East Midlands Gateway
Phase 2 (EMG2)

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ENVIRONMENTAL STATEMENT

Volume 1 Main Statement

Chapter 7

Noise and Vibration

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07

The East Midlands Gateway Phase 2 and Highway Order 202X and The East Midlands Gateway Rail Freight and Highway (Amendment) Order 202X

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7. Noise and Vibration

7.1. Introduction

7.1.1. This chapter of the ES considers the potential noise and vibration impacts and effects that may arise from the construction and operation of the **Scheme**.

7.1.2. The chapter details the assessment scope and methodology, relevant policy and guidance, baseline conditions, and the likely noise and vibration effects during the construction and operational phases of the **Scheme** at the relevant sensitive receptors. Where necessary, potential mitigation measures are discussed, following which any residual effects that may remain are described.

7.1.3. To assist with the understanding of this chapter, a glossary of technical terms specific to this Chapter is presented in **Appendix 7a**.

7.2. Scope and Methodology of the Assessment

7.2.1. The **Scheme** is comprised of three interrelated component parts, as set out in **Chapter 3**. Each of the components has the potential to generate or change noise with respect to the following sources, all of which are considered as part of the assessment scope:

- Construction of the warehousing, associated offices, and supporting infrastructure and landscaping at the **EMG2 Main Site** and **EMG1 Works**, as well as the **Highway Works**;
- Changes in the road traffic flows and road layouts on the road network around the **Scheme** during both the construction and operational phases of the **Scheme**;
- Operational activity taking place at the **EMG2 Main Site** and the additional warehousing on Plot 16 at the **EMG1 Works** site, primarily associated with heavy goods vehicles (HGVs) manoeuvring, loading/unloading, and traversing the sites. In addition, the proposed increase in the maximum permitted height of gantry cranes at the EMG1 rail freight interchange will be considered (note that while EMG1 has consent for the installation and use of gantry cranes of a lower maximum permitted height, to date, none have been installed); and
- Operation of fixed plant associated with the proposed buildings.

7.2.2. Regarding the potential generation of groundborne vibration, it is possible that there may be some associated effects during construction from certain vibration generating activities, which are considered as part of the assessment scope. Operational activity taking place at the **EMG2 Main Site** and **EMG1 Works** site is primarily associated with logistics facilities (Use Classes B8/B2) which do not include activities that will produce any significant levels of groundborne vibration (which might be expected from certain manufacturing processes etc), and therefore consideration of operational vibration has been scoped out of the assessment. It should be noted that no additional capacity for train movements is proposed at EMG1, and therefore any vibration from use of the railway would not change as a result of the **Scheme**.

7.2.3. Regarding the potential for groundborne vibration from the passage of vehicles on roads, this is not directly linked to the vehicles themselves or any change in their number during construction or operation of the **Scheme**, but rather their passing over irregularities in the road surface. In terms of internal access roads at the **EMG2 Main Site**, these would be newly constructed and free of irregularities and maintained as required. Similarly, the physical improvements associated with the **Highway Works** will be newly surfaced, and the wider road network will be maintained by the relevant highway authority. On this basis, no significant levels of groundborne vibration would occur, and consideration of vibration from the passage of vehicles has been scoped out of the assessment.

Consultation

Scoping Opinion

7.2.4. An EIA Scoping Report for the **Scheme** was submitted to the Planning Inspectorate (PINS) in August 2024. A Scoping Opinion was adopted by PINS on the 24th of September 2024. **Table 7.1** summarises the relevant comments from the Scoping Opinion and provides commentary as required.

Table 7.1: Scoping Opinion comments and commentary

Originator	Details	Commentary
PINS ID 3.5.1	Stated that no details of potential operational vibration had been provided and therefore matter could not be scoped out on that basis.	Further details have been provided demonstrating that significant effects resulting from operational vibration are unlikely to occur (see paragraphs 7.2.2 and 7.2.3).
PINS ID 3.5.2	Stated that limited details of construction works had been provided and therefore consideration of construction vibration could not be scoped out for sources other than piling and vibratory ground compaction.	Estimates of construction activities and plant have been provided and used as a basis for the assessment of noise and vibration. Further details have been provided demonstrating that significant effects resulting from construction vibration are unlikely to occur (see paragraphs 7.2.2 and 7.2.3).
PINS ID 3.5.3	Stated that the noise monitoring detailed only covered the area around the **EMG2 Main Site**, and that monitoring relating to the full **Scheme** should be undertaken as required.	Additional noise monitoring has been undertaken with reference to the area around the **EMG1 Works** (see section on Baseline Conditions below).
PINS ID 3.5.4	Stated that the receptors detailed only covered the area around the **EMG2 Main Site**, and that receptors relating to the full extent of the **Scheme** should be considered as required.	Additional receptors have been added to the assessment with reference to the **Highways Works** and **EMG1 Works** (see section on Receptors below).
Kegworth Parish Council	Stated that an estimate of noise, likely significant effects, and details of any proposed mitigation measures associated with the expanded rail freight interchange should be included.	Noise associated with the **EMG1 Works** has been assessed in the Chapter.
Leicestershire County Council	Stated that the Chapter should demonstrate how the **Scheme** will	Noise from the **Scheme** has been assessed in the Chapter.

	contribute to noise in the area, including the consideration of cumulative effects.	
North West Leicestershire District Council	Confirmed that the approached proposed in the Scoping Report, including the noise monitoring and receptor plans, were acceptable.	N/A.

Council Liaison

7.2.5. Direct liaison has been undertaken with the relevant members of the Environmental Protection Team at North West Leicestershire District Council (NWLDC), the administrative area where the **Scheme** is located. **Table 7.2** details this liaison.

Table 7.2: Council liaison details

Details	Response from NWLDC
26/04/2022 (email) Provided details of the proposed receptors and representative noise monitoring locations around the **EMG2 Main Site** that would inform the assessment (note that at this time, the **Scheme** was limited to the works taking place at the **EMG2 Main Site**).	06/05/2022 (email) Confirmation that the information had been reviewed and that the proposed approach to the noise survey was acceptable.
01/11/2024 (email) Provided updated details of proposed receptors and representative noise monitoring locations around the **Scheme** that would inform the assessment. Also provided brief overview of the proposed scope of the assessment.	21/11/2024 (email) Confirmation that the selection of receptors, monitoring approach and proposed locations, and elements to be considered within the assessment were all satisfactory.

Construction

Noise from construction activities

7.2.6. Noise from construction activities associated with the **Scheme** has been predicted at the relevant receptors, which are typically considered up to a distance of 300 m from the works, using the methodologies described in Annex F of the British Standard BS 5228-1:2009+A1:2014[1] and the International Standard ISO 9613-2:2024[2] using the noise modelling software package IMMI. Where activities will take place at multiple locations, such as bulk earthworks across the **EMG2 Main Site**, the activity has been modelled in several positions representing a reasonable worst-case relative to each receptor (i.e., in an area of the site close to each receptor); that worst-case predicted activity noise level has then been used for the assessment at the corresponding receptor.

7.2.7. Detailed information on construction techniques, plant etc is not yet available, so the predictions are based on preliminary information and methods used in similar developments, together with an indicative construction programme to provide details of any works that are likely to overlap.

[1] BS 5228-1:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sit45es, Part 1: Noise

[2] ISO 9613-2:2024 Acoustics - Attenuation of sound during propagation outdoors - Part 2: Engineering method for the prediction of sound pressure levels outdoors

The predicted construction noise levels have been combined based on the overlapping works, referred to as timeslices; to provide a clear and concise assessment of the worst-case, the timeslices representing the highest noise levels have been selected for assessment. In terms of the **Highways Works**, the works packages that could be expected to result in significant effects have been considered, i.e., not those comprising minor works. Further details of the assumptions can be found in **Appendix 7b**.

7.2.8. Most of the works are planned to take place during the daytime (core hours) and the primary assessment has been undertaken on this basis. However, regarding the off-site **Highways Works**, there are expected to be some periods when out of hours and night working may be required due to highway constraints, e.g., where it is not practicable to close a section of road during the day. For core hours works, it can be assumed that all activities will take place along the full extent of works area. For other times, the likely impacts are dependent on multiple factors including the specific location of the works, the time they take place (as there are different thresholds depending on the time), and exactly what works need to be undertaken, which may be limited compared with those taking place during core hours. This level of detail is not available at this time and therefore out-of-hours works have been considered in high-level qualitative terms, on the basis that full details will be provided in the P-CEMP produced for each works package prior to them being undertaken.

7.2.9. The potential significance of effects associated with the predicted construction noise levels has been assessed using the thresholds set out in **Table 7.3.** The values are based on the guidance within Annex E of BS 5228-1:2009+A1:2014 and are expressed in terms of the effect level definitions found in current Government noise policy: the Lowest Observed Adverse Effect Level (LOAEL), above which adverse effects can be detected, and the Significant Observed Adverse Effect Level (SOAEL), above which significant adverse effects can occur. In line with the guidance given in BS 5228-1:2009+A1:2014, a significant effect is indicated where the SOAEL is exceeded for a given period, as stated at the bottom of the table.

Table 7.3: Effect thresholds and significance criteria for construction noise

Effect level	Time period (T)	Threshold value (dB $L_{Aeq,T}$)[1,2]
LOAEL	**Core hours works:** • Mon-Fri, 07:00-19:00 (12hr); or • Sat, 07:00-13:00 (6hr).	65
	Out of hours works: • Mon-Fri, 19:00-23:00 (4hr); • Sat, 13:00-23:00 (10hr); or • Sun[3], 07:00-23:00 (16hr).	55
	Night works: • Mon-Sun, 23:00-07:00 (8hr).	45
SOAEL[4]	**Core hours works:** • Mon-Fri, 07:00-19:00 (12hr); or • Sat, 07:00-13:00 (6hr).	75
	Out of hours works: • Mon-Fri, 19:00-23:00 (4hr); • Sat, 13:00-23:00 (10hr); or • Sun[2], 07:00-23:00 (16hr).	65
	Night works: • Mon-Sun, 23:00-07:00 (8hr).	55

[1] The threshold values apply to residential receptors and those with a similar sensitivity to noise.
[2] Values apply to a location one metre from a building façade containing a window, including the effect of the acoustic reflection from that façade. Usually referred to as a façade level.
[3] And public holidays.
[4] A significant effect is predicted if the programme of works indicates that the SOAEL threshold is likely to be exceeded over a period of at least one month.

7.2.10. Where required, details of potential mitigation measures to avoid any significant effects and mitigate and minimise any adverse effects from construction noise have been provided, based on the principles of best practicable means (BPM).

Noise from construction road traffic

7.2.11. The prediction and assessment of noise from construction traffic on the road network around the **Scheme** follows the principles of the methodology described in document LA 111, part of the Design Manual for Roads and Bridges[3] (DMRB). Road traffic noise both with and without the presence of construction traffic (based on the peak period of construction traffic activity) has been calculated using the procedure described in the Calculation for Road Traffic Noise[4] (CRTN) for the relevant roads using information provided by the project transport consultant (BWB) (further details can be found in **Appendix 7b**).

7.2.12. The potential significance of effects associated with any predicted temporary increases in road traffic noise due to construction traffic has been assessed using the thresholds set out in **Table 7.4**, reflecting those included in LA 111. As stated at the bottom of the table, a significant effect is indicated where a moderate or major increase is predicted for a given period.

Table 7.4: Impact magnitudes and significance criteria for change in road traffic noise (construction traffic)

Magnitude of Impact	Increase in noise level (dB)
Major[1]	Greater than or equal to 5.0
Moderate[1]	Greater than or equal to 3.0 and less than 5.0
Minor	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0

[1] Construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:
1) 10 or more days or nights in any 15 consecutive days or nights;
2) a total number of days exceeding 40 in any 6 consecutive months.

