Tritax Symmetry (Hinckley) Limited

HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

The Hinckley National Rail Freight Interchange Development Consent Order

Project reference TR050007

ES Appendix 10.8 East Midlands Gateway – Rail Freight Terminal – Noise Assessment

Report Prepared by: Vanguardia

Document reference: 6.2.10.8

Revision: 01

December 2019

Planning Act 2008

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

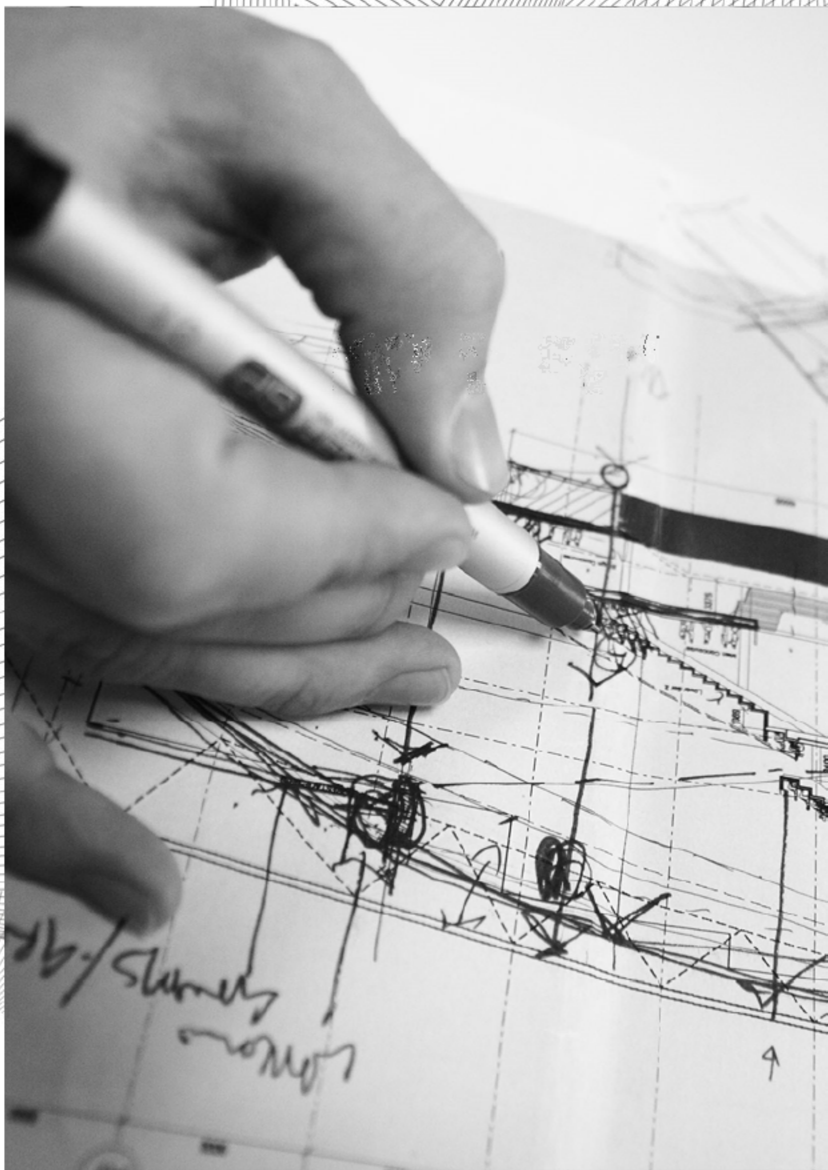
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 Regulation 14

EAST MIDLANDS GATEWAY – RAIL FREIGHT TERMINAL

NOISE ASSESSMENT IN RELATION TO DCO REQUIREMENT 22

VC-103151-EN-RP-0001
R00

DECEMBER 2019



VANGUARDIA

DOCUMENT CONTROL			
DOCUMENT TITLE	NOISE ASSESSMENT IN RELATION TO DCO REQUIREMENT 22	**REVISION**	00
DOCUMENT NUMBER	VC-103151-EN-RP-0001	**ISSUE DATE**	DECEMBER 2019
PROJECT NUMBER	103151	**AUTHOR**	CG
STATUS	ISSUE	**CHECKED**	AT
ISSUED TO	A. MCNAB (MARITIME TRANSPORT)	**PASSED**	AT

REVISION HISTORY

REVISION	NOTES	DATE ISSUED
R00	FIRST ISSUE	3RD DECEMBER 2019

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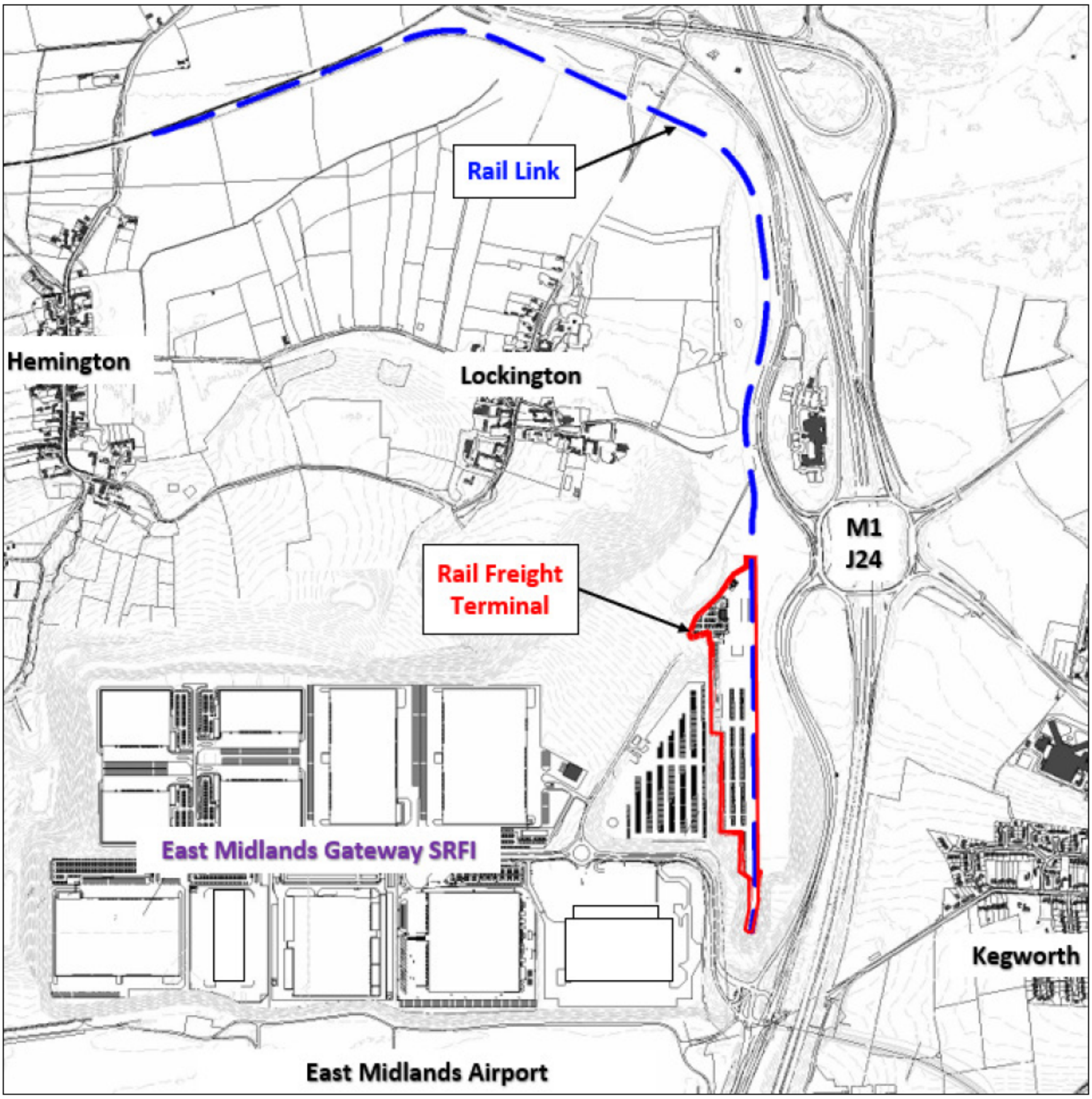
1. INTRODUCTION

