Tritax Symmetry (Hinckley) Limited

# HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

# Preliminary Environmental Information Report

## Chapter 10: Noise and vibration

January 2022

## This document forms a part of a Preliminary Environmental Information Report (PEIR) for the Hinckley National Rail Freight Interchange project.

A PEIR presents environmental information to assist consultees to form an informed view of the likely significant environmental effects of a proposed development and provide feedback.

This PEIR has been prepared by the project promoter, Tritax Symmetry (Hinckley) Limited. The Proposed Development is described in Chapter 3 of the PEIR and is the subject of a public consultation running from 12 January to 9 March 2022.

## Details of how to respond to the public consultation are provided at the end of Chapter 1 of the PEIR and on the project website:

## http://www.hinckleynrfi.co.uk/

This feedback will be taken into account by Tritax Symmetry (Hinckley) Limited in the preparation of its application for a Development Consent Order for the project.

# Chapter 10 ◆ Noise and vibration

## INTRODUCTION

10.1. In accordance with guidance[1], the information presented in this Chapter is considered 'preliminary'; the PEIR submission forms an integral part of an iterative process for both the design of the Proposed Development and the EIA and will therefore take into consideration any comments received through this consultation.

10.2. 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, excluding 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).

10.3. 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 10.1.

10.4. A full description of relevant policy, standards and guidance is provided in Appendix 10.2.

## METHODOLOGY AND DATA SOURCES

### Scoping opinion

10.5. Consultation has been undertaken in the form of the project's Scoping Report which was issued to statutory consultees. 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 | The Scoping Report proposes to scope out operational vibration impacts for the proposed new | This is agreed, no further action is required. |

[1] The Planning Inspectorate (May 2020): Advice Note Seven (Version 7); Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements

| ID | Ref | Point | Comments | Response |
|---|---|---|---|---|
| | | operation | 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. | |
| 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 the majority of the junctions, there is unlikely to be an impact from a noise perspective. Potential impacts have been identified for junctions 19 and 29, and are detailed in Paragraph 10.184. |
| 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. | Where significant effects are likely to occur due to road traffic noise associated with the construction phase, these will be considered within the ES. These will be assessed following the principles of DMRB LA111, referencing Table 3.17 of that document.<br>Further detail is provided in Paragraph 10.87. |
| 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. | Where significant effects are identified, an assessment will be undertaken. |
| 4.4.5 | 9.25 | Operational phase vibration | The Scoping Report states that the ES will assess noise arising from operational service yard | Service yard activities are likely to include vehicle movements, storage, |

| ID | Ref | Point | Comments | Response |
|---|---|---|---|---|
| | | from service yard activity | 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. | 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 redline boundary of the Main HNRFI Site.<br>Therefore, vibration from operational service yard activities is unlikely to be significant, and does not warrant consideration within the assessment.<br><br>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 operational vibration associated with the proposed rail interchange is unlikely to be significant and does not warrant consideration at this stage. This is addressed |

| ID | Ref | Point | Comments | Response |
|---|---|---|---|---|
| | | | | further in paragraphs 10.151 to 10.154. |
| 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 6lifetime 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 10.181 to 10.196. 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, we propose to develop a methodology 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. Areas such as open spaces, public footpaths, local reserves etc would be considered within any assessment. |

**Table 10.2: 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 BDC | Further consultation has been undertaken and the methodology and noise sensitive receptors 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 |

| Consultee | Comments | Response |
|---|---|---|
| | | holiday.<br>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. |
| | With regard to noise, a number of 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 will include receptors located along Billington Road, which are located closer to the Main HNRFI Site 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 will not be included within the following assessment.<br>Any re-routing of traffic as a result of the Proposed Development is captured within the traffic data and has been 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 will consider 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 and will likely be subject to their noise and vibration requirements to ensure appropriate control measures are |

| Consultee | Comments | Response |
|---|---|---|
| | | 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. |
| Sharnford Parish Council | Houses in Sharnford are less than 1.0 metre from the B114 with cracks in walls and excessive noise. | The potential effect of additional road traffic associated with the proposed development will be assessed, and mitigation will be recommended where adverse impacts are identified. |
| Stoney Stanton | Operational Phase – Rail Freight Interchange – although many British 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 at the moment no such operations take place. The ES should specifically consider noise generated at night time which is likely to have an impact over a larger area than daytime noise. | The noise and vibration assessment has considered the 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.<br>Noise associated with the Proposed Development is 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 10.3. |
| | Section 9.33 references short term but fails to clarify that with a meaning | This is addressed within this PEIR document |

| Consultee | Comments | Response |
|---|---|---|
| | full statement. This needs to state the use and definition of short term in respect to this comment. It also states "….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. | The CEMP details the control measures in place and has to be 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 bas 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;<br>'*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.<br>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. |
| | It is likely that there will be considerable noise generated by | The noise assessment will consider the potential |

| Consultee | Comments | Response |
|---|---|---|
| | operations at the site, including but not limited to steady beeping of reversing vehicles. | operational noise impact as a result of the proposed development, and recommend 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.<br>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:<br>• Immediate residents of the proposed development,<br>• Members of the public enjoying the amenity space of Burbage Common, woods and surrounding areas,<br>• All wildlife in the woods and common,<br>• The new crematorium being built near Leicester Road, Hinckley,<br>Consider the impact of the above on night time operations. | The construction phase assessment has accounted for piling activities. Further details can be found in paragraphs 10.81 to 10.91 and associated tables.<br>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 BDC 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.<br>The new crematorium will be considered, 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.<br>Night-time operations will be considered within the assessment. |
| 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 BDC 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. |

| Consultee | Comments | Response |
|---|---|---|
| Highways England (HE) | 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 will be assessed. The air quality issues are addressed in Chapter 9 of the PEIR. |
| 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 will consider Appendix 2.<br>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*.'<br>The criteria to be achieved internally is similar. The criteria 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 will adopt the metrics within BS 8233. |

10.6. 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 |
|---|---|---|---|
| BDC | 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 a number of 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.<br>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.<br><br>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.<br>In addition, the receptors that you have identified appear to be reasonable, and the monitoring locations likely to be representative of them.<br>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.<br>I look forward to hearing from | Although the comments indicate that there are no issues with the proposed approach, following the submission of the PEIR document, specific comments will be sought from BDC on the PEIR's tranquillity assessment approach and conclusions. Consideration will be given to the planning guidance document.<br><br>Following submission of the PEIR document, further consultation will be undertaken with BDC regarding the local roads included within the assessment. |

| Consultee | Date | Comments | Actions |
|---|---|---|---|
| | | you with regard to the local roads. Perhaps you could suggest some dates and times that are suitable to you for discussing the tranquillity assessment. | |
| Hinckley and Bosworth Borough Council | 26th March 2021 | A concern was raised regarding the receptor on the junction of Sapcote Road and Smithy Lane.<br>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<br>*'The methodology appears fine.*<br>*Houston Lodge is on Burbage Common Road. The assessment at Basset Cottage and Bridge Farm should address any issues there*'. |

10.7. Public consultation was undertaken with the public in 2018/2019 and noise and vibration was discussed. Concerns were raised regarding potential noise and vibration impacts and this PEIR chapter considers the potential impacts of the Proposed Development on nearby receptors.

## Definition of the study area

10.8. 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.

10.9. For the construction and rail freight interchange operations, which are localised to within the Main Order Limits, the closest receptors 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.

10.10. For off-site rail movements, an initial the assessment will be 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 will 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.

10.11. For the assessment of road traffic generated by the Proposed Development, the pertinent

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

guidance states that where a project is likely to cause a change in the Basic Noise Level (BNL) of 1dB $L_{A10,18hr}$ as a result of the project opening, or there would be reasonable stakeholder expectation that an assessment would be undertaken, then the assessment shall make a recommendation on the scope of further assessment. Therefore, all roads within a 10km radius that are likely to experience an increase of 1dB $L_{A10,18h}$ will be included within the assessment. Road traffic will dissipate on the existing road network as distance increases from the site. Any adverse impacts are likely to occur closer to the Proposed Development, which will reduce with distance. Therefore, there is unlikely to be a significant adverse effect experienced at a distance greater than 10km from the Proposed Development site.

## Scope

10.12. 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, 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

10.13. The construction works are likely to be divided into a number of ground preparation and construction phases, including:

- excavation and substructure works (including some possible piling, 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.

10.14. 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[3], based on worst-case and average case scenarios and best practice mitigation measures.

10.15. 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.

10.16. 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).

10.17. 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

10.18. The Design and Manual for Roads and Bridges (DMRB) LA111[4] 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 moderate to major 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.

10.19. Construction trips for similar sites at East Midlands Gateway and Northampton Gateway

[3] 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

[4] Highways Agency (2020), Design Manual for Roads and Bridges (DMRB) LA111 Noise and Vibration Revision 2

indicate likely construction vehicle numbers at around 10-15% of the total forecast daily operational traffic flows predicted for the HNRFI Site. The trip rates from these sites have been used to forecast initial construction traffic movements for the earliest phases, when impacts will be most keenly felt on local roads.

10.20. Indicative distribution figures from potential contractors have been provided to understand likely routing of vehicles ahead of the completion of the south facing slip roads and the A47 link road. This estimates around 60% of construction traffic will route from the M69 southbound on the existing slips. The remaining 40% from the B4669 to the west and east of the site access split equally.

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

10.22. A quantitative assessment of construction traffic was not undertaken as part of the PEIR as phasing is subject to further detailed considerations. Construction phase traffic will be considered further in the ES accompanying the DCO application.

## Construction vibration

### *Effects on humans*

10.23. 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[5] 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.

10.24. 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 the worst case scenario.

10.25. The following criteria set out in Table 10.5, 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 10.5.

[5] 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

**Table 10.5: Magnitude of effect applicable to construction vibration – Applicable to human perception**

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

### *Effects on buildings*

10.26. 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[6] 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*

10.27. 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 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[7].

10.28. 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.

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

[6] British Standards Institute (2008) BS6472-1-2008 Guide to evaluation of human exposure to vibration in buildings
[7] British Standards Institute (2014+A1:2019), BS4142 Methods for rating and assessing industrial and commercial sound

**Table 10.6: 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 ≤ +8 | Medium |
| 0 ≤ +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)*<br>*+ indicates rating level above background sound level*<br>*- indicates rating level below background sound level* | |

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

10.30. In order to determine the magnitude 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 10.6 sets out the criteria against which this potential noise impact will be assessed.

10.31. In addition to the criterion detailed in Table 10.6, 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'.

10.32. Therefore, to determine the resultant effect as a result of operational noise, sound rating levels will be 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 by using the rating level, rather than the specific level accounts for this.

### *Operational maximum noise levels*

10.33. The potential effects of operational maximum noise levels from the operational phase of the SRFI will be assessed in accordance with World Health Organisation (WHO 1999) Guidelines for community noise[8] and WHO Environmental Noise Guidelines for the European Region (2018)[9].

[8] World Health Organisation (WHO) (1999), Guidelines for Community Noise
[9] World Health Organisation (2018), Environmental Noise Guidelines for the European Region

**Table 10.7: Magnitude of effect applicable to $L_{AFmax}$ levels**

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

### *Noise from on-site rail movements*

10.34. 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 4142:2014+A1:2019.

### *Noise from off-site rail movements*

10.35. There are a number of indices 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 general 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.

10.36. The assessment of noise from off-site rail movements will consider the change in noise level between the baseline scenario and a 'future' scenario, for the daytime and night-time periods. The predicted noise levels will be calculated in accordance with CRN, based on the types of trains using the line. CRN does not state a parameter and therefore the assessment will assume a change in the absolute noise level. The assessment will be undertaken at a notional distance 25m from the existing line in accordance with CRN.

10.37. 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)[10] includes an impact classification for determining the impact from the change in sound levels. The adopted criteria is shown below in Table 10.8, and is based on the IEMA guidelines taking into account other pertinent guidance.

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

**Table 10.8: 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 |
| 0.1 to 0.9 | Unlikely to be noticeable | Very Low |

### *Vibration from off-site rail movements*

10.38. 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[11]. The criteria set is detailed below in Table 10.9.

**Table 10.9: 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*

10.39. 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.

