFI operations –	Permanent, minor adverse	Acoustic barriers and use of rubber tyred gantry cranes	Secured by requirement	Operator
Permanent Impact Noise from fixed plant, equipment and break-out noise	Permanent, minor adverse	Noise level limits were set at the NSRs	Secured by requirement	Operator
Permanent Impact Noise from off-site rail movements	Permanent, minor adverse	N/A	N/A	N/A
Permanent Impact Vibration from off-site rail movements	Permanent, negligible, adverse	N/A	N/A	N/A
Permanent Impact Off-site road traffic noise impacts	Permanent minor, adverse and permanent, negligible adverse at majority of receptors.	Acoustic barriers	Secured by requirement	Developer

Description of impact	Effect	Mitigation measures adopted as part of the project	Secured by	Responsible party
	Short-term major, adverse at NSR1			
Permanent Impact Tranquillity	Permanent minor, adverse and permanent, negligible adverse	Acoustic barriers	Secured by requirement	Developer