Vibration from construction activities

7.2.13. Where a construction activity associated with the **Scheme** has been identified as having the potential to generate levels of vibration that could adversely affect receptors, i.e., the building occupants, and a receptor has been identified as within 100 m of the activity, potential levels of vibration have been considered based on the prediction methodologies and measured data

[3] LA 111 version 2, Design Manual for Roads and Bridges, National Highways (2020)
[4] Calculation of Road Traffic Noise, Department of Transport (1988)

provided in the British Standard BS 5228-2:2009+A1:2014[5]. These levels have been converted to the vibration dose value (VDV) metric as defined in the British Standard BS 6472-1:2008[6] for the day/night period using the method from the ANC guidelines[7].

7.2.14. With regard to the likelihood of the Highways Works taking place during the out of hours and night periods due to highway constraints, a similar approach has been taken as for noise (see above).

7.2.15. The potential significance of effects associated with construction vibration has been assessed using the thresholds set out in **Table 7.5**. The values are based on the guidance within Annex B of BS 5228-2:2009+A1:2014 and current industry best practice on vibration[8], and are expressed in terms of the effect level definitions found in current national noise policy. While the policy only refers to noise exposure, it is helpful to adopt the same principles when assessing vibration impacts and effects.

Table 7.5: Effect thresholds and significance criteria for construction vibration

Effect level	Time period (T)	Threshold value (VDV m/s$^{1.75}$)[1,2]
LOAEL	Day (07:00-23:00)	0.2
	Night (23:00-07:00)	0.1
SOAEL[3]	Day (07:00-23:00)	0.8
	Night (23:00-07:00)	0.4

[1] The threshold values apply to residential receptors and those with a similar sensitivity to vibration.
[2] Values apply to a location on the floor inside a building, near but not at the centre of any habitable room.
[3] A significant effect is indicated if the programme of works indicates that the SOAEL threshold value is likely to be exceeded for two or more consecutive days.

7.2.16. As well as considering potentially adverse effects on the occupants of buildings, consideration has also been given to potential damage to buildings and other structures from construction vibration. Based on best practice from BS 5228-2 and benchmark projects including HS2, a peak particle velocity (PPV) threshold of 3 mm/s, applicable to structurally sound, unsound and heritage receptors, has been selected to indicate the onset of potential damage. However, it should be noted that this threshold is precautionary and, in most cases, could be increased following further, specific investigation/condition surveys of the relevant structure where required.

[5] BS 5228-2:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites, Part 2: Vibration

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

[7] Association of Noise Consultants (2020), ANC Guidelines: Measurement & Assessment of Groundborne Noise & Vibration

[8] High Speed Two (HS2) Limited (2017), High Speed Two Phase One Information Paper E23: Control of construction noise and vibration

Operation

Noise from operational road traffic

7.2.17. Traffic noise from the roads around the **Scheme** has been predicted at the relevant receptors both with and without the presence of vehicles associated with operation of the development, and the changes in road layouts associated with the **Highway Works**. The predictions use the procedure described in CRTN and have been undertaken with the noise modelling software package IMMI.

7.2.18. Predictions have been undertaken for the scenarios presented in **Table 7.6** using data supplied by the project transport consultant (BWB) ("do-minimum" refers to a scenario that doesn't include traffic/changes associated with the **Scheme**, while a "do-something" scenario includes the **Scheme**).

Table 7.6: Road traffic scenarios used for noise predictions

Traffic Scenario	Notes
Baseline year (2022)	Before construction of the **Scheme** commences, used to verify predictions against noise survey results.
Do-minimum (2028)	Future year forecast for opening year of the **Scheme** (inc. committed developments, adopted local plan allocations and draft local plan allocations).
Do-something (2028)	Future year forecast for opening year of the **Scheme** (inc. committed developments, adopted local plan allocations, draft local plan allocations and the **Scheme**).
Do-minimum (2038)	Future year forecast for the **Scheme** operating at full capacity (inc. committed developments, adopted local plan allocations and draft local plan allocations).
Do-something (2038)	Future year forecast for the **Scheme** operating at full capacity (inc. committed developments, adopted local plan allocations, draft local plan allocations and the **Scheme**).

7.2.19. The four do-minimum/do-something scenarios listed in **Table 7.4** above include traffic associated with allocations from the Regulation 18 draft NWLDC local plan[9]. It is possible that by including these traffic flows, the noise impact of the **Scheme** may be diluted (as the extra baseline traffic would mean that the addition of the development traffic results in a smaller increase in proportional terms). As the draft NWLDC local plan is not yet adopted, a second set of the four do-minimum/do-something scenarios which do not include traffic flows associated with the draft local plan allocations have also been assessed as a sensitivity test using the same method as the main scenarios (see below). Further details of the road traffic scenarios can be found in **Chapter 6** (Traffic and Transport) of the ES.

7.2.20. The potential significance of effects associated with any predicted increases in road traffic noise due to operational traffic (i.e., the difference in predicted road traffic noise levels for the do-minimum and do-something scenarios) has been assessed by considering both the do-something noise exposure level and the magnitude of the change, described as follows.

[9] North West Leicestershire District Council (2024), Draft North West Leicestershire Local Plan (2020 – 2040)

7.2.21. Firstly, the predicted road traffic noise levels at the receptors for the do-something scenario have been compared to the thresholds presented in **Table 7.7**, expressed in terms of current Government noise policy (i.e., as LOAELs and SOAELs).

Table 7.7: Thresholds of potential effects from road traffic noise at residences[10]

Time period	Effect level	Noise exposure threshold value
Day (07:00–23:00)	LOAEL	50 dB $L_{Aeq,16hr}$ (free-field)[a,b]
	SOAEL	63 dB $L_{Aeq,16hr}$ (free-field)[a,c]
Night (23.00–07.00)	LOAEL	40 dB L_{night} (free-field)
	SOAEL	55 dB L_{night} (free-field)

Notes:
[a] This is the average daily value (07:00 – 23:00 hours) at a position one metre from a residential building façade containing a window, ignoring the effect of an acoustic reflection from that façade.
[b] equivalent to 55 dB $L_{A10,18hr}$ façade.
[c] equivalent 68 dB $L_{A10,18hr}$ façade.

7.2.22. Secondly, if a do-something scenario predicted road traffic noise level exceeds the LOAEL, the change between the results of the corresponding do-minimum and do-something scenario (i.e., for the same year) has been calculated for the relevant period (i.e., day or night). The change has then been compared to the magnitude of impact categories presented in **Table 7.8** depending on whether the do-something effect level is between LOAEL and SOAEL, or equal to or above the SOAEL.

Table 7.8: Impact magnitude and significance criteria for change in road traffic noise (operational traffic)[11]

Magnitude of Impact	Do-something noise exposure effect level			
	Day (07:00–23:00)		Night (23.00–07.00)	
	Between LOAEL and SOAEL		SOAEL or greater	
No Change	0	0	0	0
Negligible	0.1 – 2.9 dB(A)	0.1 – 0.9 dB(A)	0.1 – 0.9 dB(A)	0.1 – 0.9 dB(A)
Minor	3.0 – 4.9 dB(A)	**1.0 – 2.9 dB(A)**	1.0 – 2.9 dB(A)	**1.0 – 2.9 dB(A)**
Moderate	5.0 – 9.9 dB(A)	**3.0 – 4.9 dB(A)**	3.0 – 4.9 dB(A)	**3.0 – 4.9 dB(A)**
Major	≥ 10.0 dB(A)	**≥ 5.0 dB(A)**	≥ 5.0 dB(A)	**≥ 5.0 dB(A)**

NOTE: If the result for any property falls in the categories shown by the shaded boxes with text in bold, this indicates that the property is regarded as experiencing a significant adverse effect.

7.2.23. Where both the predicted road traffic noise level for the do-something scenario exceeds the relevant SOAEL from **Table 7.7**, and the change between the do-minimum and do-something scenarios is within the ranges shown in the shaded boxes with bold text from **Table 7.8**, then a significant effect is indicated for the relevant time period. Note that in line with Government

[10] Values based on those used for the assessment of other schemes such as the A14 DCO and Northampton Gateway SRFI DCO, and those presented in the DMRB.

[11] Values based on those presented in the DMRB, modified to reflect Government noise policy; in particular, where road traffic noise levels are below the SOAEL, significant adverse effects would not generally be expected. This approach was adopted for the Northampton Gateway SRFI DCO.

policy on noise, reasonable steps should be taken to mitigate and minimise the non-significant adverse impacts which exceed the LOAEL but not the SOAEL, particularly those where the impact magnitude is moderate or major.

Noise from operational activity at the EMG2 Main Site and EMG1 Works

7.2.24. Noise from on-site operational HGV activity at the **EMG2 Main Site** and **EMG1 Works** has been predicted at the relevant receptors using the methodology described in ISO 9613-2:2024 and the noise modelling software IMMI, together with appropriate source levels from Vanguardia's library for HGVs pulling away from a standstill, reversing (inc. use of a reversing alarm), and being loaded or unloaded at the docking area, as well as travelling on the internal roads within the development, and trailer coupling. Furthermore, it has been assumed that 10% of the HGVs will be refrigerated, with noise from the associated sources (i.e., HGV mounted chillers) also considered.

7.2.25. The predictions of noise from operational HGV activity at the **EMG2 Main Site** are based on the Illustrative Masterplan that is being submitted for information as part of the application, primarily focusing on the access roads and service yards. However, it is recognised that this is not intended to represent a final layout. Therefore, following a review with the project team, several adjustments have been made to the layout so that, based on current information, it represents a reasonable worst-case in noise terms (the adjustments relate to the orientation of several of the units so that the service yards, which are the primary source of noise from HGV activities, are directed to the site boundaries). Predictions will be made for both layouts (i.e., the original and modified), with the worst-case result for each relevant receptor assessed.

7.2.26. In addition, noise from use of the gantry cranes proposed as part of the **EMG1 Works** has been predicted at the relevant receptors using the same method, based on measurements of similar units undertaken by Vanguardia.

7.2.27. Predictions have been undertaken for two scenarios based on information supplied by the project team: the peak (worst-case) hour of operations during the day (07:00-23:00) and the peak 15 minutes of operations during the night (23:00-07:00), both based on the **EMG2 Main Site** and **EMG1 Works** being complete and operating at full capacity. These periods were selected to align with the assessment periods from the British Standard BS 4142:2014+A1:2019[12]. Predictions have also been undertaken for individual noise events. Further details on the assumptions used for the predictions can be found in **Appendix 7c**.

7.2.28. The potential significance of effects associated with the predicted on-site activity noise levels has been assessed based on the principles of the methodology described in BS 4142:2014+A1:2019 for the peak periods of operation during the day and night. This provides an initial estimate of impact based on the difference between the noise level being assessed (i.e., the HGV noise), including the addition of corrections if certain acoustic features are present at the receptor location, which include tonality, impulsivity and intermittency (termed the rating level), and the typical background sound level at the receptor location for the relevant period, identified via measurement (see section on Baseline Conditions below).

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

7.2.29. When the typical background sound level is subtracted from the rating level, the resulting difference indicates the following initial estimate of impact:

- Around +10 dB[13] or more is likely to be an indication of a significant adverse impact, depending on the context;
- Around +5 dB is likely to be an indication of an adverse impact, depending on the context;
- Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context; and
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact.

7.2.30. Following the initial estimate of impact, the methodology states that the context in which the sound will occur must be considered to arrive at the final assessment of significance. This is specific to the situation, but can include factors such as the absolute level of the sound being introduced, particularly at night and/or in environments where existing background sound levels are low, and whether residential receptor buildings incorporate ventilation and/or cooling that reduces the need for their windows to be open.