10.40. Traffic data has been provided as 18-hour Annual Average Weekday Traffic (AAWT) by BWB Consulting Ltd for the following scenarios:

- 2026 Opening Year without Development;

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

10.41. Committed developments have been included within the scenarios and are detailed within the Transport Assessment (Chapter 8) (TA).

10.42. The Design Manual for Roads and Bridges (DMRB) assessment methodology recommends that the magnitude of noise changes from a project should be classified into levels of impact. LA111 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).

10.43. DMRB 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.

10.44. The Basic Noise Level (BNL), as referenced in Calculation Road Traffic Noise (CRTN)[12], will be calculated for the study area, to predict the change in noise level between 2026 opening year including committed developments without the development, and 2026 opening year including committed developments with the development. Calculations will also be undertaken to predict the change in noise level between the future year 2036 including committed developments with the development, and 2026 opening year including committed developments without the development.

10.45. In line with the relevant impact tables from DMRB, the magnitude of impact is assessed against the criteria found in Tables 10.10 and 10.11 below.

**Table 10.10: Magnitude of noise impacts in the short term**

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

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

**Table 10.11: Magnitude of noise impacts in the long term**

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

### *A47 link road*

10.46. In addition to the methodology and criteria described above, the significance of noise from road traffic will also draw upon the criteria in Table 10.9 and the absolute noise levels associated with the link road. The criteria set for the absolute noise levels is detailed below in Table 10.10, and is the free-field level at the façade. A noise level of 50dB $L_{Aeq,T}$ at the façade would provide an internal noise level of 35dB $L_{Aeq,T}$, assuming 15dB through a partially opened window, in accordance with BS 8233. The following impact has been defined based on the recommended internal noise levels within BS 8233.

**Table 10.12: Magnitude of noise impact from the A47 link road**

| Daytime noise level | Magnitude of impact |
|---|---|
| ≥55 | High |
| 50.1 – 54.9 | Medium |
| 45– 50 | Low |
| <45 | Very low |

### *Assessment of tranquillity*

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

10.48. There are a number of 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.

10.49. Sharps Redmore have recently published literature titled 'Tranquil Spaces – Measuring the tranquillity of public spaces'[13]. Amongst others, this details two methods for assessing tranquillity, the 'University of Bradford Method' and 'The Campaign to Protect Rural

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

England Method'.

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

10.51. 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 derived taking into account different features which can be heard and/or seen, with each one being weighted differently. Although this method is considered to be 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.

10.52. The Natural Tranquillity Method is a new methodology proposed within Tranquil Spaces – Measuring the tranquillity of public spaces. It is based on a number of 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.

10.53. Based on the fact that there is no accepted method, an assessment will be undertaken to determine the change in noise level as a result of the Proposed Development to determine the level of impact. The assessment will take into account 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 will be calculated at the receptors shown in Figure 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.

10.54. To determine the impact, the change in the absolute noise level will be determined as a result of operational noise levels associated with the Proposed Development, including development generated road traffic which includes road traffic movements once the development is operational. The adopted criteria is shown below in Table 10.13.

**Table 10.13: Impact from change in sound levels**

| Sound level change dB $L_{Aeq,T}$<br>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

10.55. 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.

10.56. 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 and tug activity.
- 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[14]. 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 10.3.
- Noise data for reach stackers, rubber tracked gantry cranes and Class 66 trains were taken from the Proof of Evidence of Simon Stephenson on Noise[15]. The author has extensive experience in the assessment of noise from port and freight handling developments. The document can be found in Appendix 10.4.
- To establish the existing baseline regarding rail movements on the existing line, Realtimetrains[16] has been used to determine the existing number of movements of both passenger and freight trains.
- 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 of a baseline noise survey undertaken by Hydrock in 2018.
- Traffic data for the Proposed Development has been provided by BWB Consulting Ltd and the methodology is detailed in Chapter 8.

10.57. Further detail is provided within this PEIR.

## Identifying sensitive receptors

10.58. 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 10.1. NSRs to be included within the study area have been defined in accordance with the details in paragraphs 9.7

[14] Appendix 8.5 Summary of Assumptions for SRFI Operational Activities
[15] 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-R0) 26th December 2017
[16] https://www.realtimetrains.co.uk/

and 9.8. There may be other NSRs located further away from those identified below, however it is considered that these are likely to experience the most adverse effects.

**Table 10.14: Identified noise sensitive receptors**

| NSR Number | Address | Bearing from site | Distance to Main HNRFI Site boundary (Approx..) |
|---|---|---|---|
| 1 | Bridge Farm | Within site boundary | N/A |
| 2 | 27 Bridle Path Road, Elmesthorpe, Leicester LE9 7SA | North | 400m |
| 3 | Bridle Path Road, Elmesthorpe, Leicester LE9 7SA | North | 430m |
| 4 | Bridle Path Road, Elmesthorpe, Leicester LE9 7SA | North | 380m |
| 5 | Billington Farm, Billington Road East | North | 350m |
| 6 | Billington Road East | North | 330m |
| 7 | Billington Road East | North | 270m |
| 8 | Billington Road East | North | 210m |
| 9 | Woodfield Stables, Burbage Common Road | East | Adjacent |
| 10 | Langton Farm, Burbage Common Road, Leicester LE9 7SE | North | Adjacent |
| 11 | Burbage Common Road, Leicester LE9 7SE | North | 300m |
| 12 | Highgate Lodge Farm, Station Road, Stoney Stanton, Leicester LE9 4LU | East | 500m |
| 13 | Red Hill Farm, Hinckley Road, Sapcote, Leicester LE9 4LT | East | 330m |
| 14 | Averley House Farm, Hinckley Road, Sapcote, Leicester LE9 4LH | South East | 140m |
| 15 | Aston Firs Caravan Park, Smithy Lane, Sapcote, Leicester LE9 4LH | South | 160m |
| 16 | Castlewood Park, Aston Firs, Smithy Lane, Leicester LE9 4JZ | South | 300m |
| 17 | Rosevale Park, Smithy Lane, Leicester LE9 4JZ | South | 230m |
| 18 | Aston Firs SSSI | South | Adjacent |
| 19 | Burbage Common and Woods | South and west | Adjacent |

| NSR Number | Address | Bearing from site | Distance to Main HNRFI Site boundary (Approx..) |
|---|---|---|---|
| 20 | Basset Cottage, Burbage Common, Hinckley LE10 3DD | North west | Adjacent |
| 21 | Hissar House Farm, Leicester Road, | North | 140m |
| 22 | Church View Fields Farm, Leicester Road, | North | 210m |
| 23 | Proposed Crematorium (18/00751/DEEM), land east of Leicester Road, Hinckley LE10 3PR | North | 390m |
| 24 | Billington Rough Dwelling | North | 50m |
| 25 | Billington Road East | North East | 180m |
| 26 | Billington Road East | North East | 100m |

## Receptor sensitivity

10.59. 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 affect the function of a receptor | Auditoria/studios and specialist medical/teaching centres, or laboratories with highly sensitive equipment |
| High | Receptors where people or operations are particularly susceptible to noise or vibration.<br>Sensitive ecological receptors known to be vulnerable to the effects of noise or vibration. | Residential;<br>Quiet outdoor areas used for recreation;<br>Conference facilities;<br>Schools/educational facilities in the daytime;<br>Hospitals/residential care homes;<br>Libraries; and<br>Ecologically sensitive areas for example Special Protection Areas (SPAs) |
| Medium | Receptors moderately sensitivity to or vibration where it may cause some distraction or disturbance | Offices;<br>Restaurants; and<br>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;<br>Factories and working environments with existing high noise levels; and<br>Sports grounds when spectator or noise is a normal part of the event. |

## Characterisation of effect

### *Significance of effects*

10.60. 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 |

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

## Significance criteria

10.62. The following terminology will be 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.

10.63. Where adverse or beneficial effects are identified, these will be 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.

10.64. 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*

10.65. 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 are identified in accordance with relevant guidance.

### *Operational phase*

10.66. 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 with regard to the change in existing noise levels at nearest NSRs to the Proposed Development.

## Assumptions and limitations

10.67. 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 will be made.

10.68. 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.

10.69. The initial modelling and assessment work has not accounted for the proposed earthworks as these were unknown at the time. The proposed earthworks have been used to inform the mitigation strategy for the scheme from an acoustics perspective.

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

10.71. Trip generation data for the site during the operational phase is highly robust and have 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.

## RELEVANT LAW, POLICY AND GUIDANCE

10.72. In considering a Nationally Significant Infrastructure Project (NSIP), the Planning Inspectorate (PINS) is guided by the National Policy Statement for National Networks[17] and by other material considerations.

10.73. A full description of relevant policy, standards and guidance in provided in Appendix 10.2

[17] National Policy Statement for National Networks (2014)

and includes the following documents.

### National Planning Policy

- National Policy Statement (NPS) for National Networks;
- National Planning Policy Framework (NPPF)[18];
- Noise Policy Statement for England (NPSE)[19]; and
- National Planning Practice Guidance (NPPG)[20].

### Local Planning Policy

- Blaby District Local Plan and Core Strategy[21];
  - Blaby Green Space Strategy[22];
  - Local Plan (Delivery) Development Plan Document[23];
- Blaby Landscape and Settlement Character Assessment[24];
- Planning Guidance Note – Noise[25];
- Hinckley and Bosworth Borough Council Site Allocations and Development Management Policies[26];
- Rugby Local Plan[27]; and
- Harborough Local Plan[28].

### Other Relevant Policy, Standards and Guidance

- British Standard 7445-1:2003 Description and measurement of environmental noise: Guide to quantities and procedures[29];

[18] Communities and Local Government (2021), National Planning Policy Framework
[19] Department for Environment, Food and Rural Affairs (2010); Noise Policy Statement for England (NPSE)
[20] Ministry of Housing, Communities and Local Government (MHCLG) (2014), Planning Practice Guidance
[21] Blaby District Council (2013) Adopted Core Strategy
[22] Blaby Green Space Strategy 2012
[23] Blaby District Council Local Plan (Delivery) Development Plan Document, February 2019
[24] Blaby Landscape and Settlement Character Assessment, Final report January 2020
[25] Planning Guidance Note – Noise 2019
[26] Hinckley and Bosworth Borough Council Site Allocations and Development Management Policies DPD, July 2016
[27] Rugby Borough Council (2019) Rugby Borough Council Local Plan 2011-2031
[28] Harborough District Council (2019) Harborough Local Plan 2011-2031
[29] British Standard 7445-1:2003 Description and measurement of environmental noise: Guide to quantities and procedures

- 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;
- WHO Environmental Noise Guidelines for the European Region;
- British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings (BS 8233)[30];
- 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[31];
- British Standard 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings; and,
- Public Health England – Noise and Health[32]

## BASELINE CONDITIONS

### Site context

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

10.75. 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

[30] British Standards Institute (2014), BS8233 Guidance on noise insulation and noise reduction for buildings
[31] Additional railway noise source terms for Calculation of Railway Noise 1995
[32] Public Health England – Noise and Health

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

10.76. A baseline noise and vibration assessment has previously been undertaken by Hydrock. Noise monitoring was undertaken between 24th July 2018 and 1st August 2018 at four locations considered representative of NSRs in the vicinity of the site. Measurement locations adopted during the survey are identified in Figure 10.2 and are described in Appendix 10.3.

10.77. Vibration monitoring was undertaken at one location adjacent to the existing rail line. However, further monitoring is required to undertake a detailed assessment, which will be completed and reported on within the ES. Therefore, the results of the previous vibration monitoring have not been reported within the PEIR document, as they have not been utilised within the following assessment. A qualitative assessment has been undertaken on vibration as a result of Proposed Development and is detailed within paragraphs 10.156 to 10.159.