1.1. Vanguardia has been appointed to undertake an assessment of the potential noise impacts and effects from operation of the rail freight terminal at the East Midlands Gateway (EMG) Strategic Rail Freight Interchange (SRFI) development, located around 10 miles to the south-west of Nottingham. The boundary of the rail freight terminal within the SRFI is shown in red in Figure 1 below, with the new rail link between the terminal and the Castle Donington railway line shown in dashed blue.

Figure 1 Indicative layout of EMG SRFI with rail freight terminal in red and rail link in dashed blue



1.2. As can be seen in Figure 1, the EMG SRFI site is bounded by East Midlands Airport to the south, and the A453 and M1 to the east with the village of Kegworth on the other side. To the north and west of the site are the villages of Lockington, Hemington and Castle Donnington. At the time of writing, it is understood that four of the eleven currently planned warehouse units at the SRFI have been constructed.

1.3. The rail freight terminal is located at the east of the SRFI, close to the M1 and A453. The primary function of the terminal is to facilitate the loading & unloading of freight trains and heavy goods vehicles (HGVs), with operations taking place during both the day and night. The rail link, once outside of the terminal, runs roughly parallel to the A50 north of J24 of the M1 until the road intersects with the Castle Donnington railway line. Following this, the rail link runs alongside the line until it connects with it. The Castle Donnington line is primarily used by freight trains. The rail freight terminal will also contain office facilities for the operator at the north end. An indicative site layout of the rail freight terminal is presented in Appendix A.

1.4. The Development Consent Order (DCO) for the EMG SRFI, a Nationally Significant Infrastructure Project (NSIP), was granted in January 2016[1]. The requirements for the management of operational noise at SRFI are set out in Schedule 2 of the DCO, under Requirement 22, as follows:

> *"Noise during the operational phase*
>
> *22.—(1) No part of the authorised development may be brought into use until a written scheme has been submitted to and approved in writing by the local planning authority, for the monitoring of noise generated during the operational phases of the development to establish baseline noise conditions and maximum noise levels to be observed. The scheme must specify the locations from where noise must be monitored, the method of noise measurement (which must be in accordance with British Standard 4142:2014 "Methods for rating and assessing industrial and commercial sound" for fixed plant noise and Calculation of Railway Noise 1995, equivalent successor standards or other agreed measurement methodologies appropriate to the circumstances). The written scheme must also specify the periods within which monitoring of operational noise must take place. The written scheme must be implemented and the maximum noise levels identified afterwards be complied with. This monitoring must be subject to annual reviews to establish the frequency of noise monitoring and the need for continued monitoring.*
>
> *(2) Prior to installation, details of all mechanical and ventilation plant must be submitted to and approved by the local planning authority. Any fixed plant or ventilation equipment must be installed and operated in accordance with manufacturers' instructions at all times.*
>
> *(3) Subject to health and safety requirements, broadband reversing alarms must be employed on mobile plant."*

1.5. Applications for NSIP projects are made to the Planning Inspectorate (PINS). However, the Local Planning Authority, in this case North West Leicester District Council (NWLDC), are responsible for ensuring that the requirements of the DCO are implemented. Following the grant of the DCO for

[1] *The East Midlands Gateway Rail Freight Interchange and Highway Order 2016 (Statutory instrument 2016 No 17)*

EMG, Vanguardia liaised closely with NWLDC to agree a suitable process for satisfying Requirement 22 of the DCO. It has been agreed that:

- With regard to operational noise, it is conventional for the proposed user of this type of development, before occupation, to provide the Local Planning Authority with details of the expected operation of the site and the consequential predicted noise impact at those noise-sensitive receptors likely to be affected;
- This assessment can be used to determine the extent to which Government noise policy is being met and whether or not additional specific noise mitigation measures are required;
- In making such a judgement, account would be taken of the existing baseline noise levels (using the information previously available) and the potential cumulative impact taking account of operational noise from the warehouse units on the site; and
- The Local Planning Authority would be asked to approve the proposals prior to the unit being used.

1.6. This report provides an assessment of the expected sound associated with the operation of the rail freight terminal in order to satisfy the points above.

1.7. To assist with the understanding of this report, a glossary of technical terms is provided in Appendix B.

2. ASSESSMENT CRITERIA

NATIONAL PLANNING POLICY FRAMEWORK 2019 (NPPF)

2.1. The latest revision of the NPPF was published in July 2018, with updates made in February 2019 and further amendments in June 2019. It sets out the Government's planning policies for England and how these are expected to be applied. At its heart is an intention to promote more sustainable development.

2.2. Paragraph 180 of the NPPF states that

> *"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;"*

2.3. The NPPF refers to the Noise Policy Statement for England 2010 (NPSE) for advice on the achievement of these policy aims, and particularly in connection with the explanation of "adverse impacts".

NOISE POLICY STATEMENT FOR ENGLAND 2010 (NPSE)

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

2.5. It uses the established concepts of No Observed Effect Level (NOEL) and Lowest Observed Adverse Effect Level (LOAEL). The NPSE extends these concepts by introducing Significant Observed Adverse Effect Level (SOAEL). This is the level above which significant adverse effects on health and quality of life occur. However, the explanatory note to the NPSE states that it is not possible to identify a single objective value to define SOAEL for noise that is applicable to all sources of noise in all situations. It is likely to be different for different noise sources, for different receptors and at different times.

2.6. The NPSE sets out the following noise policy aims, 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.

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

PLANNING PRACTICE GUIDANCE: NOISE 2019 (PPG:N)

2.8. Further guidance in relation to the NPPF has been published on the Government Planning Portal. The PPG:N supports the NPPF by providing a range of advice and includes a noise exposure hierarchy based on the likely average response. This is descriptive in terms of the potential effect on behaviour, rather than provided numerical thresholds.

2.9. In line with the NPPF and the NPSE, the guidance confirms that significant adverse effects should be avoided. At the next level down in the hierarchy, where there is an observed adverse effect, the PPG:N confirms that effects should be mitigated and reduced to a minimum (as far as reasonably practicable). No mitigation measures are required for effects that are considered to be below the lowest observed adverse effect level (LOAEL).