7.2.31. Regarding the absolute level of the sound being assessed, the guideline values in BS 8233:2014[14] relating to residences have been referenced, both in terms of internal and external noise levels (note that consideration of internal noise levels may also take any ventilation measures installed at the residence into account, as discussed in the previous paragraph). These are summarised in **Table 7.9**.

Table 7.9: Summary of guideline sound levels for residences from BS 8233:2014

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

7.2.32. The lower values shown in **Table 7.7** are generally regarding the LOAEL for steady external sound. If the sound being considered had certain acoustic features, it may be appropriate to consider a lower threshold, or incorporate a correction to the sound. For the assessment of on-site operational activity, the predicted rating levels have been used for this purpose where

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

[14] BS 8233:2014: Guidance on sound insulation and noise reduction for buildings

required, including the relevant correction for acoustic features as described in BS 4142:2014+A1:2019 (see above).

7.2.33. When considering noise from the **EMG1 Works**, context will also be considered by both comparing and combining the predicted rating levels with the measured residual sound level to take account of the existing operations at EMG1.

7.2.34. Following consideration of context, the final assessment of significance from on-site operational activity has been completed, based primarily on the result of the initial estimate of impact and the assessment of the absolute noise levels, with other contextual factors considered where relevant.

7.2.35. In addition to the prediction and assessment of on-site operational HGV activity using the methodology described in BS 4142:2014+A1:2019, the potential impacts of individual noise events from HGV activities have also been assessed. This type of noise typically represents the maximum level from a short-term noise event, rather than an average of noise levels over a period of time.

7.2.36. The World Health Organisation (WHO) document Guidelines for Community Noise states that for good sleep, indoor noise levels should not exceed around 45 dB L_{AFmax} more than 10-15 times a night, which is equated to a level outside the façade of 60 dB L_{AFmax} assuming a partially open window. It is generally accepted that this threshold represents the LOAEL for noise of this type. Regarding a corresponding SOAEL, a level outside the façade of 70 dB L_{AFmax} has been selected.

Noise from fixed plant at the EMG2 Main Site and EMG1 Works

7.2.37. It is anticipated that there will be fixed plant associated with the **EMG2 Main Site** and **EMG1 Works**, such as that used for ventilation, cooling and heating of buildings. However, prior to the occupants of the buildings and their requirements being known, information regarding the type, number, or location of the fixed plant units is not available and therefore any noise that may result from their operation cannot be assessed.

7.2.38. Therefore, appropriate target noise rating levels for fixed plant have been defined at the receptor locations based on the methodology described in BS 4142:2014+A1:2019 for the day and night periods, with reference to the measured typical background sound levels, and the predicted noise levels from on-site operational activity. These would also apply to substations.

7.2.39. It is proposed that prior the installation of any fixed plant or substations, details of the installation for each building will be submitted to NWLDC for approval as part of the discharge of requirements process. As part of this process, sound from the proposed fixed plant installations or substations will be predicted and fully assessed using the BS 4142:2014+A1:2019 methodology with respect to the target noise rating levels.

7.2.40. Items of plant will be selected and located to minimise any noise that may result from their operation at the receptor locations as far as reasonably practicable and, if necessary, mitigated to avoid potentially significant effects occurring.

Receptors

7.2.41. Sensitive receptors typically represent locations where human beings or other sensitive elements, such as wildlife, may be affected by noise and/or vibration from the construction and/or operation of the **Scheme**.

7.2.42. The receptors selected for this assessment comprise a sample of those closest to the relevant sources of noise or vibration. Their proximity means that, in general, impacts at other locations that are further from the respective sources of noise and/or vibration would be no greater, and in most cases lower than those that have been assessed. Therefore, the assessment presents a worst-case.

7.2.43. The sensitivity of a receptor is a function of both its use and the type of noise or vibration being considered (e.g., construction noise, road traffic noise etc). This means that there are different thresholds of noise and/or vibration exposure that can indicate adverse or significant adverse effects depending on the type of receptor and type of noise source.

7.2.44. To identify the relevant sensitive receptors for the assessment, a review was undertaken of the area surrounding the **Scheme**. Most of the noise and vibration sources associated with the development are located within the **EMG2 Main Site** and **EMG1 Works** and therefore the relevant receptors are around these areas. However, increases in road traffic noise may affect receptors further from the site, along the roads used by the additional vehicles.

7.2.45. The sensitive receptors selected for this assessment are listed in **Table 7.10**, which indicates their location, use, the relevant component/s of the **Scheme** they are associated with (e.g., whether they are primarily exposed to the **EMG2 Main Site** etc), and what type of noise and/or vibration source has been considered.

7.2.46. The receptors are primarily private dwellings, but several are hotels; for these, potential significance has been assessed using the same thresholds of noise/or vibration as for residences in the first instance, though it should be noted that the hotel receptors are expected to employ mechanical ventilation as well as all guest rooms being air conditioned which is relevant to the consideration of potential operational noise impact (see above). In addition, two future receptors are included, representing residential developments on the west site of Kegworth that have planning permission but have not yet been constructed. Liaison with the project ecologist (FPCR) has confirmed that no relevant ecological receptors with a sensitivity to noise or vibration have been identified. Plans showing the locations of the receptors is presented in **Appendix 7d**.

Table 7.10: Receptor list and types of noise considered [to be completed following receipt of traffic data]

Receptor ID		Type	Relevant scheme components[1]	Source of noise or vibration					
				Construction			Operational		
				Noise (works)	Vibration (works)[2]	Road traffic noise*	Noise (on-site)	Road traffic noise*	Fixed plant (on-site)[3]
R01	The Birches, Grimesgate	Resi	EMG2 MS	✓			✓		✓
R02	Leonardo Hotel East Midlands Airport	Hotel	EMG2 MS	✓	✓		✓		✓
R03	Premier Inn, Hunter Road	Hotel	EMG2 MS, HW	✓	✓		✓		✓

R04	Radisson Blu Hotel, Herald Way	Hotel	EMG2 MS, HW	✓	✓		✓		✓
R05	Travelodge, Moto Services	Hotel	EMG2 MS	✓	✓		✓		✓
R06	Woodnook Farm, West End	Resi	EMG2 MS	✓			✓		✓
R07	4 Langley Close	Resi	EMG2 MS	✓	✓		✓		✓
R08	17 Clements Gate	Resi	EMG2 MS	✓	✓		✓		✓
R09	2 Old Hall Court	Resi	EMG2 MS	✓	✓		✓		✓
R10	18 Grimes Gate	Resi	EMG2 MS	✓	✓		✓		✓
R11	Byland Cottage, Grimes Gate	Resi	EMG2 MS	✓			✓		✓
R12	Daleacre House, Lockington	Resi	EMG1 Wks	✓			✓		✓
R13	Hill Farm House, Lockington	Resi	EMG1 Wks	✓			✓		✓
R14	Hilton East Midlands Airport	Hotel	EMG1 Wks, HW	✓	✓		✓		✓
R15	72 Pritchard Drive, Kegworth	Resi	EMG1 Wks	✓			✓		✓
R16	24 Windmill Way, Kegworth	Resi	EMG1 Wks	✓			✓		✓
R17	90 Ashby Road, Kegworth	Resi	EMG1 Wks	✓			✓		✓
R18	Dowells Barn, Kegworth	Resi	HW	✓					
R19	Long Lane Farm, Kegworth	Resi	HW	✓					
F01	Derby Road, Kegworth (future)	Resi	EMG1 Wks	✓			✓		✓
F02	Ashby Road, Kegworth (future)	Resi	EMG1 Wks	✓			✓		✓

[1] Primary noise or vibration exposure from stated component; EMG2 MS refers to EMG2 Main Site, EMG1 Wks refers to EMG1 Works, HW refers to Highway Works.
[2] Selection based on distance to order limits, i.e., up to 100 m.
[3] Target noise rating levels for fixed plant defined at selected receptors.
** [Selection of receptors for the assessment of changes in road traffic noise to be completed on receipt of traffic data].*

7.2.47. Regarding the predictions of noise at the relevant receptor locations, a height of 1.5 m above ground level has been used to represent ground (or ground floor) level and used for the daytime assessment period, with 4.5 m used to represent first floor bedroom windows for the night-time assessment period. Where the receptor is a hotel, additional heights have been predicted as required and the worst-case result has been selected for both the day and night.

Assumptions and Limitations

7.2.48. Throughout the assessment process, steps have been taken to minimise as far as possible any uncertainty relating to the identification of potentially significant noise and vibration effects from the **Scheme** and to produce a technically robust assessment. However, some assumptions have been made to facilitate the assessment, and there are some practical limitations to the methodology.

7.2.49. The primary assumptions/embedded mitigation used in the assessment are summarised as follows:

- Detailed information on construction techniques, plant etc is not yet available, so the predictions are based on preliminary information and methods used in similar developments, together with an indicative construction programme to provide details

of any works that are likely to overlap; further details of these assumptions can be found in **Appendix 7b**;

- Several assumptions have been made in terms of the types, locations and intensity of the on-site operational activities, including the use of refrigerated HGVs, in conjunction with the transport consultant and the current operator of the EMG1 rail terminal (see above and **Appendix 7c** for further details);
- The proposed landscape mounding around the **EMG2 Main Site** has been considered as embedded mitigation and incorporated into the noise predictions; and
- If considering internal noise levels at sensitive receptors, a typical attenuation for sound passing through a partially open window has been assumed, as detailed information regarding the specification of each receptor is not known.

7.2.50. The main limitations of the assessment are described as follows:

- It is impractical to predict and assess the potential noise effects from the various elements of the **Scheme** at every individual receptor. Instead, as is common practice, a sample set of receptors expected to be most exposed to noise from the site has been selected, therefore representing the worst-case of all the possible receptor locations;
- It is also impractical to measure the existing noise climate at every individual receptor. Similar to the previous point, noise has been monitored at a number of locations representative of different receptors which broadly experience the same exposure as the monitoring positions;
- Sufficient detail to undertake predictions of noise from fixed plant installations is not available, so target noise rating noise levels have been defined at the receptor locations that will be referenced when occupier fit-out requirements are being specified; and
- The baseline noise survey was undertaken for a period of time considered sufficient to determine typical noise levels at the monitoring locations (see Baseline Conditions below) and was supplemented by short-term monitoring at additional locations. Longer duration surveys would have provided more data, but this was not considered proportionate.

7.3. Policy, Guidance and Legislative Context

7.3.1. There are several pieces of national and local planning policy that make specific reference to the noise and vibration, discussed as follows.

National Policy Statement National Networks (NPSNN) (March 2024)

7.3.2. The NPS was updated in March 2024 and sets out the need for, and government's policies to deliver, development of NSIPs on the national road and rail networks in England. This includes national road, rail and strategic rial freight interchanges.

7.3.3. The NPS requires applicants to undertake a noise assessment where noise impacts are likely to arise from the proposed development. Paragraph 5.230 sets out specific guidance on the scope and content of such noise assessments.

7.3.4. The NPS notes at Paragraph 5.239 that due regard should be given to the Noise Policy Statement for England, the NPPF and the government's associated planning guidance on noise.

National Planning Policy Framework (2024)

7.3.5. The National Planning Policy Framework (NPPF) sets out the Government's planning policy for England. Its central aim is to contribute to the achievement of sustainable development. The potential impacts of noise are addressed firstly in point e) of paragraph 187, as follows:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *...*
>
> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or **noise** pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans"*

7.3.6. And secondly in point a) of paragraph 198, which also includes a reference to tranquil areas in point b), as follows:

> *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *a) mitigate and reduce to a minimum potential adverse impacts resulting from **noise** from new development – and avoid **noise** giving rise to significant adverse impacts on health and the quality of life;*
>
> *b) identify and protect tranquil areas which have remained relatively undisturbed by **noise** and are prized for their recreational and amenity value for this reason"*

7.3.7. Paragraph 198 includes a direct reference to the Noise Policy Statement for England for further information on these policy aims.