### *Measurement results*

10.78. The results are shown below in Tables 10.17, 10.18, 10.19 and 10.20.

**Table 10.17: Summary of measured sound pressure levels at ML1**

| Day and date | Measured noise levels, dB re, 2 x $10^{-5}$ Pa | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Daytime (0700 – 2300) | | | | Night-time (2300 – 0700) | | | |
| | $L_{Amax,f}$[1] | $L_{A10,15m}$[2] | $L_{Aeq,15m}$[3] | $L_{A90,15m}$[4] | $L_{Amax,f}$[1] | $L_{A10,15m}$[2] | $L_{Aeq,15m}$[3] | $L_{A90,15m}$[4] |
| Tuesday 24th July 2018 | 71 | 50 | 49 | 44 | 71 | 51 | 49 | 44 |
| Wednesday 25th July 2018 | 80 | 52 | 52 | 47 | 71 | 54 | 53 | 45 |
| Thursday 26th July 2018 | 66 | 54 | 53 | 50 | 72 | 49 | 48 | 42 |
| Friday 27th July 2018 | 75 | 51 | 50 | 47 | 62 | 50 | 48 | 44 |
| Saturday 28th July 2018 | 84 | 54 | 53 | 51 | 66 | 50 | 49 | 44 |
| Sunday 29th July 2018 | 68 | 56 | 55 | 52 | 63 | 51 | 51 | 45 |
| Monday 30th July 2018 | 76 | 54 | 53 | 51 | 65 | 48 | 47 | 42 |
| Tuesday 31st July 2018 | 79 | 52 | 51 | 48 | 66 | 49 | 48 | 40 |

[1] *Highest $L_{Afmax}$ sound pressure level during measurement period*
[2] *Arithmetic average of the measured 15min periods*
[3] *Logarithmic average sound pressure levels during measurement period*
[4] *Representative $L_{A90,15m}$ value to be used following statistical analysis of $L_{A90,15m}$, including max, min, mode, median and mean*

**Table 10.18: Summary of measured sound pressure levels at ML2**

| Day and date | Measured noise levels, dB re, 2 x $10^{-5}$ Pa | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Daytime (0700 – 2300) | | | | Night-time (2300 – 0700) | | | |
| | $L_{Amax,f}$[1] | $L_{A10,15m}$[2] | $L_{Aeq,15m}$[3] | $L_{A90,15m}$[4] | $L_{Amax,f}$[1] | $L_{A10,15m}$[2] | $L_{Aeq,15m}$[3] | $L_{A90,15m}$[4] |
| Tuesday 24th July 2018 | 80 | 43 | 51 | 34 | 81 | 42 | 53 | 32 |
| Wednesday 25th July 2018 | 80 | 43 | 51 | 35 | 79 | 43 | 52 | 36 |
| Thursday 26th July 2018 | 78 | 45 | 49 | 39 | 81 | 41 | 52 | 32 |
| Friday 27th July 2018 | 77 | 43 | 49 | 37 | 78 | 40 | 46 | 34 |
| Saturday 28th July 2018 | 79 | 49 | 51 | 43 | 72 | 40 | 42 | 36 |
| Sunday 29th July 2018 | 76 | 46 | 48 | 42 | 71 | 40 | 41 | 34 |
| Monday 30th July 2018 | 76 | 44 | 49 | 39 | 80 | 40 | 48 | 31 |
| Tuesday 31st July 2018 | 88 | 45 | 50 | 37 | 77 | 38 | 47 | 30 |

*[1] Highest $L_{Afmax}$ sound pressure level during measurement period*
*[2] Arithmetic average of the measured 15min periods*
*[3] Logarithmic average sound pressure levels during measurement period*
*[4] Representative $L_{A90,15m}$ value to be used following statistical analysis of $L_{A90,15m}$, including max, min, mode, median and mean*

**Table 10.19: Summary of measured sound pressure levels at ML3**

| Day and date | Measured noise levels, dB re, 2 x $10^{-5}$ Pa | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Daytime (0700 – 2300) | | | | Night-time (2300 – 0700) | | | |
| | $L_{Amax,f}$[1] | $L_{A10,15m}$[2] | $L_{Aeq,15m}$[3] | $L_{A90,15m}$[4] | $L_{Amax,f}$[1] | $L_{A10,15m}$[2] | $L_{Aeq,15m}$[3] | $L_{A90,15m}$[4] |
| Tuesday 24th July 2018 | 96 | 46 | 64 | 34 | 97 | 43 | 65 | 33 |
| Wednesday 25th July 2018 | 96 | 47 | 64 | 35 | 96 | 45 | 65 | 38 |
| Thursday 26th July 2018 | 96 | 47 | 63 | 39 | 98 | 42 | 66 | 34 |
| Friday 27th July 2018 | 95 | 45 | 63 | 37 | 92 | 42 | 58 | 36 |
| Saturday 28th July 2018 | 95 | 50 | 62 | 43 | 89 | 43 | 53 | 38 |
| Sunday 29th July 2018 | 95 | 49 | 59 | 43 | 90 | 42 | 50 | 38 |
| Monday 30th July 2018 | 98 | 47 | 61 | 41 | 97 | 41 | 61 | 33 |
| Tuesday 31st July 2018 | 96 | 47 | 62 | 38 | 95 | 41 | 60 | 33 |

[1] *Highest $L_{Afmax}$ sound pressure level during measurement period*
[2] *Arithmetic average of the measured 15min periods*
[3] *Logarithmic average sound pressure levels during measurement period*
[4] *Representative $L_{A90,15m}$ value to be used following statistical analysis of $L_{A90,15m}$, including max, min, mode, median and mean*

**Table 10.20: Summary of measured sound pressure levels at ML4**

| Day and date | Measured noise levels, dB re, 2 x $10^{-5}$ Pa | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Daytime (0700 – 2300) | | | | Night-time (2300 – 0700) | | | |
| | $L_{Amax,f}$[1] | $L_{A10,15m}$[2] | $L_{Aeq,15m}$[3] | $L_{A90,15m}$[4] | $L_{Amax,f}$[1] | $L_{A10,15m}$[2] | $L_{Aeq,15m}$[3] | $L_{A90,15m}$[4] |
| Tuesday 24th July 2018 | 82 | 45 | 47 | 38 | 71 | 47 | 47 | 39 |
| Wednesday 25th July 2018 | 80 | 49 | 49 | 41 | 80 | 52 | 50 | 43 |
| Thursday 26th July 2018 | 71 | 51 | 50 | 46 | 71 | 48 | 47 | 41 |
| Friday 27th July 2018 | 83 | 49 | 49 | 44 | 68 | 48 | 47 | 41 |
| Saturday 28th July 2018 | 89 | 55 | 54 | 50 | 64 | 49 | 46 | 42 |
| Sunday 29th July 2018 | 72 | 53 | 52 | 50 | 69 | 50 | 50 | 44 |
| Monday 30th July 2018 | 95 | 53 | 52 | 48 | 75 | 48 | 46 | 41 |
| Tuesday 31st July 2018 | 79 | 50 | 49 | 45 | 70 | 49 | 49 | 40 |

*[1] Highest $L_{Afmax}$ sound pressure level during measurement period*
*[2] Arithmetic average of the measured 15min periods*
*[3] Logarithmic average sound pressure levels during measurement period*
*[4] Representative $L_{A90,15m}$ value to be used following statistical analysis of $L_{A90,15m}$, including max, min, mode, median and mean*

10.79. The weather conditions during the noise survey have been provided by Hydrock, and these are reproduced below in Table 10.21.

**Table 10.21: Summary of weather conditions during noise survey**

| Date | Temperature (°C) | | | Humidity (%) | | Wind speed ($ms^{-1}$) | | | Precipitation (mm) |
|---|---|---|---|---|---|---|---|---|---|
| | Avg. | Min. | Max. | Min. | Max. | Avg. | Max. | Direction | Total |
| 24/07/ 2018 | 22 | 18 | 26 | 47 | 83 | 3.2 | 10.7 | SE | 0.0 |
| 25/07/ 2018 | 20 | 15 | 26 | 34 | 77 | 2.0 | 5.8 | W | 0.0 |
| 26/07/ 2018 | 23 | 16 | 31 | 38 | 82 | 3.1 | 11.6 | SE | 0.0 |
| 27/07/ 2018 | 21 | 16 | 27 | 39 | 88 | 3.1 | 11.6 | SSE | 0.0 |
| 28/07/ 2018 | 17 | 13 | 20 | 45 | 94 | 5.0 | 12.5 | SW | 0.0 |
| 29/07/ 2018 | 17 | 14 | 19 | 82 | 100 | 5.5 | 15.6 | S | 0.0 |
| 30/07/ 2018 | 17 | 13 | 22 | 56 | 100 | 3.3 | 9.8 | S | 0.0 |
| 31/07/ 2018 | 17 | 13 | 22 | 43 | 100 | 2.9 | 8.0 | SW | 0.0 |
| 01/08/ 2018 | 17 | 12 | 23 | 44 | 94 | 2.9 | 7.6 | SW | 0.0 |

### Future baseline

10.80. 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. However, the lower, measured background noise levels have been used as a basis for the following assessment to provide a worst-case scenario.

### Sensitivity of receptors

**10.81.** In accordance with the criteria detailed in Table 10.15, the sensitivity of all of the identified existing sensitive receptors from Table 10.14 will be identified as high.

## POTENTIAL SIGNIFICANT ENVIRONMENTAL EFFECTS OF THE PROPOSALS

### Construction phase

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

10.83. Noise and vibration levels experienced by local receptors during such works depend upon a number of 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 plathethe periods of use of the

plant on site, known as onthee;

- the distance between the noise/vibration source and ththeceptor;
- 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 oftheldings; and
- the nature of the ground with respect to vibration transmission.

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

- 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***

10.85. 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.

10.86. Notwithstanding this, Table 10.22 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 10.22: 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, | Tracked Excavator [C2.19] | 77 | 10 | 50 |

| Element | Construction phase/activity | Plant type (BS 5228 ref data) | Sound pressure level dB at 10m | Number of plant | Assumed percentage 'on-time' |
|---|---|---|---|---|---|
| | earthworks | 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 lorries | Poker Vibrator [C4.33] | 78 | 4 | 75 |
| | | 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 [BMB source data] | 66 | 1 | 25 |
| 3 | Building erection works involving lorries, tracked cranes and hand-held tools | Lorry Arriving [BMB source data] | 66 | 8 | 25 |
| | | Dump truck [C2.30] | 79 | 2 | 50 |
| | | Diesel Generator [C4.79] | 64 | 2 | 100 |

| Element | Construction phase/activity | Plant type (BS 5228 ref data) | Sound pressure level dB at 10m | Number of plant | Assumed percentage 'on-time' |
|---|---|---|---|---|---|
| | | 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 | 66 | 2 | 100 |

10.87. 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.

10.88. 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 acoustically soft and that there will be no additional attenuation of sound due to acoustic barriers or screening such as local buildings. It has also been assumed that no construction activities will be undertaken on Burbage Common Road, between the Main HNRFI Site and the B581.

10.89. For NSRs which are adjacent or within the red line boundary, it has been assumed that construction activities could take place at a minimum of 25m from the NSR for the worst-

case scenario. For the average case scenarios, 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 are shown on Figure 10.1.

10.90. Table 10.23 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.

10.91. 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 10.17 to 10.20. 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.

**Table 10.23: Predicted unmitigated average/worst-case construction phase noise levels**

| NSR | Phase of construction works | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Average case[1] (dB $L_{Aeq,T}$) | | | | Worst-case(dB $L_{Aeq,T}$) | | | |
| | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| 1 | 66 | 65 | * | 51 | 83 | 82 | 79 | 66 |
| 9 | * | * | * | 43 | 83 | 82 | 79 | 66 |
| 10 | 58 | 57 | 55 | * | 83 | 82 | 79 | 66 |
| 14 | * | * | * | * | 71 | 71 | 68 | 56 |
| 15 | 75 | 74 | 53 | 60 | 83 | 82 | 79 | 66 |
| 16 | 62 | 62 | * | 48 | 83 | 82 | 79 | 66 |
| 17 | 59 | 59 | * | 45 | 83 | 82 | 79 | 66 |
| 18 | 58 | 58 | * | 45 | 83 | 82 | 79 | 66 |
| 19 | 73 | 72 | * | 58 | 83 | 82 | 79 | 66 |
| 20 | 57 | 56 | * | 43 | 83 | 82 | 79 | 66 |
| 21 | 62 | 61 | * | 48 | 71 | 71 | 68 | 56 |
| 22 | 57 | 57 | * | 44 | 64 | 64 | 61 | 50 |
| 24 | 65 | 64 | * | * | 83 | 82 | 79 | 66 |
| 26 | 62 | 62 | * | 47 | 67 | 67 | 64 | 53 |

**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.*

10.92. For works outside the daytime hours of 8am – 6pm 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 $L_{Aeq}$.

10.93. 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 the majority of 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. For NSRs 15 and 19, there is likely to be a temporary, major adverse effect, based on the element of the construction works taking place.