BS 4142:2014+A1:2019 METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

2.10. BS 4142:2014+A1:2019 provides a method for rating and assessing sound of an industrial or commercial nature to determine the potential level of impact of the source at receptor locations.

2.11. The methodology provides an initial estimate of impact based on the difference between the sound from the source being assessed, corrected for acoustic features if required (the rating sound level), and the existing background sound level at the receptor location, which, if relevant, is then modified by any relevant context.

2.12. As mentioned above, the standard indicates that certain features can increase the extent of the impact over that expected from a simple difference in sound levels. These characteristics include tonality, impulsivity, intermittency and other sound characteristics that are readily distinctive against the residual acoustic environment. Where such features are discernible at the assessment location, a character correction should be added to the sound from the source being assessed (the specific sound level) to arrive at the rating sound level.

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

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
- 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.

2.14. The standard also states that while the difference between the rating level and background sound level provides an initial estimate of the impact, other factors should be considered in terms of the context if relevant, such as the absolute noise levels, how the character and level of the specific sound source relates to the existing sound environment, and the façade sound insulation performance of the receptor. For this assessment, the absolute noise levels will be considered using the guideline values presented in BS 8233:2014 Guidance on sound insulation and noise reduction for buildings, where relevant (see below for further details).

2.15. Regarding the assessment of operational sound from freight trains serving the rail freight terminal, it should be noted that the scope of BS 4142 states the following:

> *1.1 This British Standard describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:*
> *…*
> *d) sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from fork-lift trucks, or that from train or ship movements on or around an industrial and/or commercial site.*
>
> *1.3 …*
> *Sound of an industrial and/or commercial nature does not include sound from the passage of vehicles on public roads and railway systems.*

2.16. On this basis, noise from freight trains at the point at which they leave/join the Castle Donnington line to the point at which they enter/exit the rail freight terminal has been included in the assessment of operational sound using the BS 4142 methodology.

2.17. However, as this section of the rail link is approximately 2.5 km in length, it is likely that the "operational" sound at some receptors will be dominated by noise from the movement of the trains along the track, which BS 4142 is not intended to assess in isolation and may therefore overestimate the potential impacts of the resulting noise.

2.18. Considering these points, the approach taken has been to include noise from the movement of freight trains on the 2.5 km long section of rail link between the Castle Donnington line and the rail freight terminal in the initial estimate of impact of operational sound, but, where relevant, to modify this based on the context of the source being predominantly railway noise, therefore maintaining consistency with the BS 4142 methodology.

BS 8233:2014 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

2.19. Regarding consideration of the absolute levels of sound as context, the relevant target values provided in BS 8233:2014 have been referenced where necessary. Table 4 of that standard sets out desirable internal levels to be achieved in dwellings from external sources. Information is also provided regarding desirable levels of sound for external amenity spaces associated with dwellings. The various values from BS 8233:2014 are summarised in Table 1 below.

Table 1 Target indoor ambient noise levels for dwellings from BS 8233:2014

Recommended Level/Situation	Time Period	Desirable Noise Level not to be exceeded(dB)
Inside Bedrooms & Living Rooms (resting)	Day (07:00 – 23:00)	35 dB $L_{Aeq,T}$
Inside Dining Room/area	Day (07:00 – 23:00)	40 dB $L_{Aeq,T}$
Inside Bedrooms (sleeping)	Night (23:00 – 07:00)	30 dB $L_{Aeq,T}$
External Amenity Space	Day (07:00 – 23:00)	50 dB $L_{Aeq,T}$ or 55 dB in noisier environments

2.20. The values shown in Table 1 are generally regarded as LOAEL for steady external noise, i.e. no adverse effects from sound at these thresholds would be expected. If the sound has certain characteristics, it may be appropriate to consider a lower value as the LOAEL.

2.21. BS 8233:2014 also states that "*Where development is considered necessary or desirable…. the internal target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved*."

RAILWAY NOISE INDUCED AWAKENINGS

2.22. Regarding the contextual consideration of the potential effects of railway noise during the night-time, the approach taken has been to consider the probability of a maximum noise level from a train movement giving rise to a noise induced awakening[2]. This method is increasingly being adopted to assess the impact on sleep of maximum noise levels at night and was used in the Environmental Impact Assessment (EIA) of noise from the Northampton Gateway SRFI NSIP project, approved by the Planning Inspectorate (PINS) in October 2019[3].

2.23. The approach is based on determining the internal L_{Amax} value from the freight trains travelling on the rail link outside of the rail freight terminal, and combining it with the expected number of train movements in the night-time period (23.00–07.00) to determine the cumulative probability of those movements causing a noise induced awakening. The type of locomotive, wagons, speed and number of train movements has been advised by the terminal operator. Further details of the methodology are given in Appendix C.

2.24. A significant adverse effect would occur if there is predicted to be at least one noise-induced awakening at night as a result of freight trains travelling on the rail link outside of the rail freight terminal. Below this threshold, no adverse effects would be expected.

WORLD HEALTH ORGANISATION (WHO) GUIDELINES FOR COMMUNITY NOISE 1999

2.25. The WHO Guidelines for Community Noise contains a series of recommended noise exposure levels for different situations. The document provides a precautionary approach and should be used appropriately.

2.26. The guidelines state that, at night, sound pressure levels at the external façades of living spaces should not exceed 60 dB L_{Amax} more than 10–15 times a night, so that people may sleep with bedroom windows open. These values have been obtained by assuming that the reduction from outside to inside with the windows partly open is 15 dB, assuming a façade correction is included in the external noise level. This threshold has been referenced with respect to the assessment of the potential effects of L_{Amax} noise levels from activities taking place within the rail freight terminal.

[2] Awakening here means not just being woken in the conventional sense, but also experiencing a change in sleep state to Sleep Stage S1

[3] Northampton Gateway SRFI DCO application: https://infrastructure.planninginspectorate.gov.uk/projects/east-midlands/northampton-gateway-rail-freight-interchange/

2.27. Although the WHO published an additional set of guidelines in 2018, the Environmental Noise Guidelines for the European Region, this document contains no guidance regarding the potential effects of maximum noise levels.

3. NOISE SENSITIVE RECEPTORS

3.1. The assessment of operational noise from the EMG rail freight terminal, including the rail link, has considered the noise-sensitive receptor locations identified in Table 9.24 of the Environmental Statement (ES), submitted as part of the DCO application for the scheme.

3.2. For the purposes of this assessment, the receptor locations 1 and 3-10 have been selected. The locations of these receptors are shown in Figure 2 with the descriptions as presented in the ES given in Table 2 below.