Noise Policy Statement for England (2010)

7.3.8. The Noise Policy Statement for England (NPSE) sets out the Government's overall policy on the management of noise.

7.3.9. With respect to the potential onset of effects due to noise, it uses the established concepts of the No Observed Effect Level (NOEL) and Lowest Observed Adverse Effect Level (LOAEL),

and extends these concepts by introducing the Significant Observed Adverse Effect Level (SOAEL), above which significant adverse effects on health and quality of life are likely to occur.

7.3.10. The NPSE states that it is not possible to identify a single object value for SOAEL that is applicable to all sources of noise in all situations; it is likely to be different for different noise sources, for different types of receptors, and at different times.

7.3.11. The NPSE sets out the following long-term vision of noise policy and supporting aims:

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

7.3.12. The second aim of the NPSE refers to noise impacts that lie somewhere between LOAEL and SOAEL; while these may be considered as adverse effects, they are not considered as significant. The NPSE asserts that, while all reasonable steps should be taken to mitigate and minimise adverse effects, this does not mean that such adverse effects cannot occur.

Planning Practice Guidance: Noise (2019)

7.3.13. The Government has published guidance on how planning can manage potential noise impacts in new development. The guidance provides a range of advice as answers to common questions regarding the consideration of noise as part of the planning process.

7.3.14. Regarding how it can be established whether noise is likely to be a concern, the guidance includes a noise exposure hierarchy table that provides qualitative descriptions of the outcomes where noise is present with reference to the effect levels referred to in the NPSE, e.g., where noise is above the NOEL, LOAEL or SOAEL, as well as the additional effect level of NOAEL. This table is reproduced in **Table 7.11**.

Table 7.11: Noise exposure hierarchy table

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level (NOEL)			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life	No Observed Effect	No specific measures required

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

7.3.15. The guidance confirms that adverse effects (between LOAEL and SOAEL) should be mitigated and reduced to a minimum, and significant adverse effects (above SOAEL) should be avoided, taking account of the economic and social benefit of the activity causing the noise.

North West Leicestershire Local Plan 2011 to 2031 (2021)

7.3.16. The relevant Development Plan policy is currently provided by North West Leicestershire District Council's Local Plan. This was originally adopted in November 2017, and was adopted again in March 2021 following an amendment to the timescale for the Local Plan review. The potential effects of noise and vibration from new development are primarily addressed in point 2) of Policy D2 – Amenity, as follows:

> *"Proposals for development should be designed to minimise their impact on the amenity and quiet enjoyment of both existing and future residents within the development and close to it. As such, development proposals will be supported where:*
>
> *…*

*2) They do not generate a level of activity, **noise**, **vibration**, pollution or unpleasant odour emission, which cannot be mitigated to an appropriate standard and so, would have an adverse impact on amenity and living conditions."*

Draft North West Leicestershire Local Plan 2020 to 2040

7.3.17. NWLDC consulted on the Regulation 18 draft Local Plan in February and March 2024. The potential effects of noise and vibration from new development are primarily addressed in point b) of Draft Policy AP2 – Amenity, which is similar to Policy D2 in the current Local Plan as detailed above:

"New development should be designed to minimise its impact on the amenity and quiet enjoyment of both future residents and existing residents in the vicinity of the development. Development proposals will be supported where:

…

*(b) They do not generate a level of activity, **noise**, **vibration**, pollution or unpleasant odour emission, which cannot be mitigated to an appropriate standard and so, would have an adverse impact on amenity and living conditions."*

7.3.18. The draft Local Plan includes a second relevant policy, Draft Policy AP5 – Health and Wellbeing (Strategic Policy), which references noise and vibration at point f):

"Development that maintains and improves the health and wellbeing of our residents, encouraging healthy lifestyles by tackling the causes of ill health and inequalities will be supported. Health considerations will be embedded in decision making and the Council will support the creation of a high quality, accessible and inclusive environment.

To achieve this, the Council will:

…

*(f) Prevent negative impacts on residential amenity and wider public safety from **noise**, ground instability, ground and water contamination, **vibration** and air quality."*

7.4. Baseline Conditions

7.4.1. In the context of this assessment, the primary use of baseline condition data is as part of the assessment of noise from operational activity at the **EMG2 Main Site** and **EMG1 Works** site, as well as the definition of target noise rating levels for fixed plant.

EMG2 Main Site

7.4.2. To characterise and quantify the existing baseline noise environment in the areas around the **EMG2 Main Site**, noise surveys were undertaken in May 2022.

7.4.3. The surveys comprised five static unattended monitoring locations and two locations where short-term attended measurements were undertaken. The locations were selected to be representative of the sensitive receptors in the area surrounding the proposed development. The measurement microphones were in the acoustic free-field and a height of 1.5 m above ground level at all positions.

7.4.4. A summary of the survey locations, start and end dates/times and observations of the main noise sources at each location are presented in **Table 7.12** for the unattended measurements and **Table 7.13** for the attended measurements. A plan showing the monitoring locations is presented in **Appendix 7e**.

Table 7.12: Summary of unattended noise monitoring around EMG2 Main Site

Unattended survey location		Dates		Observations of main noise sources
		Start	End	
L01	At NW corner of site boundary, representative of R01, R02 and R011	04/05/22	12/05/22	Road traffic noise on A453 dominant, occasional aircraft overhead
L02	Close to north of site boundary, representative of R03 and R04	04/05/22	12/05/22	Road traffic noise on A453 dominant, occasional aircraft overhead & at airport
L03	On E of site boundary, for correlation with S01	04/05/22	06/05/22*	Service station noise dominant, road traffic noise on A42/M1, occasional aircraft overhead & at airport
		12/05/22	20/05/22	
L04	Adjacent to the road West End, representative of R06	04/05/22	12/05/22	Road traffic noise on A42 dominant, road traffic noise on M1
L05	At SW corner of site boundary, representative of R07 & R08, and for correlation with S02	04/05/22	12/05/22	Road traffic noise on A42/M1 & Clements Gate dominant, occasional aircraft overhead
** The original deployment of L03 suffered a technical fault at 18:18 on 06/05/22. As a result, it was redeployed on 12/05/22 to ensure that sufficient data was collected.*				

Table 7.13: Summary of attended noise monitoring around EMG2 Main Site

Attended survey location		Dates/times		Observations of main noise sources
		Date	Times	
S01	Close to R05, to correlate with L03	04/05/22	14:30 - 15:15	Road traffic noise on A42/M1, occasional aircraft overhead, service station noise
		12/05/22	10:30 - 11:15	
S02	Close to R09 and R10, to correlate with L05	04/05/22	12:45 - 13:30	Distant road traffic noise on A453/A42/M1, occasional aircraft at airport
		12/05/22	11:30 - 12:15	

7.4.5. A field calibration check was undertaken prior to and following each set of measurements and no significant drift in sensitivity was noted at any location. All the sound level meters (SLMs) and field calibrators used for the survey met the requirements of a Class 1 instrument. All SLMs were within two years of their last laboratory calibrator, and all calibrators within one year. Further details of the monitoring equipment used are given in **Appendix 7f**.

7.4.6. The results of the noise surveys are presented in **Appendix 7g**. Time history graphs have been produced for the unattended monitoring results, and tables have been provided summarising the measured noise levels at the short-term attended monitoring locations.

7.4.7. Regarding the monitoring of weather conditions during the noise surveys, wind speed, wind direction and rainfall rate data has been sourced primarily from the permanent weather station installed at the nearby East Midlands Airport. The area experienced some periods of

precipitation and high winds during the survey. The weather data is summarised at the end of **Appendix 7g**.

7.4.8. In June 2024, additional noise measurements were undertaken at locations L01, L03, L04 and L05 over a period of approximately 24 hours to verify that the data measured in May 2022 remained representative of current conditions. The 2024 measurements indicated that the 2022 survey results remain valid and suitable for use as part of the assessment.

EMG1 Works

7.4.9. To characterise and quantify the existing baseline noise environment in the areas around the **EMG1 Works**, noise surveys were undertaken in November/December 2024.

7.4.10. The surveys comprised three static unattended monitoring locations and two locations where short-term attended measurements were undertaken. The locations were selected to be representative of the sensitive receptors in the area surrounding the proposed development. The measurement microphones were in the acoustic free-field and a height of 1.5 m above ground level at all positions.

7.4.11. A summary of the survey locations, start and end dates/times and observations of the main noise sources at each location are presented in **Table 7.14** for the unattended measurements and **Table 7.15** for the attended measurements. A plan showing the monitoring locations is presented in **Appendix 7e**.

Table 7.14: Summary of unattended noise monitoring around EMG1 Works

Unattended survey location		Dates		Observations of main noise sources
		Start	End	
L06	Off Main Street on south side of Lockington, representative of R12 and R13	18/11/24	22/11/24*	Road traffic noise on A50/M1 dominant, occasional aircraft overhead
		25/11/24	03/12/24	
L07	On west side of Hilton Hotel next to car park, representative of R14	18/11/24	03/12/24	Road traffic noise on A50 dominant with M1 also contributing, occasional vehicle movements in car park
L08	East of Pritchard Drive on west side of Kegworth, representative of R15 & F01, and for correlation with S04	18/11/24	03/12/24	Road traffic noise on M1 dominant with Derby Road also contributing, occasional aircraft overhead
** The original deployment of L06 suffered a technical fault at 22:13 on 22/11/24. As a result, it was redeployed on 25/11/24 to ensure that sufficient data was collected.*				

Table 7.15: Summary of attended noise monitoring around EMG1 Works

Attended survey location		Dates/times		Observations of main noise sources
		Date	Times	
S03	Off Church Street on east side of Lockington	02/12/24	22:05 - 22:51	Road traffic noise on A50/M1 dominant, airport operational noise, EMG1 rail terminal occasionally just audible.
		03/12/24	03:11 - 03:57	
S04	Close to R16, R17 & F02, to correlate with L08	02/12/24	21:02 - 21:47	Landings at airport dominant, road traffic noise on M1 audible between landings, occasional bus pass on Ashby Road.
		03/12/24	02:15 - 03:00	

7.4.12. A field calibration check was undertaken prior to and following each set of measurements and no significant drift in sensitivity was noted at any location. All the sound level meters (SLMs) and field calibrators used for the survey met the requirements of a Class 1 instrument. All SLMs were within two years of their last laboratory calibrator, and all calibrators within one year. Further details of the monitoring equipment used are given in **Appendix 7f**.

7.4.13. The results of the noise surveys are presented in **Appendix 7g**. Time history graphs have been produced for the unattended monitoring results, and tables have been provided summarising the measured noise levels at the short-term attended monitoring locations.

7.4.14. Regarding the monitoring of weather conditions during the noise surveys, wind speed, wind direction and rainfall rate data has been sourced primarily from the permanent weather station installed at the nearby East Midlands Airport. The area experienced some periods of precipitation and high winds during the survey, particularly as a result of Storm Bert and Storm Conall. The weather data is summarised at the end of **Appendix 7g**.

Identification of background sound levels for operational noise assessment

7.4.15. As discussed in the assessment methodology section above, the assessment of potential noise impacts from operational activity at the **EMG2 Main Site** and **EMG1 Works** site requires the identification of typical background sound levels at the relevant receptors for both the day and night-time periods. They are also needed for the definition of target noise rating levels for fixed plant.