10.94. 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 or any mitigation. It is likely that the effect would be lower than this, and any major adverse effect would be short-term.

10.95. 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 of time. 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.

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

10.97. At this stage of the PEIR, the construction programme for the HNRFI Site has been set out in an indicative programme in Chapter 3. More detail on construction traffic movements will be included for the final submission, including details of material removal, construction traffic management and environmental management. Further detail on this information will be included in the Construction Environmental Management Plan (CEMP).

***Construction vibration***

10.98. 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[33] (applicable to HGV induced vibration).

10.99. 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

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

typical construction vibration sources.

10.100. 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 10.24 are general in nature and not 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 10.24: 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.*

10.101. 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 effects 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.

10.102. 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

10.103. 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;
- 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;
- noise from the proposed A47 link road; and
- The effect of operational noise on local tranquility.

#### *Noise model*

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

10.105. 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[34].
- Mapping of the Site and the surrounding area was calibrated into the noise model based on known Ordinance Survey grid reference points.
- Indicative ground topography was approximated using Lidar data at 1m.
- 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 Proposed Development and receptors to the north.

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

- 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.
- Proposed buildings have an assumed height of 26m. It is understood that building heights could be between 27m to 33m. Although the building heights will be higher than those modelled, it is unlikely to affect the outcome of the assessment. Furthermore, using lower building heights presents a worst-case scenario as any increase in the height will increase the screening provided by the proposed buildings.

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

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

10.107. 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 taken into account when selecting the noise data to be used within the assessment. The noise levels used within the assessment are presented in Tables 10.25, 10.25, 10.27 10.28 and 10.29.

**Table 10.25: 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 |
| HGV departing | 1 minute | 46 |
| Total | | **52 dB $L_{Aeq,1h}$** |
| **Night-time** | | |
| HGV arriving | 2 minutes | 57 |
| Loading/unloading noise | 13 minutes | 55 |
| Total | | **56dB $L_{Aeq,15m}$** |

**Table 10.26: 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 |
| **Night-time** | | |
| HGV Delivery including arriving/departing, impact noise and cargo being wheeled | 15 minutes | 60 |

**Table 10.27: 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 passby | 5 | 6 | 73 | 78 |

**Table 10.28: 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 10.29: Summary of historic tug passby 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 |

10.108. 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.
- For the daytime and night-time periods, the number of deliveries for each unit used

within the assessment is based on the worst-case hour provided by the Transport Consultant. There is predicted to be 522 two-way movements in a worst-case hour during the daytime, and 354 two-way movements in a worst-case hour during the night-time. The total number of movements for the night-time has been divided by four to approximate a 15-minute period. 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 10.30 for the daytime and night-time periods.

**Table 10.30: Number of assumed deliveries and bay occupancy to each unit**

| Unit | Daytime | | Night-time | |
|---|---|---|---|---|
| | Assumed number of passbys per hour during the daytime | Assumed number of occupied bays per hour during the daytime | Assumed number of passbys per 15m during the night-time | Assumed number of occupied bays per 15 minutes during the night-time |
| 1 | 27 | 13 | 5 | 2 |
| 2 | 24 | 12 | 4 | 2 |
| 3 | 19 | 9 | 3 | 2 |
| 4 | 21 | 10 | 4 | 2 |
| 5 | 34 | 17 | 6 | 3 |
| 6 | 24 | 12 | 4 | 2 |
| 7 | 28 | 14 | 5 | 2 |
| 8 | 28 | 14 | 5 | 2 |
| 9 | 38 | 19 | 7 | 3 |
| 10 | 89 | 44 | 15 | 8 |
| 11 | 65 | 32 | 11 | 5 |
| 12 | 118 | 59 | 20 | 10 |
| Rail Terminal | 7 | N/A | 1 | N/A |

- The noise levels from tug passbys have been corrected for distance to 10m and time based on the assumed number of passbys 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 passbys and associated activity has been calculated based on 50% occupancy of the parking bays associated with each unit for the daytime, and 25% for the night-time. The resultant number of movements for each unit are shown below in Table 10.31.

**Table 10.31: Assumed number of tug movements**

| Unit | Number of movements associated with 50% bay occupancy during the daytime | Number of movements associated with 25% bay occupancy during the night-time |
|---|---|---|
| 1 | 30 | 15 |
| 2 | 25 | 12 |
| 3 | 23 | 11 |
| 4 | 27 | 13 |
| 5 | 34 | 17 |
| 6 | 26 | 13 |
| 7 | 31 | 16 |
| 8 | 35 | 17 |
| 9 | 21 | 10 |
| 10 | 22 | 11 |
| 11 | 27 | 13 |
| 12 | 69 | 35 |

10.109. For HGV and tug 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.

10.110. In the absence of specific data, the following sources have also been included within the assessment, detailed below in Table 10.32.

**Table 10.32: Adopted noise emission data used in the assessment**

| Equipment | Sound power $L_{WA}$ dBA | Modelled height | Assumed number of sources | | Assumed % ontime |
|---|---|---|---|---|---|
| | | | Day | Night | |
| Reach stacker | 109 | 2m | 8 | 4 | 50 |
| RTG crane engine | 109 | 26m | 2 | 2 | 50 |

| Equipment | Sound power $L_{WA}$ dBA | Modelled height | Assumed number of sources | | Assumed % ontime |
|---|---|---|---|---|---|
| | | | Day | Night | |
| RTG crane exhaust | 105 | 26m | 2 | 2 | 50 |
| Class 66 idling or pulling away | 106 | 4m | 10 | 10 | 10 |

10.111. Octave band levels for the equipment are shown below in Table 10.33. 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 10.33: 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 passby | 116 | 102 | 94 | 93 | 97 | 92 | 91 | 84 |
| Tug passby | 105 | 103 | 101 | 102 | 97 | 92 | 87 | 79 |
| Tug activity | 114 | 107 | 101 | 100 | 100 | 95 | 91 | 84 |
| Reach stacker | 101 | 104 | 111 | 107 | 104 | 97 | 90 | 81 |
| 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 |

10.112. 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 of the above operations happen during each of the deliveries/collections to the site, as a worst-case.

10.113. Based on the above information, the predicted daytime and night-time noise levels have been calculated at the NRSs, as identified in Table 10.11 without any mitigation in place. The noise level from operations at the Proposed Development site have been modelled in outdoor living 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.

10.114. As NSR10 includes stables and a paddock, the daytime outdoor level has been calculated within the paddock, and for the night-time period, the specific level at the façade has been used. For NSRs that have been identified as farms, the assessment has been undertaken at the residential elements.

10.115. 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.

10.116. 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, 19, 20, 25 and 26. A 6dB penalty has been applied at NSR24, to account for impulsivity which is likely to be clearly perceptible.

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

10.118. Given the intervening distance between the Proposed Development and NSRs 12, 13 and 14, and the presence of the M69, it is considered that noise associated with HGV deliveries is unlikely to be noticeable against the existing noise climate at these NSRs. Therefore, no penalties have been applied. Similarly, as the loading bays are located on the screened side of the buildings closest to NSRs 15 through to 18, no penalty has been applied at these receptors to account for impulsivity.

10.119. 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.

10.120. The $L_{A90}$ value used for each period is the lowest calculated $L_{A90}$ value reported in Tables 10.17 to 10.20. The previous version of BS 4142:1997 Method for rating industrial noise

affecting mixed residential and industrial areas[35] referred to rating levels below 35 dB as "very low" and stated that such levels were outside of the scope of the standard. Given that an external rating level of 35dB would result in an internal level of 20dB, assuming a 15dB loss through a partially open window, this would infer a betterment of 10dB with respect to the night-time internal guidance level for bedrooms from BS 8233:2014. Therefore, a lower rating limit of 35dB has been applied where appropriate.

10.121. The BS 4142 assessment for the weekday and weekend daytime and night–time periods is shown below in Tables 10.34, 10.35, 10.36, and 10.37 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 10.34: 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 | 47 | 2 | 49 | 35 | +14 | **High** |
| 2 | 48 | 5 | 53 | 35 | +18 | **High** |
| 3 | 45 | 5 | 50 | 35 | +15 | **High** |
| 4 | 49 | 5 | 54 | 35 | +19 | **High** |
| 5 | 48 | 5 | 53 | 35 | +18 | **High** |
| 6 | 48 | 5 | 53 | 35 | +18 | **High** |
| 7 | 45 | 5 | 50 | 35 | +15 | **High** |
| 8 | 48 | 5 | 53 | 35 | +18 | **High** |
| 9 | 54 | 6 | 60 | 41 | +19 | **High** |
| 10 | 48 | 3 | 51 | 41 | +10 | **High** |
| 11 | 45 | - | 45 | 41 | +4 | **Medium** |
| 12 | 26 | - | 26 | 41 | -15 | **Very Low** |
| 13 | 25 | - | 25 | 41 | -16 | **Very Low** |
| 14 | 35 | - | 35 | 47 | -12 | **Very Low** |
| 15 | 39 | - | 39 | 47 | -8 | **Very Low** |
| 16 | 39 | - | 39 | 47 | -8 | **Very Low** |
| 17 | 39 | - | 39 | 47 | -8 | **Very Low** |
| 18 | 40 | - | 40 | 35 | +5 | **Medium** |
| 19 | 44 | 5 | 49 | 35 | +14 | **High** |
| 20 | 41 | 5 | 46 | 35 | +11 | **High** |
| 24 | 55 | 10 | 65 | 35 | +30 | **High** |
| 25 | 51 | 5 | 56 | 35 | +21 | **High** |

[35] British Standard BS4142:1997 Method for rating industrial noise affecting mixed residential and industrial areas

| 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 |
| 26 | 50 | 5 | 55 | 35 | +20 | **High** |

10.122. During the daytime on a weekday, noise levels associated with the operation of the SRFI are between -15 and +30 dB above the measured background sound levels during the daytime, dependent on the NSR.

10.123. 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 daytime on a weekday. For NSRs 11 and 18, the impact is predicted to be permanent, moderate adverse effect. For NSRs 12 through to 17, the impact is predicted to be permanent, negligible adverse effect.

**Table 10.35: 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 | 50 | 2 | 52 | 35* | +17 | **High** |
| 2 | 50 | 5 | 55 | 35* | +20 | **High** |
| 3 | 48 | 5 | 53 | 35* | +18 | **High** |
| 4 | 50 | 5 | 55 | 35* | +20 | **High** |
| 5 | - | - | - | - | - | **-** |
| 6 | 48 | 5 | 53 | 35* | +18 | **High** |
| 7 | 50 | 5 | 55 | 35* | +20 | **High** |
| 8 | 49 | 5 | 54 | 35* | +19 | **High** |
| 9 | - | - | - | - | - | **-** |
| 10 | 44 | 3 | 47 | 39 | +8 | **Medium** |
| 11 | 49 | - | 49 | 39 | +10 | **High** |
| 12 | 39 | - | 39 | 39 | 0 | **Low** |
| 13 | 40 | - | 40 | 39 | +1 | **Low** |
| 14 | 39 | - | 39 | 40 | -1 | **Very Low** |
| 15 | 40 | - | 40 | 40 | 0 | **Low** |
| 16 | 39 | - | 39 | 40 | -1 | **Very Low** |
| 17 | 40 | - | 40 | 40 | 0 | **Low** |
| 18 | - | - | - | - | - | **-** |

| 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 |
| 19 | - | - | - | - | - | - |
| 20 | 41 | 5 | 46 | 35* | +11 | **High** |
| 24 | 55 | 10 | 65 | 35* | +30 | **High** |
| 25 | 51 | 5 | 56 | 35* | +21 | **High** |
| 26 | 51 | 5 | 56 | 35* | +21 | **High** |

10.124. During the night-time on a weekday, noise levels associated with the operation of the SRFI are between -1 and +30 dB above the measured background noise levels during the night-time, dependent on the NSR.

10.125. 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 weekday. For NSRs located further away from the Proposed Development, the effect is likely to be permanent, minor adverse and permanent, negligible adverse.