Figure 2 Locations of Noise Sensitive Receptors around EMG SRFI site

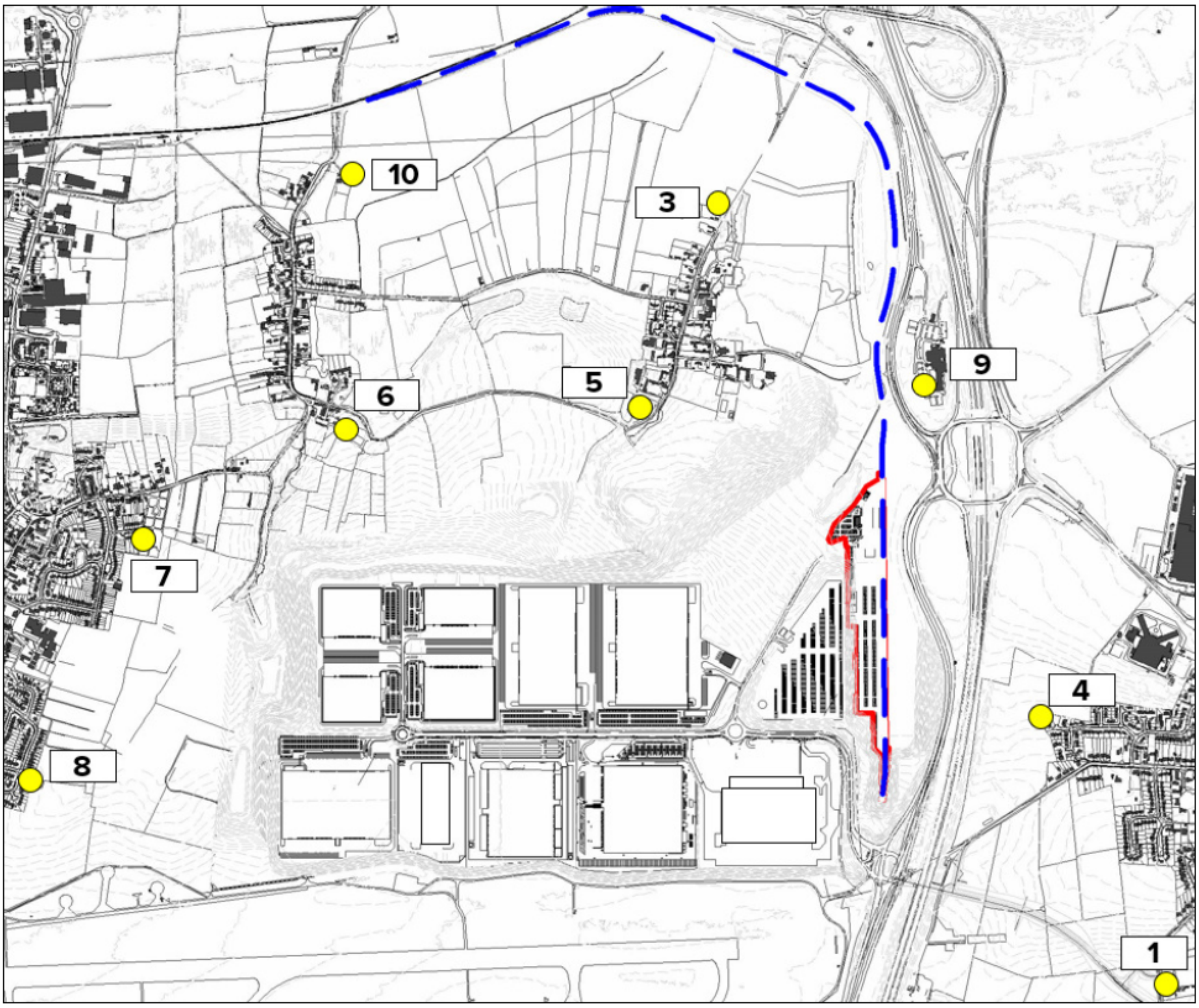


Table 2 Summary of Noise Sensitive Receptor locations

Receptor	Location
1	South Kegworth
3	North Lockington
4	West Kegworth
5	South Lockington
6	South Hemington
7	East Castle Donnington
8	South Castle Donnington
9	Hotel, M1 Junction 24
10	North Hemington

3.3. The receptors represent residential properties/areas, except for receptor 9 which is a Hilton hotel.

3.4. It is noted that outline planning permission for two residential developments on land between Kegworth and the M1 has been granted (NWLDC planning references 12/00323 and 14/00541). Receptor 4 is considered representative of these developments, both in terms of the existing noise environment (discussed in the next section) and the predicted levels of operational sound from the rail freight terminal and rail link.

4. BASELINE CONDITIONS

4.1. As described above, the EMG SRFI site is bounded by East Midlands Airport to the south, and the A453 and M1 to the east with the village of Kegworth on the other side. To the north and west of the site are the villages of Lockington, Hemington and Castle Donnington.

4.2. Further north is the Castle Donnington freight railway line, beyond which lies the A50 dual carriageway. Donnington Park Race Circuit is approximately 3 km south-west of the development.

4.3. The existing noise environment in the area surrounding the EMG SRFI site is characterised by aircraft noise from East Midlands Airport, railway noise from the existing Castle Donnington line, road traffic noise from the M1, A453 and other nearby roads, and occasional activity taking place at Donnington Park Race Circuit.

4.4. For the purposes of this assessment, in order to compare the predicted operational noise levels against the baseline situation (prior to the development of the SRFI), the data obtained from the noise surveys undertaken for the original ES in 2013 have been used. This has been supported by further measurements made in 2016. Details of the 2013 and 2016 noise surveys are summarised below, along with an explanation of how the baseline noise levels used in this assessment have been derived from the measured data.

ES BASELINE NOISE SURVEY - 2013

4.5. For the ES, a baseline noise survey was undertaken in September and October 2013 at 11 locations surrounding the site to collect a representative sample of the existing noise climate at various nearby noise sensitive receptors which could potentially be affected by noise from the proposed SRFI.

4.6. The receptors used for this assessment are 1 and 3-10. At these locations, noise levels were monitored over a period of up to a week. All meters were enclosed in environmental cases. The microphones, fitted with outdoor windshields, were positioned at least 3 metres from any acoustically reflective surface, other than the ground, at a height of approximately 1.2 metres. The ES reports that all sound level meters used for the survey were calibrated at the start and the end of the measurement period and no significant drift in calibration was observed.

4.7. The weather during the survey period was reported as being '*dry with light showers on occasions, but mostly dry with breaks of sunny periods.*'

FURTHER BASELINE NOISE MEASUREMENTS – 2016

4.8. To supplement the previously obtained baseline survey data, further noise monitoring was undertaken between the 11th and 18th July 2016 at locations 1 and 9. All meters were enclosed in environmental cases. The microphones were fitted with outdoor windshields and were positioned at least 3 metres from any acoustically reflective surface, other than the ground, at a height of approximately 1.2 metres. No significant drift in calibration was observed.

4.9. The weather conditions during this survey were largely dry with south-westerly winds which generally had a speed of less than 5 m/s.

4.10. Attended short-term measurements were also undertaken with a handheld sound level meter at the other locations which confirmed that the noise levels had not changed significantly from those measured in 2013.

BASELINE NOISE LEVELS USED FOR ASSESSMENT

4.11. The assessment of potential impacts from the sound of operational activities at the rail freight terminal and rail link is based on BS 4142:2014. The standard states that it is important to ensure that the background sound levels used in the assessment are reliable and suitably represent the particular circumstances and periods of interest. The objective is to quantify what is typical during the periods when the noise sources would be operational, rather than identifying the lowest background sound level.

4.12. Wind direction can have a significant effect on noise levels. This can be particularly apparent when there is a dominant, static, and steady source of noise, such as road traffic on the M1. The effect of the wind is generally greater as the distance from the source increases. Noise levels typically increase downwind of the source and decrease upwind of the source.