7.4.16. The background sound level is the underlying level of sound over a period and is generally governed by continuous or semi-continuous sound, rather than transient or short-duration noise events. It is represented by the $L_{A90,T}$ metric, where T corresponds to the duration of the individual measurements. BS 4142:2014+A1:2019 states that the selected background sound levels should represent what is typical during the relevant period and that the duration of each measurement should usually be 15 minutes.

7.4.17. To identify the typical background sound levels, the noise survey results and weather data were reviewed and any measured sound levels that were likely to have been affected by high average wind speeds (above 5 m/s), precipitation, the dawn chorus, or other extraneous noise events were excluded from further analysis.

7.4.18. Next, for the unattended monitoring locations, the modal background sound level was identified for the day and night-time periods using statistical analysis, i.e., the most frequently occurring $L_{A90,15min}$ value during the relevant periods. The modal value is considered a good indicator of the typical background sound level.

7.4.19. However, at some locations, the different measured background sound levels are not evenly spread around the modal value and there can be a relatively high number of occasions when a lower value occurs, meaning that the modal value alone may not fully describe the typical level.

7.4.20. To address this possibility, the data for each monitoring location was analysed and the background sound level representing the lower quartile was identified for both the day and night-time periods. This is the value for which 75% of all the measured values were higher. Where this was 3 dB(A) or more below the modal value, this was considered an indication there was unevenness in the spread of the measured levels. In those cases, the lower quartile value has

been used as a sensitivity test for the assessment, in addition to the modal value, to provide a more comprehensive and robust assessment.

7.4.21. Finally, the results were compared with the same analysis of the unedited dataset, i.e., the data with no exclusions for bad weather conditions etc, to ensure that the worst-case levels (i.e., the lowest) were identified.

7.4.22. Based on the results of this analysis, the typical background sound levels together with the sensitivity test background sound levels (where necessary) are presented in **Table 7.16** below for each receptor where operational activity has been assessed and target noise rating levels for fixed plant have been defined.

Table 7.16: Typical background sound levels for operational noise assessment

Receptor		Typical background sound level (dB $L_{A90,15min}$)			
		Modal value		Sensitivity test value	
		Day	Night	Day	Night
R01	The Birches[1]	47	46	42	42
R02	Leonardo Hotel[1]	47	46	42	42
R03	Premier Inn[2]	51	51	-	-
R04	Radisson Blu Hotel[2]	51	51	-	-
R05	Travelodge[3]	52	49	47	-
R06	Woodnook Farm[4]	59	53	-	50
R07	4 Langley Close[5]	44	44	-	-
R08	17 Clements Gate[5]	44	44	-	-
R09	2 Old Hall Court[6]	43	43	-	-
R10	18 Grimes Gate[6]	43	43	-	-
R11	Byland Cottage[1]	47	46	42	42
R12	Daleacre House[7]	45	44	-	-
R13	Hill Farm House[7]	45	44	-	-
R14	Hilton Hotel[8]	59	53	-	-
R15	72 Pritchard Drive[9]	60	55	54	51
R16	24 Windmill Way[10]	59	52	53	48
R17	90 Ashby Road[10]	59	52	53	48
F01	Derby Road[9]	60	55	54	51
F02	Ashby Road[10]	59	52	53	48

[1] Levels from L01 monitor
[2] Levels from L02 monitor
[3] Levels from L03 monitor minus 1 dB based on correlation with S01 monitor
[4] Levels from L04 monitor
[5] Levels from L05 monitor
[6] Levels from L05 monitor minus 1 dB based on correlation with S02 monitor
[7] Levels from L06 monitor
[8] Levels from L07 monitor
[9] Levels from L08 monitor
[10] Levels from L08 monitor minus 1 dB (day) and 3 dB (night) based on correlation with S04 monitor

7.5. Potential Impacts

Construction

7.5.1. The potential effects have been considered separately for the construction works associated with the works at the **EMG2 Main Site** and the **Highways Works** and the **EMG1 Works**, as well as from the **Scheme** as a whole.

EMG2 Main Site and Highways Works

Noise from construction activities

7.5.2. As discussed in the Scope and Methodology of the Assessment section above, the potential significance of construction noise associated with the **EMG2** Main Site and Highway Works has been assessed by comparing predicted noise levels for a selection of timeslices (groups of activities taking place at the same time representing the worst-case in terms of construction noise) to the relevant effect level thresholds for the daytime (core hours), as well as considering the duration of the noise if required.

7.5.3. The predicted noise levels for each construction noise timeslice associated with these activities at the relevant receptors and the subsequent assessment are presented in **Table 7.17** for core hours (see **Appendix 7b** for further details).

Table 7.17: Predictions of construction noise from EMG2 Main Site and Highway Works for selected timeslices and comparison to LOAEL/SOAEL assessment thresholds (core hours)

Receptor ID	Timeslice ID: predicted construction noise level (dB $L_{Aeq,T}$ façade)									>L[1]	>S[2]	Sig[3]
	1	2	3	4	5	6	7	8	9			
R01 The Birches	67	67	67	68	67	67	55	49	53	6	0	**No**
R02 Leonardo Hotel	74	74	74	74	74	74	61	53	61	6	0	**No**
R03 Premier Inn	75	75	75	75	75	75	71	65	70	8	0	**No**
R04 Radisson Blu	75	75	75	75	75	75	66	65	58	7	0	**No**
R05 Travelodge	73	73	74	74	74	74	65	59	64	6	0	**No**
R06 Woodnock Farm	59	59	60	60	60	60	53	51	49	0	0	**No**
R07 4 Langley Close	72	72	72	72	72	72	58	53	57	6	0	**No**
R08 17 Clements Gate	66	66	66	66	66	66	53	49	52	6	0	**No**
R09 2 Old Hall Court	67	67	67	67	67	67	53	47	52	6	0	**No**
R10 18 Grimes Gate	65	65	65	65	65	65	52	48	51	0	0	**No**
R11 14 Grimes Gate	64	64	64	64	64	64	52	46	51	0	0	**No**
R14 Hilton West	70	70	70	70	70	70	35	31	33	6	0	**No**
R18 Dowells Barn	57	57	57	57	57	57	16	12	15	0	0	**No**
R19 Long Lane Farm	60	60	60	60	60	60	30	27	28	0	0	**No**

[1] Indicates the number of timeslices that exceed the LOAEL at that receptor.
[2] Indicates the number of timeslices that exceed the SOAEL at that receptor, potentially indicating a significant effect depending on the duration of any exceedances.
[3] Indicates whether a significant effect has been predicted.

7.5.4. As can be seen in **Table 7.17**, none of the predicted construction noise levels for the selected timeslices exceed the SOAEL and therefore no significant effects are expected from construction activities associated with the **EMG2 Main Site** or **Highway Works**. There are exceedances of the LOAEL which indicate that some short-term temporary adverse effects may occur at the relevant receptors.

7.5.5. It should be noted that the higher predicted noise levels (e.g., around 70 dB(A) and above at receptors R02-R05, R07 and R14) are primarily due to the bulk earthworks activity at the **EMG2 Main Site** which, due to the worst-case assumptions, is assumed to be in an area of the site close to each receptor whenever they are active (i.e., in timeslices 1 to 6). In reality, the activity will move around the site and the higher levels will occur for a relatively short amount of time.

7.5.6. As previously stated, it is likely that some **Highways Works** will need to take place outside of core hours due to highway constraints, but due to the level of detail required, it is not possible to undertake predictions of the likely effects at this time. Considering the predicted construction noise levels for the individual works packages for core hours as a worst-case, if the works packages taking place in locations close to sensitive receptors were to take place out of hours or during the night, then depending on the exact works being undertaken (which may be limited compared to core hours working) and what time they took place, then it is possible that both the relevant LOAEL and SOAEL thresholds for noise could be exceeded. Nevertheless, the duration of any such works (in terms of the number of days they may take place at the same location) is expected to be limited, and therefore it is considered that while short-term temporary adverse effects may occur in such situations, it is unlikely that they would be significant. Full details of such works will be provided in the relevant P-CEMP.

Noise from construction road traffic

7.5.7. [This section to be completed on receipt of traffic data].

Vibration from construction activities

7.5.8. As discussed in the Scope and Methodology of the Assessment section above, the potential significance of construction vibration has been considered in two ways: in terms of potential damage to buildings and other structures, as well as potential distance. Following a review of the construction plant to be used (see **Appendix 7b**), the use of vibratory compaction for the **EMG2 Main Site** works and the **Highways Works** was identified as the only activity where potentially significant levels of vibration might be generated at receptors.

7.5.9. The predicted vibration levels for both uses of vibratory compaction (the vibratory roller types are different) in terms of both PPV (for potential damage) and VDV (for disturbance) at the closest receptors are presented in **Table 7.18**.

Table 7.18: Predictions of construction vibration arising from the EMG2 Main Site and Highway Works

Receptor ID	Predicted construction vibration level from vibratory compaction			
	EMG2 Main Site works (distance 70 m)		**Highways Works** (distance 45 m)	
	VDV[a] m/s$^{1.75}$	**PPV[b] mm/s**	**VDV[a] m/s$^{1.75}$**	**PPV[b] mm/s**
R03 Premier Inn	0.37	1.0	0.17	0.5
R04 Radisson Blu				

[a] Predictions include correction for potential amplification at upper floors, and incorporate assumed used of plant over day (e.g., on-time, area covered etc).
[b] Predictions at foundation level.

7.5.10. As can be seen in Table **7.18**, the predicted levels of vibration using the PPV metric are well below the conservative threshold of 3 mm/s selected to indicate the onset of potential damage. On this basis, no significant effects are expected in terms of potential damage as a result of construction vibration.

7.5.11. With respect to disturbance, predicted VDV level due to vibratory compaction as part of the **Highways Works** is below the LOAEL for the day period and therefore no significant or otherwise adverse effects are expected. The predicted VDV level due to the **EMG2 Main Site** works is above the day period LOAEL but below the SOAEL and therefore no significant effects are expected as a result, though some short-term temporary adverse effects may occur at the relevant receptors when vibratory compaction is taking place at the closest point to them.

7.5.12. As previously stated, it is likely that some **Highways Works** will need to take place outside of the day period hours due to highway constraints, but due to the level of detail required, it is not possible to undertake predictions of the likely effects at this time. Considering the predicted construction vibration levels in **Table 7.18** as a worst-case, if the works packages taking place in locations close to sensitive receptors were to take place out of hours or during the night, then depending on the exact works being undertaken (which may be limited compared to core hours working) and what time they took place, then it is possible that the relevant LOAEL threshold for vibration could be exceeded. On this basis, no significant effects are predicted, though some short-term temporary adverse effects may occur in such situations. Full details of such works will be provided in the relevant P-CEMPs.

EMG1 Works

Noise from construction activities

7.5.13. As discussed in the Scope and Methodology of the Assessment section above, the potential significance of construction noise associated with the **EMG1 Works** has been assessed by comparing predicted noise levels for a selection of timeslices (groups of activities taking place at the same time representing the worst-case in terms of construction noise) to the relevant effect level thresholds for the daytime (core hours), as well as considering the duration of the noise if required.

7.5.14. The predicted noise levels for each construction noise timeslice associated with **EMG1 Works** activities at the relevant receptors and the subsequent assessment are presented in **Table 7.19** for core hours (see **Appendix 7b** for further details).