**Table 10.36: 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 | 47 | 2 | 49 | 43 | +6 | **Medium** |
| 2 | 48 | 5 | 53 | 43 | +10 | **High** |
| 3 | 45 | 5 | 50 | 43 | +7 | **Medium** |
| 4 | 49 | 5 | 54 | 43 | +11 | **High** |
| 5 | 48 | 5 | 53 | 43 | +10 | **High** |
| 6 | 48 | 5 | 53 | 43 | +10 | **High** |
| 7 | 45 | 5 | 50 | 43 | +7 | **Medium** |
| 8 | 48 | 5 | 53 | 43 | +10 | **High** |
| 9 | 54 | 6 | 60 | 50 | +10 | **High** |
| 10 | 48 | 3 | 51 | 50 | +1 | **Low** |
| 11 | 45 | - | 45 | 50 | -5 | **Very Low** |
| 12 | 26 | - | 26 | 50 | -24 | **Very Low** |
| 13 | 25 | - | 25 | 50 | -25 | **Very Low** |
| 14 | 35 | - | 35 | 51 | -16 | **Very Low** |
| 15 | 39 | - | 39 | 51 | -12 | **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 |
| 16 | 39 | - | 39 | 51 | -12 | **Very Low** |
| 17 | 39 | - | 39 | 51 | -12 | **Very Low** |
| 18 | 40 | - | 40 | 42 | -2 | **Very Low** |
| 19 | 44 | 5 | 49 | 42 | +7 | **Medium** |
| 20 | 41 | 5 | 46 | 43 | +3 | **Low** |
| 24 | 55 | 10 | 65 | 43 | +22 | **High** |
| 25 | 51 | 5 | 56 | 43 | +13 | **High** |
| 26 | 50 | 5 | 55 | 43 | +12 | **High** |

10.126. During the daytime on a weekend, noise levels associated with the operation of the SRFI are between -25 and +22 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.

10.127. 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 daytime on a weekend. 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.

**Table 10.37: 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 | 50 | 2 | 52 | 38 | +14 | **High** |
| 2 | 50 | 5 | 55 | 38 | +17 | **High** |
| 3 | 48 | 5 | 53 | 38 | +15 | **High** |
| 4 | 50 | 5 | 55 | 38 | +17 | **High** |
| 5 | - | - | - | - | - | **-** |
| 6 | 48 | 5 | 53 | 38 | +15 | **High** |
| 7 | 50 | 5 | 55 | 38 | +17 | **High** |
| 8 | 49 | 5 | 54 | 38 | +16 | **High** |
| 9 | - | - | - | - | - | **-** |
| 10 | 44 | 3 | 47 | 42 | +5 | **Medium** |
| 11 | 49 | - | 49 | 42 | +7 | **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 |
| 12 | 39 | - | 39 | 42 | -3 | **Very Low** |
| 13 | 40 | - | 40 | 42 | -2 | **Very Low** |
| 14 | 39 | - | 39 | 44 | -5 | **Very Low** |
| 15 | 40 | - | 40 | 44 | -4 | **Very Low** |
| 16 | 39 | - | 39 | 44 | -5 | **Very Low** |
| 17 | 40 | - | 40 | 44 | -4 | **Very Low** |
| 18 | - | - | - | - | | **-** |
| 19 | - | - | - | - | | **-** |
| 20 | 41 | 5 | 46 | 38 | +8 | **Medium** |
| 24 | 55 | 10 | 65 | 38 | +27 | **High** |
| 25 | 51 | 5 | 56 | 38 | +18 | **High** |
| 26 | 51 | 5 | 56 | 38 | +18 | **High** |

10.128. 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.

10.129. 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 the majority of NSRs located further away from the Proposed Development, the effect is likely to be permanent, minor adverse and permanent, negligible adverse.

***Context***

10.130. 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.

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

10.132. 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 10.38: Increase in ambient noise levels – Weekday**

| Increase in noise level due to operational noise from the SRFI – Weekday | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NSR | Daytime (0700 – 2300) | | | | Night-time (2300 – 0700) | | | |
| | Rating level | Ambient level | Rating + ambient | Increase | Rating level | Ambient level | Rating + ambient | Increase |
| 1 | 49.0 | 61.3 | 61.5 | **+0.2** | 52.0 | 60.5 | 61.1 | **+0.6** |
| 2 | 53.0 | | 61.9 | **+0.6** | 55.0 | | 61.6 | **+1.1** |
| 3 | 50.0 | | 61.6 | **+0.3** | 53.0 | | 61.2 | **+0.7** |
| 4 | 54.0 | | 62.0 | **+0.7** | 55.0 | | 61.6 | **+1.1** |
| 5 | 53.0 | | 61.9 | **+0.6** | - | | - | **-** |
| 6 | 53.0 | | 61.9 | **+0.6** | 53.0 | | 61.2 | **+0.7** |
| 7 | 50.0 | | 61.6 | **+0.3** | 55.0 | | 61.6 | **+1.1** |
| 8 | 53.0 | | 61.9 | **+0.6** | 54.0 | | 61.4 | **+0.9** |
| 9 | 60.0 | 48.6 | 60.3 | **+11.7** | - | 46.3 | - | **N/A** |
| 10 | 51.0 | | 53.0 | **+4.4** | 47.0 | | 49.7 | **+3.4** |
| 11 | 45.0 | | 50.2 | **+1.6** | 49.0 | | 50.9 | **+4.6** |
| 18 | 40.0 | 48.6 | 49.2 | **+0.6** | - | - | - | **-** |
| 19 | 49.0 | | 51.8 | **+3.2** | - | | - | **-** |
| 20 | 46.0 | 61.3 | 61.4 | **+0.1** | 46.0 | 60.5 | 60.7 | **+0.2** |
| 24 | 65.0 | | 66.5 | **+5.2** | 65.0 | | 66.3 | **+5.8** |
| 25 | 56.0 | | 62.4 | **+1.1** | 56.0 | | 61.8 | **+1.3** |
| 26 | 55.0 | | 62.2 | **+0.9** | 56.0 | | 61.8 | **+1.3** |

10.133. Table 10.38 shows that for the majority of NSRs, the existing ambient noise levels are predicted to increase by up to 3.5dB during the weekday daytime and night-time as a result of the proposed operations of the SRFI.

10.134. This level of change is considered marginal, and would barely be perceptible to the human ear with changes of 3dB only just perceptible under laboratory conditions. As such, an increase of 3.5dB is considered to be low, which is likely to result in a permanent, minor adverse effect when context is taken into consideration.

10.135. For NSRs 9, 10, 11 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 10.39: Increase in ambient noise levels – Weekend**

| Increase in noise level due to operational noise from the SRFI – Weekend | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NSR | Daytime | | | | Night-time | | | |
| | Rating level | Ambient level | Rating + ambient | Increase | Rating level | Ambient level | Rating + ambient | Increase |
| 1 | 49.0 | 59.4 | 59.8 | **+0.4** | 52.0 | 49.9 | 54.1 | **+4.2** |
| 2 | 53.0 | | 60.3 | **+0.9** | 55.0 | | 56.2 | **+6.3** |
| 3 | 50.0 | | 59.9 | **+0.5** | 53.0 | | 54.7 | **+4.8** |
| 4 | 54.0 | | 60.5 | **+1.1** | 55.0 | | 56.2 | **+6.3** |
| 5 | 53.0 | | 60.3 | **+0.9** | - | | - | **-** |
| 6 | 53.0 | | 60.3 | **+0.9** | 53.0 | | 54.7 | **+4.8** |
| 7 | 50.0 | | 59.9 | **+0.5** | 55.0 | | 56.2 | **+6.3** |
| 8 | 53.0 | | 60.3 | **+0.9** | 54.0 | | 55.4 | **+5.5** |
| 9 | 60.0 | 52.2 | 60.7 | **+8.5** | - | 46.5 | N/A | **N/A** |
| 10 | 51.0 | | 54.7 | **+2.5** | 47.0 | | 49.8 | **+3.3** |
| 11 | 45.0 | | 53 | **+0.8** | 49.0 | | 50.9 | **+4.4** |
| 18 | 40.0 | 47.8 | 48.5 | **+0.7** | - | - | - | **-** |
| 19 | 49.0 | | 51.5 | **+3.7** | - | | - | **-** |
| 20 | 46.0 | 59.4 | 59.6 | **+0.2** | 46.0 | 49.9 | 51.4 | **+1.5** |
| 24 | 65.0 | | 66.1 | **+6.7** | 65.0 | | 65.1 | **+15.2** |
| 25 | 56.0 | | 61 | **+1.6** | 56.0 | | 57 | **+7.1** |
| 26 | 55.0 | | 60.7 | **+1.3** | 56.0 | | 57 | **+7.1** |

10.136. Table 10.39 shows that for all NSRs during the daytime on a weekend, with the exception of NSRs 9 and 24, the existing ambient noise levels are predcited to increase by up to 3.7dB as a result of the proposed operation of the SRFI.

10.137. As discussed above, this level of change is considered marginal, and would barely be perceptible to the human ear. As such, an increase of 3.5dB is considered to be low, which is likely to result in a permanent, minor adverse effect when context is taken into consideration.

10.138. For NSRs 1 through 8, 11 and NSRs 25 and 26 during the night-time, and 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.

10.139. 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.

10.140. It is also worth noting that, with the exception of NSRs 24 and 25, the rating levels at the remainder of the receptors is below the 55dB criterion for garden areas given in the WHO

Guidelines and BS 8233:2014.

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

***Assessment of operational maximum noise levels***

10.142. 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 tug activity associated with connecting to trailers, reach stackers and/or cranes handling containers.

10.143. 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.

10.144. The following sources, which has been taken from Appendix 8.5 of the ES chapter for Northampton Gateway[36], and have been included within the noise model as point sources. A number of points have been included for each source within the area that the source will operate.

**Table 10.40: 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 |
| HGV Coupling | 1.5 | 113 | 106 | 107 | 108 | 108 | 107 | 102 | 92 |
| 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 |

10.145. The predicted noise levels at the facades of the closest NSRs are detailed below in Table 10.41. 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.

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

**Table 10.41: Predicted $L_{AFmax}$ noise level at each receptor**

| NSR | Source | Predicted external $L_{AF,max}$ | Level above 60dB $L_{AFmax}$ criterion |
|---|---|---|---|
| 1 | HGV coupling | 49 | -11 |
| | Spreader impact | 59 | -1 |
| | Container placement | 62 | +2 |
| 2 | HGV coupling | 44 | -16 |
| | Spreader impact | 54 | -6 |
| | Container placement | 58 | -2 |
| 3 | HGV coupling | 44 | -16 |
| | Spreader impact | 51 | -9 |
| | Container placement | 58 | -8 |
| 4 | HGV coupling | 49 | -11 |
| | Spreader impact | 54 | -6 |
| | Container placement | 59 | -1 |
| 6 | HGV coupling | 50 | -10 |
| | Spreader impact | 54 | -6 |
| | Container placement | 59 | -1 |
| 7 | HGV coupling | 52 | -8 |
| | Spreader impact | 57 | -3 |
| | Container placement | 62 | +2 |
| 8 | HGV coupling | 49 | -11 |
| | Spreader impact | 53 | -7 |
| | Container placement | 59 | -1 |
| 10 | HGV coupling | 17 | -43 |
| | Spreader impact | 28 | -32 |
| | Container placement | 48 | -12 |
| 11 | HGV coupling | 18 | -42 |
| | Spreader impact | 38 | -22 |
| | Container placement | 55 | -5 |
| 20 | HGV coupling | 38 | -22 |
| | Spreader impact | 47 | -13 |
| | Container placement | 54 | -6 |
| 24 | HGV coupling | 53 | -7 |
| | Spreader impact | 64 | +4 |
| | Container placement | 66 | +6 |
| 25 | HGV coupling | 50 | -10 |
| | Spreader impact | 54 | -6 |
| | Container placement | 62 | +2 |
| 26 | HGV coupling | 51 | -9 |
| | Spreader impact | 54 | -6 |
| | Container placement | 64 | +4 |

10.146. The results indicate that for the majority of receptors, the resultant $L_{AF,max}$ value for each of the identified sources will be below the criterion of 60dB $L_{AF,max}$ externally at the nearest façade in free-field conditions. Therefore, the resultant effect for NSRs where the predicted level is likely to be lower than 5dB below the adopted criteria, is predicted to be permanent, negligible adverse. For NSR24, the effect is predicted to be permanent, major adverse, therefore, consideration has been given to mitigation further in this Chapter.