4.13. The effect of different wind directions will affect some noise indices used to describe the noise environment more than others. At locations which experience more distant road traffic noise from the M1, the background level (L_{A90}), a measure indicating the constant, underlying level of noise, may vary significantly with wind direction. However, if there is local/nearby road traffic or railway noise at the same location, it is these sources that will usually dominate the ambient noise level (L_{Aeq}). Furthermore, as the local sources are typically closer to the receptors, the results will tend to show less variation with wind direction.

4.14. As the wind direction has a strong influence on the measured sound levels in the area around the EMG SRFI site, the survey results have been split into two data sets based on the wind direction at the time of measurement, as follows:

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

4.15. In general, for positions to the west of the M1, broadly south-westerly winds will result in lower background sound levels (i.e. the wind is "re-directing" the sound away from them). The same wind directions will cause generally higher background sound levels at positions to the east of the M1.

4.16. For positions east of the M1 the opposite is true, i.e. broadly south-westerly winds will result in generally higher background sound levels, and broadly north-easterly winds will cause generally lower background sound levels.

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

4.18. However, in some situations, the background sound level is not evenly distributed about the modal value and there can be quite a few occasions when a lower value occurs.

4.19. To explore whether this feature existed, the following process was adopted. For the measurements made at each monitoring location, the value of the result was identified for which 75% of all the measured values were higher. This value is known as the lower quartile and was determined for both the day and night-time periods. When the lower quartile value was 3 dB(A) or more below the modal value, this was considered an indication that there was unevenness in the distribution of the background sound level. In those cases, the lower quartile value was used as a sensitivity test in the operational sound assessment, in addition to the modal value. This means that a robust approach to the consideration of typical background sound levels in the assessment has been followed.

4.20. Based on this analysis, the background sound levels (L_{A90}) for each monitoring position have been identified for the daytime (07.00 – 23.00) and night-time (23:00 – 07:00) periods. These values are presented in Tables 3 and 4 below.

Table 3 Background Sound Levels - Daytime (07:00 – 23:00)

Monitoring Location	Broadly South-Westerly Winds				Broadly North-Easterly Winds			
	Modal Value	Lower Quartile	Difference	Sens Test Required?	Modal Value	Lower Quartile	Difference	Sens Test Required?
1*	50	49	-1	NO	51	49	-2	NO
3	60	56	-4	YES	60	59	-1	NO
4	61	58	-3	YES	65	54	-11	YES
5	54	54	0	NO	51	49	-2	NO
6	57	56	-1	NO	49	48	-1	NO
7	39	37	-2	NO	46	40	-6	YES
8	44	43	-1	NO	49	46	-3	YES
9*	60	58	-2	NO	60	59	-1	NO
10	58	58	0	NO	52	50	-2	NO

* From additional 2016 monitoring

Table 4 Background Sound Levels - Night-time (23:00 – 07:00)

Monitoring Location	Broadly South-Westerly Winds				Broadly North-Easterly Winds			
	Modal Value	Lower Quartile	Difference	Sens Test Required?	Modal Value	Lower Quartile	Difference	Sens Test Required?
1	50	46	-4	YES	53	52	-1	NO
3	55	50	-5	YES	56	53	-3	YES
4	57	52	-5	YES	52	51	-1	NO
5	50	45	-5	YES	45	45	0	NO
6	47	47	0	NO	45	45	0	NO
7	38	34	-4	YES	46	41	-5	YES
8	40	40	0	NO	49	46	-3	YES
9*	52	51	-1	NO	53	52	-1	NO
10	49	46	-3	YES	47	47	0	NO

* From additional 2016 monitoring

5. OPERATIONAL DETAILS

5.1. As discussed above, the primary function of the rail freight terminal is to facilitate the loading & unloading of freight trains and heavy goods vehicles (HGVs), with operations taking place during both the day (07:00-23:00) and night (23:00-07:00).

5.2. The assessment has been based on the primary sources of operational noise from the rail freight terminal:

- Reach stackers and empty container handlers operating within the terminal, loading & unloading trains and HGVs and moving empty containers;
- HGV manoeuvres within the rail freight terminal; and
- Freight trains moving within the rail freight terminal and along the rail link.

5.3. It is noted that there is no gantry crane operating in the rail freight terminal.

5.4. Other potential sources of noise, such as ventilation plant servicing the office facilities, are unlikely to result in any material effects at receptors and have not been considered.

REACH STACKERS & EMPTY CONTAINER HANDLERS

5.5. The rail freight terminal operator has provided details of the number of reach stackers and empty container handlers expected to be in use during the peak hour of the day and peak 15 minutes of the night, as well as their expected usage (or on-time) during those periods, when the terminal is operating at capacity. These periods correspond the day and night-time assessment periods in BS 4142. The details are presented in the following table:

Table 5 Reach stackers & empty container handlers operating in terminal during peak day and night-time periods

Period	Reach Stackers		Empty Container Handlers	
	Number	On-time	Number	On-Time
Day (1 hour)	6	80%	2	80%
Night (15 minutes)	2	100%	1	100%

5.6. It should be noted that these values represent the peak periods of the day and night, and other periods should contain lower levels of activity and therefore lower levels of operational sound.

5.7. Regarding the source levels used to predict sound from the reach stackers and empty container handlers (ECH) as they move and load/unload containers from trains and HGVs, these are based on details of the units to be used as supplied by the operator and Vanguardia library measurements of similar reach stackers loading & unloading, moving and stacking containers at the Port of Tilbury. The source levels used in the predictions are presented in the following table:

Table 6 Reach stacker & empty container handler source terms used for predictions of operational sound

Activity	Type	Sound Power Level (dB) at Octave-Band Centre Frequencies (Hz)								dB(A)
		63	125	250	500	1000	2000	4000	8000	
Reach Stacker: SANY G Class	$L_{eq,T}$	105	105	104	100	96	99	88	81	104
ECH: SANY SDCY80K/100K	$L_{eq,T}$	109	109	108	104	100	103	92	85	108
Reach Stacker: Container Placement	L_{max}	120	122	121	120	116	115	106	102	122

Note: $L_{eq,T}$ sound power levels have been corrected for appropriate on-times when calculating operational sound levels for day/night periods, i.e. to reflect the time they are active during the assessment periods; see Table 5.

5.8. The reach stacker and ECH sources used for the assessment of operational sound following BS 4142 methodology, represented by the $L_{eq,T}$ source levels, have been modelled at a height of 1.5 m above local ground level. The sources represented by the L_{max} source levels, used for comparison with the WHO Guidelines for Community Noise threshold, have been modelled at a height of 6 m above local ground level, approximately the height of two stacked containers, to represent a likely worst-case in terms of potential screening between the source and the receptor.

HEAVY GOODS VEHICLES

5.9. The rail freight terminal operator has provided details of the number of HGVs expected to be active within the terminal during the peak hour of the day and peak 15 minutes of the night when the terminal is operating at capacity. These periods correspond the day and night-time assessment periods in BS 4142. The details are presented in the following table. The values represent the number of HGVs expected to enter the terminal, be loaded or unloaded, and exit the rail terminal within the periods stated.