Table 7.19: Predictions of construction noise from EMG1 Works for selected timeslices and comparison to LOAEL/SOAEL assessment thresholds (core hours)

Receptor ID	Timeslice ID: predicted construction noise level (dB $L_{Aeq,T}$ façade)					>L[1]	>S[2]	Sig[3]
	4	5	6	7	8			
R12 Main Street	53	36	35	35	35	0	0	**No**
R13 Church Street	60	40	38	38	38	0	0	**No**
R14 Hilton West	61	41	40	40	40	0	0	**No**
R15 Pritchard Drive	52	36	34	34	34	0	0	**No**
R16 Windmill Way	55	37	35	35	35	0	0	**No**
R17 Ashby	51	34	32	32	32	0	0	**No**
F01 Derby Road	52	37	35	35	35	0	0	**No**
F02 Ashby Road	52	37	35	35	35	0	0	**No**

[1] Indicates the number of timeslices that exceed the LOAEL at that receptor.
[2] Indicates the number of timeslices that exceed the SOAEL at that receptor, potentially indicating a significant effect depending on the duration of any exceedances.
[3] Indicates whether a significant effect has been indicated.

7.5.15. As can be seen in **Table 7.19**, none of the predicted construction noise levels for the selected timeslices exceed the LOAEL and therefore no significant or otherwise adverse effects are expected from construction activities associated with the **EMG1 Works**. This is primarily due to the scale of the works, and the distance between them and the relevant receptors.

Noise from construction road traffic

7.5.16. [This section to be completed on receipt of traffic data].

Vibration from construction activities

7.5.17. No sensitive receptors have been identified as within 100 m of the **EMG1 Works**. On that basis, no significant or otherwise adverse effects are expected due to vibration due from the associated construction activities.

Scheme (in combination)

Noise from construction activities

7.5.18. As discussed in the Scope and Methodology of the Assessment section above, the potential significance of construction noise associated with the **Scheme** as a whole has been assessed by comparing predicted noise levels for a selection of timeslices (groups of activities taking place at the same time representing the worst-case in terms of construction noise) to the relevant effect level thresholds for the daytime (core hours), as well as considering the duration of the noise if required.

7.5.19. The predicted noise levels for each construction noise timeslice associated with **Scheme** works activities at the relevant receptors and the subsequent assessment are presented in **Table 7.20** for core hours (see **Appendix 7b** for further details).

Table 7.20: Predictions of construction noise from Scheme for selected timeslices and comparison to LOAEL/SOAEL assessment thresholds (core hours)

Receptor ID	Timeslice ID: predicted construction noise level (dB $L_{Aeq,T}$ façade)									>L[1]	>S[2]	Sig[3]
	1	2	3	4	5	6	7	8	9			
R01 The Birches	67	67	67	68	67	67	55	49	53	6	0	**No**
R02 Leonardo Hotel	74	74	74	74	74	74	61	53	61	6	0	**No**
R03 Premier Inn	75	75	75	75	75	75	71	65	70	8	0	**No**
R04 Radisson Blu	75	75	75	75	75	75	66	65	58	7	0	**No**
R05 Travelodge	73	73	74	74	74	74	65	58	65	6	0	**No**
R06 Woodnock Farm	59	59	60	60	60	60	53	51	49	0	0	**No**
R07 4 Langley Close	72	72	72	72	72	72	58	53	57	6	0	**No**
R08 17 Clements Gate	66	66	66	66	66	66	53	49	52	6	0	**No**
R09 2 Old Hall Court	67	67	67	67	67	67	53	47	52	6	0	**No**
R10 18 Grimes Gate	65	65	65	65	65	65	52	48	51	0	0	**No**
R11 14 Grimes Gate	64	64	64	64	64	64	52	46	51	0	0	**No**
R12 Main Street	49	49	50	55	50	50	38	36	33	0	0	**No**
R13 Church Street	56	56	56	61	56	56	40	39	33	0	0	**No**
R14 Hilton West	70	70	70	71	70	70	41	41	33	6	0	**No**
R15 Pritchard Drive	55	55	55	57	55	55	37	35	33	0	0	**No**
R16 Windmill Way	59	59	59	60	59	59	40	38	36	0	0	**No**
R17 Ashby	55	55	56	57	56	56	40	37	37	0	0	**No**
R18 Dowells Barn	57	57	57	57	57	57	26	25	15	0	0	**No**
R19 Long Lane Farm	60	60	60	60	60	60	32	30	28	0	0	**No**
F01 Derby Road	57	57	57	58	57	57	39	37	34	0	0	**No**
F02 Ashby Road	59	59	59	60	59	59	40	38	37	0	0	**No**

[1] Indicates the number of timeslices that exceed the LOAEL at that receptor.
[2] Indicates the number of timeslices that exceed the SOAEL at that receptor, potentially indicating a significant effect depending on the duration of any exceedances.
[3] Indicates whether a significant effect has been predicted.

7.5.20. As can be seen in **Table 7.20**, none of the predicted construction noise levels for the selected timeslices exceed the SOAEL and therefore no significant effects are expected from construction activities associated with the **Scheme**. There are exceedances of the LOAEL which indicate that some short-term temporary adverse effects may occur at the relevant receptors. Based on the selected timeslices, while there are some increases in predicted construction noise levels when comparing the combined **Scheme** results to separate results for the **EMG2** works and the **EMG1 Works**, no additional adverse effects are predicted.

7.5.21. As for the **EMG2** works, the higher predicted noise levels (e.g., around 70 dB(A) and above at receptors R02-R05, R07 and R14) are primarily due to the bulk earthworks activity at the **EMG2 Main Site** which, due to the worst-case assumptions, is assumed to be in an area of the site close to each receptor whenever they are active (i.e., in timeslices 1 to 6). In reality, the activity will move around the site and the higher levels will occur for a relatively short amount of time.

7.5.22. As the **Highways Works** is the only component expected to require works to take place outside of core hours due to highways constraints, the assessment as detailed for the **EMG2** works above remains unchanged when considering the **Scheme**, i.e., that it is possible that both the relevant LOAEL and SOAEL thresholds for noise cold be exceeded, but as the duration of such works is expected to be limited, it is considered that while short-term temporary adverse effects may occur, it is unlikely that they would be significant. Full details of such works will be provided in the relevant P-CEMPs.

Noise from construction road traffic

7.5.23. [This section to be completed on receipt of traffic data].

Vibration from construction activities

7.5.24. As no significant or otherwise adverse effects have been predicted due to vibration associated with the **EMG1 Works**, the potential significance of construction vibration associated with the **Scheme** is as described for the **EMG2** works above, i.e., no significant effects are expected, but some short-term temporary adverse effects may occur at the relevant receptors during both the day and, with respect of any **Highways Works** that are required to take place outside of the day due to highway constraints, night periods.

Operational

7.5.25. The potential effects have been considered separately for the operational activities associated with the **EMG2 Main Site** and the **EMG1 Works**, as well as in terms of the **Scheme** as a whole.

EMG2 Main Site

Noise from operational road traffic

7.5.26. [This section to be completed on receipt of traffic data].

Noise from operational activity at the EMG2 Main Site

7.5.27. As discussed in the Scope and Methodology of the Assessment section above, the potential significance of noise associated with the operation of the **EMG2 Main Site** has been assessed based on the principles of the methodology described in BS 4142:2014+A1:2019 for the peak periods of operation during the day and night. The predicted noise is based on HGV activities.

7.5.28. In terms of applying a correction to the predicted noise levels if certain acoustic features are present at the receptor locations, it is noted that the surrounding area includes significant sources of road traffic noise (the M1, A42 and A453) and aircraft noise from East Midlands Airport. Nevertheless, the operational noise may have other sound characteristics that are readily distinctive against the residual acoustic environment. To account for this, when a predicted noise level is 5 dB or less below the typical background sound level, a penalty of +3 dB has been added to derive the rating level used for the assessment.

7.5.29. The predicted rating levels for operational noise from the **EMG2 Main Site** at the relevant receptors are presented in **Table 7.21** for the peak hour of the day and **Table 7.22** for the peak 15 minutes of the night, together with the typical and (where relevant) sensitivity test

background sound level for each receptor and the differences between the values. **Table 7.22** also includes the predicted noise level from individual noise events. As previously noted, the results represent the worst-case (i.e., the highest) based on the layout options considered.

Table 7.21: Predictions of operational noise from EMG2 Main Site for day and comparison of rating levels with background sound levels

Receptor ID	Predicted RL[1,2], dB $L_{Ar,TR}$	Typical BSL[3], dB $L_{A90,15min}$	RL – Typical BSL	Sensitivity test (ST) BSL, dB $L_{A90,15min}$	RL – ST BSL	Sig[4]
R01	34	47	**-13**	42		**No**
R02	45	47	**-2**	42	**3**	**No**
R03	54	51	**3**	-	-	**No**
R04	42	51	**-9**	-	-	**No**
R05	44	52	**-8**	47	**-3**	**No**
R06	36	59	**-23**	-	-	**No**
R07	42	44	**-2**	-	-	**No**
R08	38	44	**-6**	-	-	**No**
R09	41	43	**-2**	-	-	**No**
R10	37	43	**-6**	-	-	**No**
R11	35	47	**-12**	42	**-7**	**No**

[1] RL stands for rating level; 3 dB has been added to derive the rating level where the predicted noise level is 5 dB or less below the typical background sound level.
[2] Rating levels for the day have been predicted at a height of 1.5 m, except for hotels where the levels represent the worst-case floor.
[3] BSL stands for background sound level.
[4] Indicates whether a significant effect has been predicted.

Table 7.22: Predictions of operational noise from EMG2 Main Site for night and comparison of rating levels with background sound levels

Receptor ID	Predicted RL[1,2], dB $L_{Ar,TR}$	Typical BSL[3], dB $L_{A90,15min}$	RL – Typical BSL	Sensitivity test (ST) BSL, dB $L_{A90,15min}$	RL – ST BSL	INEL[4], dB L_{AFmax} façade	Sig[5]
R01	33	46	**-13**	42	**-9**	**48**	**No**
R02	40	46	**-6**	42	**-2**	**56**	**No**
R03	53	51	**2**	-	-	**66**	**No**
R04	40	51	**-11**	-	-	**51**	**No**
R05	42	49	**-7**	-	-	**57**	**No**
R06	35	53	**-18**	50	**-15**	**45**	**No**
R07	43	44	**-1**	-	-	**54**	**No**
R08	38	44	**-6**	-	-	**50**	**No**
R09	36	43	**-7**	-	-	**47**	**No**
R10	35	43	**-8**	-	-	**46**	**No**
R11	33	46	**-13**	42	**-9**	**44**	**No**

[1] RL stands for rating level; 3 dB has been added to derive the rating level where the predicted noise level is 5 dB or less below the typical background sound level.
[2] Rating levels for the night have been predicted at a height of 4.5 m, except for hotels where the levels represent the worst-case floor.
[3] BSL stands for background sound level.
[4] INEL stands for individual noise event level.
[5] Indicates whether a significant effect has been predicted.

7.5.30. As can be seen in **Table 7.21** and **Table 7.22**, none of the predicted rating levels indicate a significant adverse impact (i.e., where the rating level exceeds the background sound level by around 10 dB), and, in **Table 7.22**, none of the predicted individual noise event levels exceed the SOAEL of 70 dB L_{AFmax}. Therefore, no significant effects are expected from operational noise associated with the **EMG2 Main Site**.

7.5.31. At R02 Leonardo Hotel, while the predicted daytime rating level is below the typical background sound level by 2 dB, it exceeds the sensitivity test background sound level by 3 dB which could indicate the potential for adverse effects. However, the predicted rating level is 45 dB $L_{Ar,Tr}$; hotels invariably have alternative methods of ventilation and cooling, particularly when adjacent to an airport, but assuming a partially open window as a worst-case, the corresponding internal level would be around 33 dB(A), including the +3 dB penalty. This is below the LOAEL for internal noise levels as stated in **Table 7.9**. On this basis, no adverse effects are expected at this receptor.