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

10.147. 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.

10.148. 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.

10.149. Noise from external plant on the development site should therefore be designed to achieve the noise level limits shown in Table 10.42. It is assumed that if the limits are met at these receptors, then the limits will also be achieved at receptors located further away.

**Table 10.42: 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 | 35 | 35* | 43 | 36 |
| 3 | 35 | 35* | 43 | 36 |
| 9 | 41 | 39 | 50 | 41 |
| 10 | 41 | 39 | 50 | 41 |
| 12 | 41 | 39 | 50 | 41 |
| 13 | 41 | 39 | 50 | 41 |
| 14 | 48 | 40 | 51 | 44 |
| 15 | 48 | 40 | 51 | 44 |
| 16 | 48 | 40 | 51 | 44 |
| 17 | 48 | 40 | 51 | 44 |
| 18 | 35 | 35* | 42 | 35* |
| 19 | 35 | 35* | 42 | 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) |
| 20 | 35 | 35* | 43 | 35* |
| 24 | 35 | 35* | 43 | 36 |
| *Background noise levels at these locations are considered to be very low and therefore a limit of 35dB has been adopted, as previously discussed (see paragraph 9.91)* | | | | |

10.150. For context, to achieve a level of 35dB at NSR24, which is located approximately 50m from the Main HNRFI Site boundary, the item of fixed plant could have a maximum rated noise level of up to 69dB 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.

10.151. 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.

10.152. 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.

10.153. 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.

10.154. 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.

10.155. 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.

10.156. Should the limits set out in Table 10.42 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***

10.157. The change in noise level as a result of the additional rail movements associated with the Proposed Development have been calculated based on the existing and proposed train

movements.

10.158. It is recognised that the on-going situation with COVID-19 and Brexit is likely to affect movements on the line. However, in the absence of information on known movements prior to March 2020, Realtimetrains[37] 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.

10.159. The study area is defined earlier in this Chapter. A typical daytime and night-time period has 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 10.43.

**Table 10.43: 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 |

10.160. It is understood that there will be a maximum of 16 intermodal train movements per day as a result of the Proposed Development, 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).

10.161. 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*'.

10.162. 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 results are shown below in Table 10.44.

[37] http://www.realtimetrains.co.uk

**Table 10.44: 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 |

10.163. The highest change is predicted to be +1.8dB which will result in a permanent, minor adverse effect. This is not considered significant in EIA terms and therefore mitigation is not considered warranted at this time.

***Vibration from off-site rail movements***

10.164. Although baseline vibration monitoring has previously been undertaken by Hydrock in July 2018, further monitoring is required to undertake a detailed assessment, which will be included within the full Noise and Vibration ES chapter.

10.165. The existing line is used by both passenger and freight trains, and as previously discussed, there will be a maximum of 16 intermodal train movements per day as a result of the Proposed Development. In the absence of detailed information, it has been assumed that there will be 21 movements during the daytime (0700-2300) and 11 movements during the night-time (2300-0700).

10.166. The nearest dwelling to the Proposed Development is located approximately 70m from the existing line, with the remaining receptors located further away. It is acknowledged that there are other receptors located further away, which will be closer to the existing line than 70m. Similar to the study area for off-site rail movements, the assessment will be undertaken for a notional receptor.

10.167. Although it is not possible to state the magnitude of effect of vibration as a result of the additional train movements, it is anticipated that 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 resultant impact is likely to be low, which would infer there is likely to be, at worst, a permanent, long term, minor adverse effect.

***Off-site road traffic noise impacts***

10.168. 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.

10.169. 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.

10.170. 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, and weekday night-time $L_{A10,8h}$ noise level.

10.171. To quantify short term effects, calculations have been undertaken for the opening year 2026 both with and without the Proposed Development. Road traffic speeds have been applied based on information provided by the Transport Consultant. The traffic data supplied has included for other committed developments for the assessment year. 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.

10.172. For the vast majority of road links assessed in 2026, the predicted increase is up to +3dB which in accordance with DMRB is likely to result in a permanent, minor, adverse effect during the daytime as a result of the additional road traffic in the short term.

10.173. There are seven links where the predicted increase is up to +3.8dB which in accordance with DMRB is likely to result in a permanent, moderate adverse effect during the daytime in the short term. These are shown below in Table 10.45.

**Table 10.45: Road links predicted to experience an increase in the BNL of between 3.5dB and 5dB in the short-term**

| Road link | A Node – B Node | 2026 No development $L_{A10,18h}$ | 2026 With development $L_{A10,18h}$ | Increase in noise due to the Proposed Development |
|---|---|---|---|---|
| B4669 | 30022 - 30167 | 65.9 | 68.9 | +3 |
| B4669 | 30022 - 30050 | 64.3 | 67.4 | +3.1 |
| B4669 | 30141 - 30184 | 67.8 | 71.0 | +3.2 |
| B4669 | 30092 - 30184 | 64.3 | 67.7 | +3.4 |
| B4669 | 30092 - 39996 | 62.6 | 66.2 | +3.6 |

| Road link | A Node – B Node | 2026 No development $L_{A10,18h}$ | 2026 With development $L_{A10,18h}$ | Increase in noise due to the Proposed Development |
|---|---|---|---|---|
| Off slip - Junction 2 M69 | 30500 - 30504 | 64.5 | 68.3 | +3.8 |
| On slip – Junction 2 M69 | 30503 - 30501 | 65.4 | 68.9 | +3.5 |

10.174. Review of dwellings located on these links indicate that for the majority of dwellings, garden areas are located to the rear of dwellings and are therefore screened from road traffic sources. Consideration has been given to mitigation further in this Chapter.

10.175. There are six links where the predicted increase is up to +8.8dB, which is likely to result in a permanent, major adverse effect during the daytime. These are shown below in Table 10.46.

**Table 10.46: Road links predicted to experience an increase in the BNL greater than 5dB in the short-term**

| Road link | A Node – B Node | 2026 No development $L_{A10,18h}$ | 2026 With development $L_{A10,18h}$ | Increase in noise due to the Proposed Development |
|---|---|---|---|---|
| Roundabout – Junction 2 M69 | 30196 – 37001 | 66.9 | 73.0 | +6.1 |
| Roundabout – Junction 2 M69 | 30197 – 37006 | 66.6 | 73.1 | +6.5 |
| Roundabout – Junction 2 M69 | 30503 – 30504 | 62.9 | 71.7 | +8.8 |
| Roundabout – Junction 2 M69 | 30504 – 30197 | 66.1 | 73.0 | +6.9 |
| Roundabout – Junction 2 M69 | 37001 – 30503 | 66.9 | 73.3 | +6.4 |
| Roundabout – Junction 2 M69 | 37003 - 30196 | 66.6 | 73.0 | +6.4 |

10.176. Although NSR14, shown on Figure 10.1, is located near to junction 2, as the increase in noise level is only predicted to occur on the roundabout and the motorway slip roads, and the dwelling is located adjacent to the M69 where noise levels will be dominated by road traffic on the motorway, it is considered that the impact will be reduced.

10.177. Similarly, in order to account for the potential effects over the 8-hour night-time period

(23:00 – 07:00), an assessment has been undertaken. The night-time noise levels were approximated using the BNL method which, in the absence of an established method, is considered the most appropriate way to consider the night-time effects.

10.178. The majority of the roads that were assessed during the night-time period in 2026, have low flows and therefore fall outside the scope of CRTN. For the reminder of the roads, the predicted increase is up to 2.6dB. Therefore, there is predicted to be a permanent, negligible adverse effect during the night-time as a result of additional road traffic in the long- term.

10.179. To quantify long term effects, calculations have been undertaken for the future year 2036, both with and without the Proposed Development. For the vast majority of road links assessed in 2036, the predicted increase is up to +4.4dB which in accordance with DMRB is likely to result in a permanent, minor, adverse effect during the daytime as a result of the additional road traffic in the long-term.

10.180. There are six links where the predicted increase is up to +9.1dB which in accordance with DMRB is likely to result in a permanent, moderate adverse effect during the daytime in the long term. These are shown below in Table 10.47.

**Table 10.47: Road links predicted to experience an increase in the BNL greater than 5dB in the long-term**

| Road link | A Node – B Node | 2036 No development $L_{A10,18h}$ | 2036 With development $L_{A10,18h}$ | Increase in noise due to the Proposed Development |
|---|---|---|---|---|
| Roundabout – Junction 2 M69 | 30196 – 37001 | 66.9 | 73.1 | +6.2 |
| Roundabout – Junction 2 M69 | 30197 – 37006 | 66.5 | 73.4 | +6.9 |
| Roundabout – Junction 2 M69 | 30503 – 30504 | 63.1 | 72.2 | +9.1 |
| Roundabout – Junction 2 M69 | 30504 – 30197 | 65.9 | 73.4 | +7.5 |
| Roundabout – Junction 2 M69 | 37001 – 30503 | 66.9 | 73.6 | +6.7 |
| Roundabout – Junction 2 M69 | 37003 - 30196 | 66.5 | 73.2 | +6.7 |

10.181. As previously discussed, NSR14 is located near to junction 2, however as the increase in noise level is only predicted to occur on the roundabout, and the dwelling is located adjacent to the M69, it is considered that the impact will be reduced.

10.182. Similar to the short-term, the majority of the roads that were assessed during the night-time period in 2036, have low flows and therefore fall outside the scope of CRTN. For the reminder of the roads, the predicted increase is up to 2dB. Therefore, there is predicted to be a permanent, minor adverse effect during the night-time as a result of additional road traffic in the short- term.

10.183. It is also worth noting that the noise level is predicted to decrease as a result of the Proposed Development, and further information of these links will be provided in full in the ES.

10.184. A review has been undertaken of the off-site road links. This indicates that for the majority of the junctions, there is unlikely to be an impact from a noise perspective. Potential impacts have been identified for junction 19 due to an increase in road traffic and at Junction 29, due to the location of the flare increase on the entry arm, and the presence of nearby receptors. Further consideration will be given to these junctions within the ES.

### *A47 link road*

10.185. The proposed link road has been included within the noise model to determine the change in road traffic noise levels for the future year 2036, with the Proposed Development in place.

10.186. In addition to the prediction methodologies detailed above, the following has also been adopted:

- The noise model was set up to apply the noise prediction methodology set out in the 1988 Department for Transport (DfT) and the Welsh Office document Calculation of Road Traffic Noise for road traffic noise sources.
- A 10x10m grid spacing was used at a calculated height of 4m above local ground height.
- The buildings associated with the Proposed Development have been included within the model to provide a worst-case scenario.

10.187. To quantify the impact of noise from the proposed link road, the noise exposure has been calculated for nearby NSRs. The $L_{A10,18hr}$ AAWT value has been included within the noise model, and adjusted by -2dB to approximate the $L_{Aeq,16h}$ value, in accordance with CRTN methodology, and the resultant level has been predicted at NSRs for the daytime period only. The resultant noise contour is shown in Figure 10.3.