Table 7 HGVs operating in terminal during peak day and night-time periods

Peak Hour	No. of HGVs
Day (1 hour)	30
Night (15 minutes)	3

5.10. As above, it should be noted that these values represent the peak periods of the day and night, and other periods should contain lower levels of activity and therefore lower levels of operational sound.

5.11. Regarding the source levels used to predict sound from the HGVs as they move around the terminal, these are based on Vanguardia library measurements of an HGV starting its engine and pulling away from standstill. It has been assumed that this manoeuvre takes place three times for each HGV: once when they depart the holding bays to proceed to the loading/unloading pads, once when they depart the loading/unloading pads, and once when they depart the exit bays. It is understood that no HGVs will be fitted with chillers.

5.12. The source levels used in the predictions are presented in the following table:

Table 8 HGV source terms used for predictions of operational sound

Activity	Type	Sound Power Level (dB) at Octave-Band Centre Frequencies (Hz)								dB(A)
		63	125	250	500	1000	2000	4000	8000	
HGV Starting up & Pulling away	$L_{eq,T}$	107	101	98	97	97	94	87	78	101

Note: HGV $L_{eq,T}$ sound power levels have been corrected for an on-time of one minute when calculating operational sound levels for day/night periods, i.e. to reflect the time they are active during the assessment periods. This corresponds to a -18 dB correction during the day and a -12 dB correction during the night.

5.13. The HGV sources used for the assessment of operational sound following BS 4142 methodology have been modelled at a height of 1 m above local ground level.

FREIGHT TRAINS

5.14. The rail freight terminal operator has provided details of the number of freight trains expected to arrive and depart from the terminal during the peak hour of the day and peak 15 minutes of the night. These periods correspond the day and night-time assessment periods in BS 4142. The details are presented in the following table.

Table 9 Freight trains accessing the terminal during peak day and night-time periods

Peak Hour	No. of Trains Arriving	No. of Trains Departing
Day (1 hour)	1	1
Night (15 minutes)	1	

5.15. It can be seen from Table 9 that, during the peak 15 minutes of the night, it is expected that either one train would arrive or depart the terminal, but not both. As above, it should be noted that these values represent the peak periods of the day and night, and other periods should contain lower levels of activity and therefore lower levels of operational sound.

5.16. Regarding the prediction of sound from freight trains as they travel along the rail link and through the rail freight terminal, the methodology described in the Calculation of Railway Noise[4] (CRN) has been used. This considers the location/length of the rail link and other information about the freight trains and track, as follows:

- The type of locomotive and whether it is on-power – the operator has advised that a Class 66 locomotive should be used, assumed to be on-power at all times;
- The type and number of wagons – the operator has advised that 30 tread-braked 4-axle tank wagons should be assumed;
- The speed of the train – the operator has advised that 20 km/h should be assumed; and
- The type of track – the operator has advised that jointed track should be assumed.

5.17. These assumptions represent a likely worst-case in terms of the potential noise from freight train movements. In particular, it is unlikely that the locomotives will be on-power at all times, but CRN only provides options for a locomotive to be fully on-power or rolling, and therefore on-power has been selected to provide a robust assessment.

5.18. As discussed above, where necessary, the assessment also considers context and the probability of railway noise induced awakenings. This process utilises the predictions from CRN together with the total number of trains expected to arrive and depart the rail freight terminal during the night, and the estimated time it takes for a train to pass a receptor location. The rail freight terminal operator has advised that three trains are expected to both arrive and depart the terminal during the night resulting in a total of six train movements on the rail link, and that the trains take around two minutes to pass a single point.

PREDICTION METHODOLOGIES

5.19. The predictions of operational sound from the reach stackers, ECHs and HGVs within the rail freight terminal have been undertaken in the noise modelling software IMMI, using the methodology from the standard ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of calculation.

5.20. A 3D model of the rail freight terminal, rail link, wider EMG SRFI site and the surrounding area including buildings and topographical data has been created.

5.21. All reach stacker, ECH and HGV sources have been modelled as point sources using the ISO 9613-2 methodology and the source level data and other information stated above. Predictions of L_{max}

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

noise levels from the reach stackers placing containers have been carried out at multiple source locations, with the single worst-case result at each receptor selected for assessment.

5.22. When calculating the noise level at a receptor point, ISO 9613-2 considers factors including distance attenuation, screening by obstacles, the effects of hard or soft ground, and atmospheric absorption. The method assumes that the receptor is downwind of the source to reflect the likely worst-case. For this assessment, the ground within the SRFI has been considered as hard, with the ground outside the SRFI as a mixture of hard and soft ground.

5.23. As discussed above, sound from the movement of freight trains has been predicted using the methodology described in CRN, which has been incorporated into the IMMI model. This uses the same details regarding ground type and also assumes that wind is blowing from the source to the receptor (downwind).

6. NOISE IMPACT ASSESSMENT

6.1. The rating levels from the EMG rail freight terminal and rail link during the peak hour of operation during the daytime period have been predicted at the receptors listed in Table 2 and are presented in Table 10 below.

6.2. Table 10 includes a comparison of the predicted rating levels with the daytime modal background sound levels for both of the wind directions discussed above, following the process given in BS 4142 for making an initial estimate of the potential impact of the sound at the receptors. Where the distribution of background sound levels indicates that a sensitivity test value should be considered, this is presented in Table 11.

6.3. The assessment of operational sound during the day is generally carried out for a receptor height of 1.5 m, representative of ground floor windows. The exception is the hotel at receptor 9, for which noise is assessed at each storey as all may contain guest bedrooms.

6.4. Regarding the correction for acoustic features that may increase the extent of the impact as described in section 2, it is considered unlikely that the operational sound will have any features that are perceived as specifically tonal, impulsive or intermittent at the receptor locations. However, it may have other less specific features that are readily distinctive against the residual acoustic environment. On this basis, as a cautious approach, a +3 dB(A) correction has been applied to all predicted specific sound levels for both day and night.

Table 10 Comparison of predicted daytime rating levels for terminal with modal background sound levels

Receptor		Rating Level* dB $L_{Ar,1hr}$	Under broadly south-westerly winds		Under broadly north-easterly winds	
Name	Height (m)		Modal Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level	Modal Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level
1	1.5	36	50	-14	51	-15
3	1.5	48	60	-12	60	-12
4	1.5	46	61	-15	65	-19
5	1.5	31	54	-23	51	-20
6	1.5	25	57	-32	49	-24
7	1.5	30	39	-9	46	-16
8	1.5	30	44	-14	49	-19
9	1.5	53	60	-7	60	-7
9	4.5	54	60	-6	60	-6
9	7.5	54	60	-6	60	-6
9	10.5	54	60	-6	60	-6
10	1.5	45	58	-13	52	-7

Notes:
* Rating level includes a +3 dB correction to the predicted specific sound level for other sound features that are likely to be readily distinctive at the receptors.

Table 11 Comparison of predicted daytime rating levels for terminal with sensitivity test background sound levels

Receptor		Rating Level* dB $L_{Ar,1hr}$	Under broadly south-westerly winds		Under broadly north-easterly winds	
Name	Height (m)		Sensitivity Test Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level	Sensitivity Test Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level
3	1.5	48	56	-8	-	-
4	1.5	46	58	-12	54	-8
7	1.5	30	-	-	40	-10
8	1.5	30	-	-	46	-16

Notes:
* Rating level includes a +3 dB correction to the predicted specific sound level for other sound features that are likely to be readily distinctive at the receptors.