7.5.32. At R03 Premier Inn, the predicted daytime rating level exceeds the typical background sound level by 3 dB and the night-time typical background sound level by 2 dB, while the predicted individual noise event level exceeds the LOAEL by 6 dB. This indicates that long-term permanent adverse effects may occur at this receptor, although they are not considered significant.

7.5.33. It should be noted that the results for receptors R02 and R03 are due to the alternate layout considered, where the Units 5b and 6 as shown on the illustrative masterplan have been rotated so that the service yards are on the north side, facing the two hotels.

Noise from fixed plant at the EMG2 Main Site

7.5.34. Target noise rating levels for fixed plant at all relevant receptors are defined under the corresponding **Scheme** heading below (the target levels do not change when considering the components separately).

EMG1 Works

Noise from operational road traffic

7.5.35. [This section to be completed on receipt of traffic data].

Noise from operational activity at the EMG1 Works

7.5.36. As discussed in the Scope and Methodology of the Assessment section above, the potential significance of noise associated with the operation of the **EMG1 Works** has been assessed based on the principles of the methodology described in BS 4142:2014+A1:2019 for the peak

periods of operation during the day and night. The predicted noise is based on HGV activities and use of the proposed gantry cranes.

7.5.37. In terms of applying a correction to the predicted noise levels if certain acoustic features are present at the receptor locations, it is noted that the surrounding area includes significant sources of road traffic noise (the M1, A50 and A453), aircraft noise from East Midlands Airport, as well as the existing **EMG1** Strategic rail freight interchange. Nevertheless, the operational noise may have other sound characteristics that are readily distinctive against the residual acoustic environment. To account for this, when a predicted noise level is 5 dB or less below the typical background sound level, a penalty of +3 dB has been added to derive the rating level used for the assessment.

7.5.38. The predicted rating levels for operational noise from the **EMG1 Works** at the relevant receptors are presented in **Table 7.23** for the peak hour of the day and **Table 7.24** for the peak 15 minutes of the night, together with the typical and (where relevant) sensitivity test background sound level for each receptor and the differences between the values. **Table 7.24** also includes the predicted noise level from individual noise events. As previously noted, the results represent the worst-case (i.e., the highest) based on the layout options considered.

Table 7.23: Predictions of operational noise from EMG1 Works for day and comparison of rating levels with background sound levels

Receptor ID	Predicted RL[1,2], dB $L_{Ar,TR}$	Typical BSL[3], dB $L_{A90,15min}$	RL – Typical BSL	Sensitivity test (ST) BSL, dB $L_{A90,15min}$	RL – ST BSL	Sig[4]
R12	28	45	**-17**	-	-	**No**
R13	32	45	**-13**	-	-	**No**
R14	38	59	**-21**	-	-	**No**
R15	32	60	**-28**	54	**-22**	**No**
R16	36	59	**-23**	53	**-17**	**No**
R17	33	59	**-26**	53	**-20**	**No**
F01	34	60	**-26**	54	**-20**	**No**
F02	36	59	**-23**	53	**-17**	**No**

[1] RL stands for rating level; 3 dB has been added to derive the rating level where the predicted noise level is 5 dB or less below the typical background sound level.
[2] Rating levels for the day have been predicted at a height of 1.5 m, except for hotels where the levels represent the worst-case floor.
[3] BSL stands for background sound level.
[4] Indicates whether a significant effect has been predicted.

Table 7.24: Predictions of operational noise from EMG1 Works for night and comparison of rating levels with background sound levels

Receptor ID	Predicted RL[1,2], dB $L_{Ar,TR}$	Typical BSL[3], dB $L_{A90,15min}$	RL – Typical BSL	Sensitivity test (ST) BSL, dB $L_{A90,15min}$	RL – ST BSL	INEL[4], dB L_{AFmax} façade	Sig[5]
R12	30	44	**-14**	-	-	**45**	No
R13	34	44	**-10**	-	-	**48**	No
R14	39	53	**-14**	-	-	**57**	No
R15	35	55	**-20**	51	**-16**	**51**	No
R16	37	52	**-15**	48	**-11**	**53**	No
R17	36	52	**-16**	48	**-12**	**51**	No
F01	37	55	**-18**	51	**-14**	**52**	No
F02	38	52	**-14**	48	**-10**	**52**	No

[1] RL stands for rating level; 3 dB has been added to derive the rating level where the predicted noise level is 5 dB or less below the typical background sound level.
[2] Rating levels for the night have been predicted at a height of 4.5 m, except for hotels where the levels represent the worst-case floor.
[3] BSL stands for background sound level.
[4] INEL stands for individual noise event level.
[5] Indicates whether a significant effect has been predicted.

7.5.39. As can be seen in **Table 7.23** and **Table 7.24**, none of the predicted rating levels indicate an adverse impact (i.e., where the rating level exceeds the background sound level by around 5 dB), and, in **Table 7.24**, none of the predicted individual noise event levels exceed the LOAEL of 60 dB L_{AFmax}. Therefore, no significant or otherwise adverse effects are expected from operational noise associated with the **EMG1 Works**.

7.5.40. To provide further context to the potential impact of the **EMG1 Works** in combination with existing operations at **EMG1**, the predicted rating levels have been logarithmically summed with the existing noise levels and the increase calculated. To provide a worst-case assessment, the lowest measured existing noise levels for both the day and night periods have been used, so that the additional noise will result in the largest increase. The results of this are presented in **Table 7.25** for the day and **Table 7.26** for the night.

Table 7.25: Increase in noise level when adding predicted rating level for EMG1 Works to lowest measured existing noise level for day

Receptor ID	Predicted RL[1,2], dB $L_{Ar,TR}$	Lowest existing noise level, dB $L_{Aeq,15min}$	Sum of RL and existing level, dB $L_{Aeq,15min}$	Increase over lowest existing noise level, dB
R12	28	42	42.2	**0.2**
R13	32	42	42.4	**0.4**
R14	38	58	58.0	**0.0**
R15	32	49	49.1	**0.1**
R16	36	49	49.2	**0.2**
R17	33	49	49.1	**0.1**
F01	34	49	49.1	**0.1**
F02	36	49	49.2	**0.2**

[1] RL stands for rating level; 3 dB has been added to derive the rating level where the predicted noise level is 5 dB or less below the typical background sound level.
[2] Rating levels for the day have been predicted at a height of 1.5 m, except for hotels where the levels represent the worst-case floor.

Table 7.25: Increase in noise level when adding predicted rating level for EMG1 Works to lowest measured existing noise level for night

Receptor ID	Predicted RL[1,2], dB $L_{Ar,TR}$	Lowest existing noise level, dB $L_{Aeq,15min}$	Sum of RL and existing level, dB $L_{Aeq,15min}$	Increase over lowest existing noise level, dB
R12	30	41	41.3	**0.3**
R13	34	41	41.8	**0.8**
R14	39	54	54.1	**0.1**
R15	35	47	47.3	**0.3**
R16	37	47	47.4	**0.4**
R17	36	47	47.3	**0.3**
F01	37	47	47.4	**0.4**
F02	38	47	47.5	**0.5**

[1] RL stands for rating level; 3 dB has been added to derive the rating level where the predicted noise level is 5 dB or less below the typical background sound level.
[2] Rating levels for the night have been predicted at a height of 4.5 m, except for hotels where the levels represent the worst-case floor.

7.5.41. As can be seen in **Table 7.24** and **Table 7.25**, when considering operational noise from the **EMG1 Works** in the context of the existing noise levels, including current operations at **EMG1**, the worst-case increase is below 1 dB during both the day and night. This degree of change is not considered to be perceptible.

Noise from fixed plant at the EMG1 Works

7.5.42. Target noise rating levels for fixed plant at all relevant receptors are defined under the corresponding **Scheme** heading below (the target levels do not change when considering the components separately).

Scheme (in combination)

Noise from operational road traffic

7.5.43. [This section to be completed on receipt of traffic data].

Noise from operational activity at the Scheme

7.5.44. As discussed in the Scope and Methodology of the Assessment section above, the potential significance of noise associated with the operation of the **Scheme** as a whole has been assessed based on the principles of the methodology described in BS 4142:2014+A1:2019 for the peak periods of operation during the day and night.

7.5.45. The approach to applying a correction to the predicted noise levels if certain acoustic features are present at the receptor locations is the same as for the **EMG2 Main Site** and **EMG1 Works** assessments detailed above.

7.5.46. The predicted rating levels for operational noise from the **EMG1 Works** at the relevant receptors are presented in **Table 7.26** for the peak hour of the day and **Table 7.27** for the peak 15 minutes of the night, together with the typical and (where relevant) sensitivity test background sound level for each receptor and the differences between the values. **Table 7.27** also includes the predicted noise level from individual noise events. As previously noted, the results represent the worst-case (i.e., the highest) based on the layout options considered.

Table 7.26: Predictions of operational noise from the Scheme for day and comparison of rating levels with background sound levels

Receptor ID	Predicted RL[1,2], dB $L_{Ar,TR}$	Typical BSL[3], dB $L_{A90,15min}$	RL – Typical BSL	Sensitivity test (ST) BSL, dB $L_{A90,15min}$	RL – ST BSL	Sig[4]
R01	33	47	**-14**	42	**-9**	**No**
R02	45	47	**-2**	42	**3**	**No**
R03	54	51	**3**	-	**-**	**No**
R04	42	51	**-9**	-	**-**	**No**
R05	42	52	**-10**	47	**-5**	**No**
R06	35	59	**-24**	-	**-**	**No**
R07	42	44	**-2**	-	**-**	**No**
R08	37	44	**-7**	-	**-**	**No**
R09	36	43	**-7**	-	**-**	**No**
R10	35	43	**-8**	-	**-**	**No**
R11	33	47	**-14**	42	**-9**	**No**
R12	28	45	**-17**	-	**-**	**No**
R13	32	45	**-13**	-	**-**	**No**
R14	38	59	**-21**	-	**-**	**No**
R15	32	60	**-28**	54	**-22**	**No**
R16	36	59	**-23**	53	**-17**	**No**

R17	36	59	**-23**	53	**-17**	**No**
F01	34	60	**-26**	54	**-20**	**No**
F02	36	59	**-23**	53	**-17**	**No**

[1] RL stands for rating level; 3 dB has been added to derive the rating level where the predicted noise level is 5 dB or less below the typical background sound level.
[2] Rating levels for the day have been predicted at a height of 1.5 m, except for hotels where the levels represent the worst-case floor.
[3] BSL stands for background sound level.
[4] Indicates whether a significant effect has been predicted.

Table 7.27: Predictions of operational noise from the Scheme for night and comparison of rating levels with background sound levels

Receptor ID	Predicted RL[1,2], dB $L_{Ar,TR}$	Typical BSL[3], dB $L_{A90,15min}$	RL – Typical BSL	Sensitivity test (ST) BSL, dB $L_{A90,15min}$	RL – ST BSL	INEL[4], dB L_{AFmax} façade	Sig[5]
R01	33	46	**-13**	42	**-9**	**48**	**No**
R02	40	46	**-6**	42	**-2**	**56**	**No**
R03	53	51	**2**	-	**-**	**66**	**No**
R04	40	51	**-11**	-	**-**	**51**	**No**
R05	42	49	**-7**	-	**-**	**57**	**No**
R06	35	53	**-18**	50	**-15**	**45**	**No**
R07	43	44	**-1**	-	**-**	**54**	**No**
R08	38	44	**-6**	-	**-**	**50**	**No**
R09	36	43	**-7**	-	**-**	**47**	**No**
R10	35	43	**-8**	-	**-**	**46**	**No**
R11	33	46	**-13**	42	**-9**	**44**	**No**
R12	30	44	**-14**	-	**-**	**45**	**No**
R13	34	44	**-10**	-	**-**	**48**	**No**
R14	39	53	**-14**	-	**-**	**57**	**No**
R15	35	55	**-20**	51	**-16**	**51**	**No**
R16	37	52	**-15**	48	**-11**	**53**	**No**
R17	36	52	**-16**	48	**-12**	**51**	**No**
F01	37	55	**-18**	51	**-14**	**52**	**No**
F02	38	52	**-14**	48	**-10**	**52**	**No**

[1] RL stands for rating level; 3 dB has been added to derive the rating level where the predicted noise level is 5 dB or less below the typical background sound level.
[2] Rating levels for the night have been predicted at a height of 4.5 m, except for hotels where the levels represent the worst-case floor.
[3] BSL stands for background sound level.
[4] INEL stands for individual noise event level.
[5] Indicates whether a significant effect has been predicted.