**Table 10.48: Resultant daytime noise levels at NSRs as a result of the A47 link road**

| Receptor | Garden (1.5m) dB $L_{Aeq,16h}$ | First Floor (4m) dB $L_{Aeq,16h}$ | Magnitude of impact |
|---|---|---|---|
| NSR1 | 57 | 57 | **High** |

| Receptor | Garden (1.5m) dB $L_{Aeq,16h}$ | First Floor (4m) dB $L_{Aeq,16h}$ | Magnitude of impact |
|---|---|---|---|
| NSR2 | 44 | 45 | **Low** |
| NSR3 | 43 | 44 | **Very Low** |
| NSR4 | 42 | 44 | **Very Low** |
| NSR5 | 42 | - | **Very Low** |
| NSR6 | 41 | 43 | **Very Low** |
| NSR7 | 41 | 42 | **Very Low** |
| NSR8 | 40 | 41 | **Very Low** |
| NSR9 | 32 | - | **Very Low** |
| NSR10 | 29 | 31 | **Very Low** |
| NSR11 | 32 | 32 | **Very Low** |
| NSR12 | 37 | 37 | **Very Low** |
| NSR13 | 29 | 42 | **Very Low** |
| NSR14 | 47 | 49 | **Low** |
| NSR15* | 61 | 62 | **High** |
| NSR16 | 48 | 48 | **Low** |
| NSR17 | 49 | 50 | **Low** |
| NSR18 | 45 | - | **Low** |
| NSR19 | 53 | - | **Medium** |
| NSR20 | 51 | 54 | **Medium** |
| NSR21 | 54 | 56 | **High** |
| NSR22 | 51 | - | **Medium** |
| NSR23 | 45 | - | **Low** |
| NSR24 | 41 | 41 | **Very Low** |
| NSR25 | 39 | 40 | **Very Low** |
| NSR26 | 38 | 40 | **Very Low** |

**This has been taken as the NSR closest to the road.*
*[1] Calculated at ground floor.*

10.188. The results indicate that there will be a permanent negligible, and permanent minor, adverse impact at the majority of NSRs. However, for NSRs 1, 15, 19, and 20, there is predicted to be a permanent, moderate to major adverse effect. Therefore, consideration has been given to mitigation.

10.189. There is also predicted to be a permanent, moderate and major adverse effects at NSRs 21 and 22, respectively. However, further baseline noise monitoring is required to characterise the existing baseline noise levels in the area, and therefore the overall effect of road traffic noise on the proposed link road. This will be completed at a later stage.

### *Assessment of tranquillity*

10.190. 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.

10.191. 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.

10.192. The Blaby Landscape and Settlement Character Assessment identifies the majority 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.

10.193. 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).

10.194. HBBC Allocations, Designations and Development Management DPD provides a detailed review of the boundaries of the countryside. The majority of the site has been designated as Countryside with the exception of 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.

10.195. There are a number of 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.

10.196. In accordance with the Blaby Green Space Strategy and The Blaby Landscape and Settlement Character Assessments, it is considered that the tranquillity assessment should ensure that significant effects are minimised from new development in the area.

10.197. 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.

10.198. 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 and operations associated with the SRFI facility have been predicted at Burbage Common Woods. The lowest measured 16-hour $L_{Aeq}$ noise levels measured at ML2 for the weekday and weekend have been used to establish the baseline noise levels. A noise level of 49dB $L_{Aeq,T}$ has been used for the daytime period on a weekday and 48dB $L_{Aeq,T}$ has been used for the daytime on a weekend.

10.199. For Aston Firs and Freeholt Wood, the lowest measured 16-hour $L_{Aeq}$ noise levels measured at ML1 for the weekday and weekend have been used to establish the baseline noise levels. A noise level of 50dB $L_{Aeq,T}$ has been used for the daytime period on a weekday and 53dB $L_{Aeq,T}$ has been used for the daytime on a weekend. The results are shown below in Table 10.49.

**Table 10.49: Predicted change in absolute noise level**

| NSR | Daytime 16-hour period (0700 – 2300) | | | Resultant future noise level dB $L_{Aeq,16h}$ | Change |
|---|---|---|---|---|---|
| | | Existing measured level – dB $L_{Aeq,16h}$ | Future contribution from Proposed Development – Calculated dB $L_{Aeq,16h}$ | | |
| Burbage Common Woods | Weekday | 48.6 | 53.1 | 54.4 | +5.8 |
| | Weekend | 47.8 | | 54.2 | +6.4 |
| Aston Firs | Weekday | 50.2 | 46.3 | 51.7 | +1.5 |
| | Weekend | 53.2 | | 54 | +0.8 |
| Freeholt Wood | Weekday | 50.2 | 53.8 | 55.4 | +5.2 |
| | Weekend | 53.2 | | 56.5 | +3.3 |

10.200. Table 10.49 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.

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

10.202. However, review of the resultant noise levels indicates that, with the exception of Freeholt Wood on a weekend, these are all below the upper guideline value of 55dB $L_{Aeq,16h}$ for external areas in accordance with WHO guidelines and BS 8233. It is therefore considered that the amenity of visitors to these areas will be protected.

10.203. 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.

10.204. 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.

10.205. Based on the above, with the exception of Freeholt 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 Freeholt Woods, and consideration is given to mitigation further in this Chapter.

## PROPOSED MITIGATION

10.206. Where the assessments have identified effects greater than 'minor adverse', consideration has been given to further mitigation measures.

### Construction noise and vibration

10.207. 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.

10.208. All work outside 0800 and 1800 hours Monday to Friday will be subject to prior agreement of, and/or reasonable notice to BDC and HBBC as appropriate. Night-time working will be restricted to specific circumstances, and work internally within buildings. By arrangement, there may be some out of hours construction deliveries made to the site.

10.209. Mitigation measures may 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[38] 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 around the area where works are being undertaken, where practicable, to assist in the screening of noise 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;

[38] Control of Pollution Act, 1974

- 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, so as 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.

10.210. 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.

10.211. 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 tolerant of short-term disturbance with potential long-term benefits of the proposals.

10.212. 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 alongside the ES. This should also help to ensure that the noise and vibration impacts relating to construction activities are minimised.

10.213. 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.

### Completed development

10.214. The unmitigated modelling and assessment work detailed above did not account for the proposed earthworks as the final levels were not determined at the time. As the scheme has progressed, the proposed earthworks have become available. Therefore, the future noise model has been updated to include the proposed earthworks and further inform the noise mitigation strategy.

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

10.215. 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 a number of NSRs, particularly during the night-time on a weekend. Therefore, further consideration has been given to mitigation measures.

10.216. 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. In light of this, the gantry cranes and associated character correction have been removed from the following assessment.

10.217. 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, a number of 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.

10.218. 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'.

10.219. Therefore, to minimise the effect, the following are likely to be required, shown on Figure 10.6:

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

10.220. 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.

10.221. The barriers have been included within the noise model and the resultant levels predicted at NSRs where an adverse impact has previously been identified. Tables 10.50 through to

Table 10.53 outlines the BS 4142 assessment with the proposed mitigation in place.

**Table 10.50 - 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 | 45 | N/A | 45 | 35 | +10 | **High** |
| 2 | 45 | | 45 | 35 | +10 | **High** |
| 3 | 41 | | 41 | 35 | +6 | **Medium** |
| 4 | 44 | | 44 | 35 | +9 | **High** |
| 5 | 45 | | 45 | 35 | +10 | **High** |
| 6 | 45 | | 45 | 35 | +10 | **High** |
| 7 | 41 | | 41 | 35 | +6 | **Medium** |
| 8 | 45 | | 45 | 35 | +10 | **High** |
| 9 | 46 | | 46 | 41 | +5 | **Medium** |
| 10 | 44 | | 44 | 41 | +3 | **Low** |
| 11 | 42 | | 42 | 41 | +1 | **Low** |
| 24 | 51 | | 51 | 35 | +16 | **High** |
| 25 | 47 | | 47 | 35 | +12 | **High** |
| 26 | 46 | | 46 | 35 | +11 | **High** |

10.222. During the daytime on a weekday, with mitigation in place, noise levels associated with the operation of the SRFI are between +1 and +16 dB above the measured background noise levels during the daytime, dependent on the NSR.

10.223. 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 3 and 7, the impact is predicted to be permanent, moderate adverse effect. For NSRs 9, 10 and 11, the impact is predicted to be permanent, negligible adverse effect.

**Table 10.51: 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 | 48 | N/A | 48 | 35* | +13 | **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 |
| 2 | 45 | | 45 | 35* | +10 | **High** |
| 3 | 43 | | 43 | 35* | +8 | **Medium** |
| 4 | 45 | | 45 | 35* | +10 | **High** |
| 5 | - | | - | - | - | **-** |
| 6 | 45 | | 45 | 35* | +10 | **High** |
| 7 | 47 | | 47 | 35* | +12 | **High** |
| 8 | 45 | | 45 | 35* | +10 | **High** |
| 9 | - | | - | - | - | **-** |
| 10 | 43 | | 43 | 39 | +4 | **Medium** |
| 11 | 44 | | 44 | 39 | +5 | **Medium** |
| 24 | 50 | | 50 | 35* | +15 | **High** |
| 25 | 47 | | 47 | 35* | +12 | **High** |
| 26 | 48 | | 48 | 35* | +13 | **High** |

10.224. During the night-time on a weekday, with mitigation in place, noise levels associated with the operation of the SRFI are between +4 and +13 dB above the measured background noise levels during the night-time, dependent on the NSR.

10.225. 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 10 and 11, the impact is predicted to be permanent, moderate adverse effect.

**Table 10.52: 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 | 45 | N/A | 45 | 43 | +2 | **Low** |
| 2 | 45 | | 45 | 43 | +2 | **Low** |
| 3 | 41 | | 41 | 43 | -2 | **Very Low** |
| 4 | 44 | | 44 | 43 | +1 | **Low** |
| 5 | 45 | | 45 | 43 | +2 | **Low** |
| 6 | 45 | | 45 | 43 | +2 | **Low** |
| 7 | 41 | | 41 | 43 | -2 | **Very Low** |
| 8 | 45 | | 45 | 43 | +2 | **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 |
| 9 | 46 | | 46 | 50 | -4 | **Very Low** |
| 10 | 44 | | 44 | 50 | -6 | **Very Low** |
| 11 | 42 | | 42 | 50 | -8 | **Very Low** |
| 24 | 51 | | 51 | 43 | +8 | **Medium** |
| 25 | 47 | | 47 | 43 | +4 | **Medium** |
| 26 | 46 | | 46 | 43 | +3 | **Low** |

10.226. During the daytime on a weekend, with mitigation in place, noise levels associated with the operation of the SRFI are between -8 and +8 dB above the measured background noise levels during the daytime, dependent on the NSR.

10.227. The mitigated effect of operational noise associated with the SRFI is likely to be a permanent, moderate adverse at worst for NSRs 24 and 25 during the daytime on a weekend. For the remaining NSRs, the impact is predicted to be permanent, negligible adverse effect.

**Table 10.53: 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 | 48 | N/A | 48 | 38 | +10 | **High** |
| 2 | 45 | | 45 | 38 | +7 | **Medium** |
| 3 | 44 | | 44 | 38 | +6 | **Medium** |
| 4 | 45 | | 45 | 38 | +7 | **Medium** |
| 5 | - | | - | - | - | **-** |
| 6 | 45 | | 45 | 38 | +7 | **Medium** |
| 7 | 47 | | 47 | 38 | +9 | **High** |
| 8 | 45 | | 45 | 38 | +7 | **Medium** |
| 9 | - | | - | - | - | **-** |
| 10 | 43 | | 43 | 42 | +1 | **Low** |
| 11 | 44 | | 44 | 42 | +2 | **Low** |
| 24 | 50 | | 50 | 38 | +12 | **High** |
| 25 | 47 | | 47 | 38 | +9 | **High** |
| 26 | 48 | | 48 | 38 | +10 | **High** |

10.228. During the night-time on a weekend, with mitigation in place, noise levels associated with the operation of the SRFI are between +1 and +12 dB above the measured background noise levels during the night-time, dependent on the NSR.

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

10.230. 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 where a moderate effect or greater is predicted, for the daytime and night-time for both the weekday and weekend periods.