6.5. The rating levels from the EMG rail freight terminal and rail link during the peak 15 minutes of operation during the night-time period have also been predicted at the receptors listed in Table 2 and are presented in Tables 12 and 13 below, using the same format for comparison with modal and sensitivity test background sound levels as for the daytime above.

6.6. The assessment of operational noise during the night is generally carried out for a receptor height of 4.5 m, representative of first-floor windows. However, as for the daytime, all storeys have been considered for the hotel at receptor 9.

Table 12 Comparison of predicted night-time rating levels for terminal with modal background sound levels

Receptor		Rating Level* dB $L_{Ar,15min}$	Under broadly south-westerly winds		Under broadly north-easterly winds	
Name	Height (m)		Modal Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level	Modal Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level
1	4.5	36	50	-14	53	-17
3	4.5	52	55	-3	56	-4
4	4.5	47	57	-10	52	-5
5	4.5	34	50	-16	45	-11
6	4.5	28	47	-19	45	-17
7	4.5	33	38	-5	46	-13
8	4.5	33	40	-7	49	-16
9	1.5	56	52	+4	53	+3
9	4.5	56	52	+4	53	+3
9	7.5	57	52	+5	53	+4
9	10.5	57	52	+5	53	+4
10	4.5	48	49	-1	47	+1

Notes:
* Rating level includes a +3 dB correction to the predicted specific sound level for other sound features that are likely to be readily distinctive at the receptors.

Table 13 Comparison of predicted night-time rating levels for terminal with sensitivity test background sound levels

Receptor		Rating Level* dB $L_{Ar,15min}$	Under broadly south-westerly winds		Under broadly north-easterly winds	
Name	Height (m)		Sensitivity Test Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level	Sensitivity Test Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level
1	4.5	36	46	-10	-	-
3	4.5	52	50	+2	53	-1
4	4.5	47	52	-5	-	-
5	4.5	34	45	-11	-	-
7	4.5	33	34	-1	41	-8
8	4.5	33	-	-	46	-13
10	4.5	48	46	+2	-	-

Notes:
* Rating level includes a +3 dB correction to the predicted specific sound level for other sound features that are likely to be readily distinctive at the receptors.

ASSESSMENT OF RATING LEVELS

6.7. With regard to the daytime assessment period, it can be seen from Tables 10 and 11 that the predicted rating levels of operational sound are at least 5 dB below both the modal and sensitivity test background sound levels under both of the wind directions considered, and at the majority of receptors the difference is considerably greater. Based on the guidance in BS 4142, this indicates that the impact of the operational sound is below the threshold for a low impact at all receptors, and therefore no adverse effects are expected, and no specific mitigation measures are required.

6.8. Regarding the night-time assessment period, it can be seen from Tables 12 and 13 that the predicted rating levels of operational sound at the majority of receptors are below the modal and sensitivity test background sound levels under both of the wind directions considered, indicating that the impact of the operational sound is below the threshold for a low impact at these receptors, and therefore no adverse effects are expected, and no specific mitigation measures are required.

6.9. At two receptors, 3 and 10, the predicted night-time rating levels slightly exceed the sensitivity test background sound level under south-westerly winds by 2 dB, and at receptor 10 the rating level exceeds the modal background sound level under north-easterly winds by 1 dB. At these locations (see Figure 2 above), the rating level is dominated by noise from the freight trains as they travel along the northern section of the rail link.

6.10. It can be seen that both receptors 3 and 10 are relatively close to the existing Castle Donnington freight railway line, and therefore it is expected that noise from passing freight trains is a normal part of the residual night-time acoustic environment at these locations. Considering this together with the relatively small magnitude of the exceedances over the background sound level, with the larger of them (+2 dB) only applying to the sensitivity test values (the rating levels at receptors 3 and

10 are both below the modal background sound level), it is expected that while the sound may, on occasion, be audible at these receptors during the night, it would not be considered intrusive, and therefore no adverse effects are expected, and no specific mitigation measures are required.

ASSESSMENT OF NIGHT-TIME RATING LEVELS AT L9 (HILTON HOTEL)

6.11. During the night-time, it can be seen from Table 12 that the predicted rating levels of operational sound at receptor 9 exceed the modal background sound level by between 3 and 5 dB (there is no requirement for a sensitivity test at this location). Based on the guidance in BS 4142, this indicates that the operational sound may result in an adverse impact, depending on the context, with the threshold for a significant adverse impact being an exceedance by 10 dB, depending on the context.

6.12. The rating level at the receptor is dominated by noise from the freight trains as they travel along the section of the rail link to the west, closest to the receptor (see Figure 2). Therefore, it is considered appropriate to consider noise from the trains in the context of the likelihood of it giving rise to a noise induced awakening during the night-time period (23:00-07:00), as described in section 2 above.

6.13. The predicted railway noise at the receptor is dominated by engine noise from the locomotive as it is always assumed to be on-power. As discussed in section 5, this is unlikely to be the case and therefore the resulting noise levels would be expected to be lower on at least some occasions. However, the on-power assumption has been maintained to provide a robust and likely worst-case assessment.

6.14. In the first instance, the probability of an awakening has been considered assuming that the windows of the hotel guest rooms are partially open, providing around 12 dB attenuation of external sound levels. The number of freight trains passing the receptor during the night-time is six, based on three trains arriving and three trains departing the rail freight terminal during this period as advised by the operator. The cumulative probability of noise from passing freight trains resulting in an awakening is presented in the following table:

Table 14 Cumulative probability of rail noise induced awakening at receptor 9 during night (windows open)

Receptor	Height (m)	No. of Train Passes	Predicted Number of Awakenings (Windows Open; 12 dB attenuation)
9	1.5	6	0.7
9	4.5	6	0.7
9	7.5	6	0.7
9	10.5	6	0.7

6.15. It can be seen from Table 14 that with windows partially open, the cumulative probability of a noise induced awakening at the receptor due to trains on the rail link during the night, is less than one for all floors of the building. On this basis, no adverse effects are expected, and no specific mitigation measures are required.

6.16. It is worth considering that the brand standards for Hilton hotels require that internal ambient noise levels inside guest rooms achieve the night-time threshold of 30 dB $L_{Aeq,8hr}$ stated in BS 8233 (see Table 1), including the provision of ventilation. Analysis of the 2016 baseline survey data at receptor 9 indicates that existing night-time noise levels are typically around 60 dB $L_{Aeq,8hr}$. It is therefore reasonable to assume that the guest rooms will have been designed to mitigate external noise levels by at least 30 dB. On this basis, the cumulative probability of noise from passing freight trains resulting in an awakening is presented in the following table:

Table 15 Cumulative probability of rail noise induced awakening at receptor 9 during night (windows closed)

Receptor	Height (m)	No. of Train Passes	Predicted Number of Awakenings (Windows Closed; 30 dB attenuation)
9	1.5	6	0.4
9	4.5	6	0.4
9	7.5	6	0.4
9	10.5	6	0.4

6.17. It can be seen from Table 15 that the cumulative probability of a noise induced awakening at receptor 9 due to trains on the rail link during the night with windows closed is reduced to 0.4 for all floors of the building. Considering the context of the existing acoustic environment (e.g. the existing noise levels and the proximity of the hotel to the M1, A50 and East Midlands Airport), this result is considered more likely to be a representative indication of the probability of a railway noise induced awakening at the receptor.