7.5.47. As can be seen in **Table 7.26** and **Table 7.27**, none of the predicted rating levels indicate a significant adverse impact (i.e., where the rating level exceeds the background sound level by around 10 dB), and, in **Table 7.27**, none of the predicted individual noise event levels exceed

the SOAEL of 70 dB L_{AFmax}. Therefore, no significant effects are expected from operational noise associated with the **Scheme**.

7.5.48. Regarding the predicted rating levels exceeding the background sound levels at R02 and R03, and the individual noise event level exceeding the LOAEL at R03, these remain exactly as discussed in the **EMG2 Main Site** section above, i.e., that no adverse effects are expected at R02, and long-term permanent effects may occur at R03, although they are not considered significant.

Noise from fixed plant at the Scheme

7.5.49. Target noise rating levels for fixed plant and substations at all relevant receptors are presented in **Table 7.28** below. The values are cumulative rating levels, i.e., they represent the combined noise level as produced by all fixed plant associated with the **Scheme**, including any corrections for acoustic features if required.

7.5.50. The target noise level has been defined as equal to the typical (or sensitivity test if this is present) background sound level at each receptor, which according to BS 4142:2014+A1:2019 is indication of a low (non-adverse) impact. Note that these are not proposed noise limits, and some exceedances of these values would still meet the requirements of noise policy, especially when context is considered.

Table 7.28: Target noise rating levels for fixed plant and substations

Receptor ID		**Target noise rating levels for fixed plant and substations**	
		Day (07:00 – 23:00), dB $L_{Ar,1hr}$	**Night (23:00 – 07:00), dB $L_{Ar,15min}$**
R01	The Birches	42	42
R02	Leonardo Hotel	42	42
R03	Premier Inn	51	51
R04	Radisson Blu Hotel	51	51
R05	Travelodge	47	49
R06	Woodnook Farm	59	50
R07	4 Langley Close	44	44
R08	17 Clements Gate	44	44
R09	2 Old Hall Court	43	43
R10	18 Grimes Gate	43	43
R11	Byland Cottage	42	42
R12	Daleacre House	45	44
R13	Hill Farm House	45	44
R14	Hilton Hotel	59	53
R15	72 Pritchard Drive	54	51
R16	24 Windmill Way	53	48
R17	90 Ashby Road	53	48
F01	Derby Road	54	51
F02	Ashby Road	53	48

7.5.51. It is proposed that prior the installation of any fixed plant or substations, details of the installation for each building will be submitted to NWLDC for approval as part of the discharge of requirements process. As part of this process, sound from the proposed fixed plant installations

or substations will be predicted and fully assessed using the BS 4142:2014+A1:2019 methodology with respect to the target noise rating levels.

Cumulative

7.5.52. [This section to be completed on receipt of finalised list of cumulative schemes to be considered as part of the assessment].

7.6. Mitigation Measures

Construction

7.6.1. As described in the previous section, no significant effects as a result of construction noise or vibration associated with the **EMG2 Main Site, Highway Works**, **EMG1 Works** or the **Scheme** overall have been predicted.

7.6.2. Nevertheless, some short-term temporary adverse effects are expected during the likely out of hours and night period working with respect to the **Highways Works**. The NPPF states that new development should mitigate and reduce to a minimum potential adverse impacts resulting from noise (and vibration).

7.6.3. To facilitate the management of construction noise and vibration, P-CEMPs will be produced and implemented for each component as required as an additional mitigation measure. The specific noise and vibration controls to be included will be confirmed when a detailed approach to the works has been finalised, details of which will also be included, but they will follow the principal of Best Practicable Means (BPM), and are expected to include the following measures where appropriate:

- Installation of perimeter hoarding to reduce noise at ground level from works taking place within the site;
- Phasing of earthworks to prioritise the construction of any bunding to provide screening of the subsequent works where practicable;
- Selection of appropriate equipment and construction methods, e.g., hydraulic plant will be used in preference to pneumatic plant, and electrically powered rather than internal combustion engine powered, where possible;
- Plant and equipment will be maintained in good working order and fitted with silencers and acoustic panels where appropriate;
- All plant will be switched off when not in use or throttled down between periods of use;
- Acoustic enclosures and temporary hoardings/screens around works will be used where required;
- Works will take place during agreed site hours and there will be appropriate management of working hours for noisier tasks;
- ‘White noise’ type reversing warnings should be used on mobile plant in preference to ‘bleepers’ to minimise intrusion;

- Site personnel instructed on BPM to reduce noise and vibration as part of their site induction training and as required prior to specific work activities;
- Liaison with residents in advance of works commencing and on an ongoing basis to provide information regarding the programme;
- Plant to be located as far as reasonably practicable from noise-sensitive receptors; and
- A noise and vibration monitoring regime may be implemented focusing on the nearest/most exposed receptors and including trigger levels to ensure significant levels of noise and vibration are avoided.

Operational

7.6.4. As discussed above, no significant effects as a result of operational noise from the **EMG2 Main Site**, **EMG1 Works** or the **Scheme** overall have been predicted. However, it is possible that, depending on the final layout of the **EMG2 Main Site**, long-term permanent adverse effects may occur at the receptors to the north, e.g., at R03 Premier Inn.

7.6.5. Following the NPPF requirement for potentially adverse impacts resulting from noise to mitigated and reduced to a minimum, options for additional mitigation have been tested. As detailed previously, the predicted adverse effects are due to consideration of a scenario where Unit 6 has been rotated so that the service yard is on the north side, facing the receptor. The effect of 3 m high acoustic fencing along the northern boundary of the unit has been modelled. The revised predictions of operational noise are presented in **Table 7.29** and **Table 7.30** for the day and night periods respectively.

Table 7.29: Predictions of operational noise from EMG2 Main Site for day at R03 and comparison of rating levels with background sound levels inc. 3 m high northern barrier for rotated Unit 6

Receptor ID	Predicted RL[1,2], dB $L_{Ar,TR}$	Typical BSL[3], dB $L_{A90,15min}$	RL – Typical BSL	Sensitivity test (ST) BSL, dB $L_{A90,15min}$	RL – ST BSL	Sig[4]
R03	51	51	**0**	-	-	**No**

[1] RL stands for rating level; 3 dB has been added to derive the rating level where the predicted noise level is 5 dB or less below the typical background sound level.
[2] Rating levels for the day have been predicted at a height of 1.5 m, except for hotels where the levels represent the worst-case floor.
[3] BSL stands for background sound level.
[4] Indicates whether a significant effect has been predicted.

Table 7.30: Predictions of operational noise from EMG2 Main Site for night at R03 and comparison of rating levels with background sound levels inc. 3 m high northern barrier for rotated Unit 6

Receptor ID	Predicted RL[1,2], dB $L_{Ar,TR}$	Typical BSL[3], dB $L_{A90,15min}$	RL – Typical BSL	Sensitivity test (ST) BSL, dB $L_{A90,15min}$	RL – ST BSL	INEL[4], dB L_{AFmax} façade	Sig[5]
R03	50	51	**-1**	-	-	**61**	**No**

[1] RL stands for rating level; 3 dB has been added to derive the rating level where the predicted noise level is 5 dB or less below the typical background sound level.
[2] Rating levels for the night have been predicted at a height of 4.5 m, except for hotels where the levels represent the worst-case floor.
[3] BSL stands for background sound level.
[4] INEL stands for individual noise event level.
[5] Indicates whether a significant effect has been predicted.

7.6.6. As can be seen in **Table 7.29** and **Table 7.30**, the predicted rating levels have been reduced by 3 dB and the individual noise event level by 5 dB due to the implementation of the barrier. Neither the day nor night rating levels exceed the corresponding typical background sound levels and no longer indicates a potentially adverse effect. The individual noise event level exceeds the LOAEL by 1 dB; however, this is considered marginal and, considering the location of the hotel, it would certainly not rely on open windows to provide ventilation or cooling. Therefore, with the implementation of the barrier, no significant or otherwise adverse effects are expected from operational noise associated with the **EMG2 Main Site**, or the **Scheme** as a whole.

7.6.7. As stated, this mitigation is based on the alternate layout designed to represent a likely worst case in terms of potential operational noise effects from the **EMG2 Main Site**. It provides a demonstration of how effective mitigation can be implemented, and which can be finalised once the layout is confirmed.

7.7. Residual Effects

Construction

7.7.1. No significant effects from noise or vibration associated with the construction of the **Scheme** have been predicted.

7.7.2. With the implementation of BPM through a P-CEMP, it is anticipated that the short-term temporary adverse effects from the works during the likely out of hours and night period working with respect to the **Highways Works**, would occur less often and the resulting noise and vibration levels would be reduced. However, it is difficult to quantify the reduction that would be achieved at this stage of the development. Therefore, it is considered possible that some short-term temporary adverse effect would remain, though they will have been mitigated and minimised to comply with national policy**.**

Operational

7.7.3. No significant effects from noise or vibration associated with the operation of the **Scheme** have been predicted. Based on the layouts as assessed, with the implementation of a 3 m high barrier

to the north of Unit 6 (where the unit has been rotated to represent a likely worst-case in terms of noise), no otherwise adverse effects would occur.

7.8. Summary of Effects and Conclusions

7.8.1. This chapter of the ES considers the potential noise and vibration impacts and effects that may arise from the construction and operation of the **Scheme**. The effects of the **EMG2 Main Site**, **Highway Works** and the **EMG1 Works** have been considered separately, and in combination in terms of the overall **Scheme**.

7.8.2. The existing noise climate around the site has been quantified through the undertaking of a noise survey. During the survey, the baseline noise conditions in the areas around the **Scheme** are generally, dominated by road traffic, primarily from the M1, A453, A42 and A50, with aircraft serving East Midlands Airport also contributing.

7.8.3. Using worst-case assumptions, construction noise and vibration associated with the **Scheme** has been predicted and assessed at the relevant receptors. The assessment concluded that no likely significant effects were indicated, and that while some short-term temporary adverse effects may occur, primarily at the hotels directly to the north of the **EMG2 Main Site** as well as the residences close to the south-west corner, these could be mitigated and minimised using measures detailed in a P-CEMP to be produced once final details of the relevant works are known.

7.8.4. Noise from operation of the scheme has also been predicted and assessed at the relevant receptors, concluding that no likely significant effects were indicated. Based on a worst-case layout, some long-term permanent adverse effects were indicated at the Premier Inn to the north of the **EMG2 Main Site**. It was demonstrated how these could be mitigated using a 3 m high barrier along the northern boundary of the **EMG2 Main Site**, opposite Unit 6. With this in place, no adverse effects were expected.

7.8.5. Based on the results of the assessment, it is concluded that the **Scheme** complies with the relevant national and local planning policy with respect to noise and vibration.