**Table 10.54: Predicted increase in ambient noise levels with mitigation - Weekday**

| Increase in noise level due to operational noise from the SRFI with mitigation- Weekday | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NSR | Daytime (0700 – 2300) | | | | Night-time (2300 – 0700) | | | |
| | Rating level | Ambient level | Rating + ambient | Increase | Rating level | Ambient level | Rating + ambient | Increase |
| 1 | 45.0 | 61.3 | 61.4 | **+0.1** | 48.0 | 60.5 | 60.7 | **+0.2** |
| 2 | 45.0 | | 61.4 | **+0.1** | 45.0 | | 60.7 | **+0.1** |
| 3 | 41.0 | | 61.4 | **+0.0** | 43.0 | | 60.6 | **+0.1** |
| 4 | 44.0 | | 61.4 | **+0.1** | 45.0 | | 60.7 | **+0.1** |
| 5 | 45.0 | | 61.4 | **+0.1** | - | | - | **N/A** |
| 6 | 45.0 | | 61.4 | **+0.1** | 45.0 | | 60.6 | **+0.1** |
| 7 | 41.0 | | 61.4 | **+0.0** | 47.0 | | 60.7 | **+0.2** |
| 8 | 45.0 | | 61.4 | **+0.1** | 45.0 | | 60.6 | **+0.1** |
| 9 | 46.0 | 48.6 | 49.9 | **+1.9** | - | 46.3 | - | **N/A** |
| 10 | 44.0 | | 49.9 | **+1.3** | 43.0 | | 48 | **+1.7** |
| 11 | 42.0 | | 49.5 | **+0.9** | 44.0 | | 48.3 | **+2** |
| 24 | 51.0 | 61.3 | 61.6 | **+0.4** | 50.0 | 60.5 | 60.9 | **+0.4** |
| 25 | 47.0 | | 61.5 | **+0.2** | 47.0 | | 60.7 | **+0.2** |
| 26 | 46.0 | | 61.4 | **+0.1** | 48.0 | | 60.7 | **+0.2** |

**Table 10.55: Predicted increase in ambient noise levels with mitigation - Weekend**

| Increase in noise level due to operational noise from the SRFI with mitigation- Weekend | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NSR | Daytime | | | | Night-time | | | |
| | Rating level | Ambient level | Rating + ambient | Increase | Rating level | Ambient level | Rating + ambient | Increase |
| 1 | 45.0 | 59.4 | 59.6 | **+0.2** | 48.0 | 49.9 | 51.7 | **+2.2** |
| 2 | 45.0 | | 59.6 | **+0.2** | 45.0 | | 51.4 | **+1.2** |
| 3 | 41.0 | | 59.5 | **+0.1** | 43.0 | | 50.9 | **+0.8** |
| 4 | 44.0 | | 59.6 | **+0.1** | 45.0 | | 51.4 | **+1.2** |
| 5 | 45.0 | | 59.6 | **+0.2** | - | | - | **-** |
| 6 | 45.0 | | 59.6 | **+0.2** | 45.0 | | 50.9 | **+1.2** |
| 7 | 41.0 | | 59.5 | **+0.1** | 47.0 | | 51.4 | **+1.8** |
| 8 | 45.0 | | 59.6 | **+0.2** | 45.0 | | 51.1 | **+1.2** |
| 9 | 46.0 | 52.2 | 52.8 | **+0.9** | - | 46.5 | - | **-** |
| 10 | 44.0 | | 52.8 | **+0.6** | 43.0 | | 48.1 | **+1.6** |
| 11 | 42.0 | | 52.6 | **+0.4** | 44.0 | | 48.4 | **+1.9** |
| 24 | 51.0 | 59.4 | 59.9 | **+0.6** | 50.0 | 49.9 | 53 | **+3.1** |
| 25 | 47.0 | | 59.6 | **+0.2** | 47.0 | | 51.4 | **+1.8** |
| 26 | 46.0 | | 59.6 | **+0.2** | 48.0 | | 52.1 | **+2.2** |

10.231. Tables 10.54 and 10.55 show that for all NSRs, the existing ambient noise levels are predicted to increase by up to 3.1dB during the weekday and weekend daytime and night-time as a result of the proposed operations of the SRFI, with mitigation in place.

10.232. Table 10.54 indicates that for the daytime period on a weekday, the increase in noise levels is predicted to be between +0.0dB and +1.9dB. For the night-time period, the increase ranges between +0.1dB and +1.7dB.

10.233. Table 10.55 indicates that for the daytime period on a weekend, the increase in noise levels is predicted to be between +0.1dB and +0.9dB. For the night-time period, the increase ranges between +0.8dB and +3.1dB.

10.234. 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 laboratory 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 3dB is considered to be low, which is likely to result in a permanent, minor adverse effect, when context is taken into consideration.

10.235. It is also worth noting that during the daytime, the rating levels at NSRs with the exception of NSR24, 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 32dB $L_{Aeq,T}$. This would achieve the internal noise level criteria set out in BS 8233, when considering noise associated with the SRFI facility.

10.236. With the exception of NSR 24, the rating levels at the remainder of the receptors would only marginally exceed the recommended internal noise level in bedrooms during the night-time, assuming a 15dB loss through a partially opened window.

10.237. It is therefore considered with the implementation of acoustic barriers, as shown on Figure 10.6, and consideration to the existing noise climate, the resultant impacts at nearby NSRs will be low.

10.238. 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.

10.239. 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 design will continue to be revised. The exact heights and extents will be confirmed in the ES.

***Gantry cranes***

10.240. 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 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.

10.241. Further modelling has been undertaken of the receptors identified in Tables 10.51 and 10.52, with a 10dB reduction applied to each of the crane engines and crane exhausts, and the proposed boundary mitigation in place. With all sources operating, the results indicate that the predicted noise levels at all NSRs remain unchanged (less than 1dB). The largest increase is 0.5dB at NSRs and although this increases the ambient noise level during the night-time to +3.6dB, 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.

10.242. 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 one assumed within this assessment.

***Assessment of operational maximum noise levels***

10.243. The $L_{AF,max}$ level as a result of tug activity, 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 10.56.

**Table 10.56: Predicated $L_{AFmax}$ noise level at NSRs with mitigation**

| NSR | Source | Predicted external $L_{AFmax}$ | Level above 60dB $L_{AFmax}$ criterion |
|---|---|---|---|
| 1 | Container Placement | 61 | +1 |
| 7 | Container placement | 62 | +2 |
| 24 | Spreader impact | 63 | +3 |
| | Container placement | 65 | +5 |
| 25 | Container placement | 61 | +1 |
| 26 | Container Placement | 64 | +4 |

10.244. 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 in close proximity to 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 the majority of the time, the $L_{AFmax}$ levels at the NSRs will be lower than those predicted above.

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

10.245. 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***

10.246. 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***

10.247. Although it is not possible to state the magnitude of effect of vibration as a result of the additional train movements, it is likely that the resultant impact will be low, which will be confirmed following the detailed vibration assessment and reported on in the ES.

***Off-site road traffic noise impacts***

10.248. The assessment of the potential noise impact from Development generated traffic

indicates that, when considering the change in noise levels, and the resultant future noise levels at worst affected receptors, there is likely to be, at worst a permanent, major adverse effect from this noise. Therefore, the benefit of mitigation should be considered.

10.249. As the impacts are predicted for receptors that are located away from the Proposed Development, and outside the control of the project team, consideration has been given to the guidance within DMRB to mitigate noise where adverse impacts are predicted. This recommends consideration could be given to the following;

- vertical or horizontal alignment of the road;
- earth bunds to act as a noise barrier;
- noise barriers;
- low noise road surfacing;
- speed limits; and
- restrictions on noisy vehicle types.

10.250. It is acknowledged that not all of the options provided above, such as earth bunds and road alignments, are feasible due to existing constraints on the roads. However, more detailed modelling will be undertaken to determine the extent of effects and what, if any measures can be implemented to reduce these within the ES. Consideration will also be given to those options which could feasibly be implemented, to reduce noise at existing NSRs.

10.251. For receptors where a moderate adverse effect is predicted i.e links on the B4669, and the on/off slip roads associated with Junction 2, it is considered that the resultant effect would likely be permanent, minor adverse effect with proposed mitigation in place.

10.252. Although a major, adverse effect is predicted on the roundabout associated with Junction 2 of the M69, NSR14 which is the nearest receptor, is located adjacent to the M69 where noise levels are likely to be dominated by road traffic on the motorway, therefore any effect is likely to be lower than stated at this receptor.

***A47 link road***

10.253. Noise from road traffic on the proposed link road is predicted to result in permanent, major adverse effects at NSRs 1, 15, 19, and 20. Therefore, further consideration has been given to mitigation measures.

10.254. Although an adverse impact is not predicted at NSR19, the resultant noise contour indicates that a small area of the nature reserve would experience noise levels in excess of 55dB $L_{Aeq.16h}$. Therefore, consideration has also been given to reducing noise levels in this area.

10.255. Therefore, to minimise the effect, the following are likely to be required, shown on Figure

10.4:

- a 6m high acoustic barrier on the eastern boundary, in the south eastern part of the Main HNRFI Site;
- a 4m high acoustic barrier adjacent to the A47 link road, in the south-eastern part of the site. This has been extended to protect Freeholt Wood, where a moderate adverse effect was predicted on tranquillity;
- a 1.8m high acoustic adjacent to the A47 to protect Burbage Common; and
- bunding adjacent to the A47 link road as it passes NSR1.

10.256. The barriers have been included within the noise model and the resultant levels predicted at NSRs where an adverse impact has previously been identified. The results are shown below in Table 10.57.

**Table 10.57: Resultant daytime noise levels at NSRs as a result of the A47 link road with mitigation**

| Receptor | Garden (1.5m) dB $L_{Aeq,16h}$ | First Floor (4m) dB $L_{Aeq,16h}$ | Magnitude of impact |
|---|---|---|---|
| NSR1 | 54 | 54 | **Low** |
| NSR15 | 50 | 50[1] | **Low** |
| NSR19* | 54 | N/A | **Low** |
| NSR20 | 50 | 53 | **Low** |

*[1] Calculated at ground floor level*
** Based on 55dB $L_{Aeq,16h}$ in accordance with WHO and BS 8233 guidelines.*

10.257. It is therefore considered with the implementation of acoustic barriers, as shown on Figure 10.4, the resultant impacts at nearby NSRs will be low.

10.258. 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.

10.259. In addition, where barriers run parallel to each other, on opposite sides of the road, the area facing the road will need to be absorptive.

10.260. The exact heights and extents of the acoustic barriers are subject to final road alignments, and final finished levels on site.

***Tranquillity***

10.261. 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 10.58.

**Table 10.58: 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 |
|---|---|---|---|---|---|
| | | Existing measured level – dB $L_{Aeq,16h}$ | Future contribution from Proposed Development – Calculated dB $L_{Aeq,16h}$ | | |
| Freeholt Wood | Weekend | 53.2 | 51.2 | 55.3 | +2.1 |

10.262. The resultant effect at Freeholt Woods on a weekend with mitigation in place will be permanent, negligible adverse.

10.263. 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 Freeholt Woods may experience noise levels above those predicted above, particularly where the woods are in close proximity to the proposed link road.

10.264. 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

### Construction phase

10.265. 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***

10.266. 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*

10.267. 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*

10.268. 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*

10.269. Although it is not possible to state the magnitude of effect of vibration as a result of the additional train movements, it is likely that the permanent, long term residual effect will be minor adverse, which will be confirmed following the detailed vibration assessment and reported on in the ES.

### *Off-site road traffic noise impacts*

10.270. The predicted noise impact from development generated traffic with mitigation in place, indicates that there will be between a permanent, minor adverse and permanent, moderate adverse effect at NSRs during the daytime.

10.271. During the night-time, effect is likely to remain at permanent, negligible adverse effect as a result of development generated road traffic in the short-term.

### *A47 link road*

10.272. It is considered that with the proposed mitigation in place, the residual effect is likely to be permanent, minor adverse.

### *Tranquillity*

10.273. 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 minor adverse.

## CUMULATIVE AND IN-COMBINATION EFFECTS

### Construction phase

10.274. Due to the distances between the Proposed Development and the committed developments, it is considered unlikely that the cumulative effects of construction noise will be significant. A full consideration of the likely effects from the identified short list will be reported on in the ES.

### Completed development

10.275. 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.

10.276. 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. This will be considered further within the final ES.

## CLIMATE CHANGE

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

## SUMMARY AND CONCLUSIONS

10.278. 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.

10.279. In order to define baseline noise conditions, the results of a previous noise survey undertaken by Hydrock in 2018 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.

10.280. 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.

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

10.282. 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.

10.283. 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.

10.284. 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.

10.285. 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.

10.286. Although it is not possible to state the magnitude of effect of vibration as a result of the additional train movements, it is likely that the resultant impact will be low, which will be confirmed following the detailed vibration assessment.

10.287. Road traffic noise associated with the proposed A47 link has been modelled based on data provided by the Transport Consultant. With appropriate mitigation in place, including acoustic barriers, the residual effect would be a permanent, minor adverse.

10.288. 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.