6.18. It should also be noted that operational sound has been predicted at the west façade of the hotel, i.e. facing and closest to the rail link, to represent a likely worst-case. It is expected that sound from passing freight trains would be lower at other façades of the hotel.

ASSESSMENT OF NIGHT-TIME L_{AMAX} NOISE LEVELS

6.19. The L_{Amax} noise levels from activities taking place within the rail freight terminal have been predicted at the receptors listed in Table 2 and are presented in the table below:

Table 16 Predicted L_{Amax} noise levels from activities taking place within rail freight terminal

Receptor		Predicted External L_{Amax} (Façade) (dB)
Name	**Height (m)**	
1	4.5	47
3	4.5	30
4	4.5	58
5	4.5	48
6	4.5	42
7	4.5	39
8	4.5	38
9	1.5	54
9	4.5	58
9	7.5	59
9	10.5	59
10	4.5	24

6.20. It can be seen from Table 16 that the predicted L_{Amax} noise levels at the receptor façades are all below the threshold of 60 dB(A) from the WHO Guidelines for Community Noise as discussed in section 2 above. Therefore, no adverse effects from L_{Amax} noise levels from the rail freight terminal during the night are expected, and no specific mitigation measures are required.

7. CUMULATIVE IMPACT ASSESSMENT

7.1. Vanguardia have previously carried out assessments of the potential effects of operational sound from three of the warehouse units at the EMG SRFI: plots 2, 3 and 4. These plots are along the south of the SRFI, adjacent to the boundary with East Midlands Airport. These assessments primarily focused on noise from HGVs, as well as any fixed mechanical plant for which data was provided.

7.2. Based on the results of these assessments, the potential cumulative impact of operational sound from the rail freight terminal and rail link together with plots 2, 3 and 4 has also been considered.

7.3. It should be noted that the assessments for the plots, like the rail freight terminal, are based on the periods of peak activity during both day and night-time hours, and it is unlikely these would all occur at the same time. However, for the purpose of the cumulative assessment, this has been assumed to occur to provide a robust assessment.

7.4. On this basis, the cumulative rating levels from the EMG rail freight terminal and rail link together plots 2, 3 and 4 during the peak hour of operation during the daytime period have been predicted at the receptors listed in Table 2 and are presented in Tables 17 and 18 below, using the same format for comparison with modal and sensitivity test background sound levels as the main assessment in section 6 above. The same assumptions regarding receptor heights and corrections for acoustic features as described in section 6 have also been used.

Table 17 Comparison of predicted daytime cumulative rating levels for terminal and plots 2,3 &4 with modal background sound levels

Receptor		Rating Level* dB $L_{Ar,1hr}$	Under broadly south-westerly winds		Under broadly north-easterly winds	
Name	Height (m)		Modal Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level	Modal Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level
1	1.5	39	50	-11	51	-12
3	1.5	48	60	-12	60	-12
4	1.5	47	61	-14	65	-18
5	1.5	37	54	-17	51	-14
6	1.5	36	57	-21	49	-13
7	1.5	37	39	-2	46	-9
8	1.5	37	44	-7	49	-12
9	1.5	53	60	-7	60	-7
9	4.5	54	60	-6	60	-6
9	7.5	54	60	-6	60	-6
9	10.5	54	60	-6	60	-6
10	1.5	45	58	-13	52	-7

Notes:
* Rating level includes a +3 dB correction to the predicted specific sound level for other sound features that are likely to be readily distinctive at the receptors.

Table 18 Comparison of predicted daytime cumulative rating levels for terminal and plots 2,3 &4 with sensitivity test background sound levels

Receptor		Rating Level* dB $L_{Ar,1hr}$	Under broadly south-westerly winds		Under broadly north-easterly winds	
Name	Height (m)		Sensitivity Test Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level	Sensitivity Test Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level
3	1.5	48	56	-8	-	-
4	1.5	47	58	-11	54	-7
7	1.5	37	-	-	40	-3
8	1.5	37	-	-	46	-9

Notes:
* Rating level includes a +3 dB correction to the predicted specific sound level for other sound features that are likely to be readily distinctive at the receptors.

7.5. The cumulative rating levels from the EMG rail freight terminal and rail link together with plots 2, 3 and 4 during the peak 15 minutes of operation during the night-time period have also been predicted at the receptors listed in Table 2 and are presented in Tables 19 and 20 below, using the same format for comparison with modal and sensitivity test background sound levels as the daytime above, and using the same assumptions regarding receptor heights as described in section 6.

Table 19 Comparison of predicted night-time cumulative rating levels for terminal and plots 2,3 &4 with modal background sound levels

Receptor		Rating Level* dB $L_{Ar,15min}$	Under broadly south-westerly winds		Under broadly north-easterly winds	
Name	Height (m)		Modal Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level	Modal Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level
1	4.5	38	50	-12	53	-15
3	4.5	52	55	-3	56	-4
4	4.5	48	57	-9	52	-4
5	4.5	38	50	-12	45	-7
6	4.5	36	47	-11	45	-9
7	4.5	38	38	0	46	-8
8	4.5	38	40	-2	49	-11
9	1.5	56	52	+4	53	+3
9	4.5	57	52	+5	53	+4
9	7.5	57	52	+5	53	+4
9	10.5	57	52	+5	53	+4
10	4.5	48	49	-1	47	+1

Notes:
* Rating level includes a +3 dB correction to the predicted specific sound level for other sound features that are likely to be readily distinctive at the receptors.

Table 20 Comparison of predicted night-time cumulative rating levels for terminal and plots 2,3 &4 with sensitivity test background sound levels

Receptor		Rating Level* dB $L_{Ar,15min}$	Under broadly south-westerly winds		Under broadly north-easterly winds	
Name	Height (m)		Sensitivity Test Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level	Sensitivity Test Background Sound Level dB $L_{A90,15min}$	Rating Level - Background Sound Level
1	4.5	38	46	-8	-	-
3	4.5	52	50	+2	53	-1
4	4.5	48	52	-4	-	-
5	4.5	38	45	-7	-	-
7	4.5	38	34	+4	41	-3
8	4.5	38	-	-	46	-8
10	4.5	48	46	-2	-	-

Notes:
* Rating level includes a +3 dB correction to the predicted specific sound level for other sound features that are likely to be readily distinctive at the receptors.

ASSESSMENT OF CUMULATIVE RATING LEVELS

7.6. With regard to the daytime assessment period, it can be seen from Tables 17 and 18 that the predicted cumulative rating levels of operational sound are higher at some of the receptors closer to the main SRFI site, particularly receptors 5, 6, 7 & 8, when compared to sound from the rail freight terminal alone, as would be expected.

7.7. However, all of the predicted daytime cumulative rating levels are at least 2 dB below both the modal and sensitivity test background sound levels under both of the wind directions considered, and at the majority of receptors the difference is considerably greater. Based on the guidance in BS 4142, this indicates that the impact of the cumulative operational sound is below the threshold for a low impact at the receptors, and therefore no adverse effects are expected, and no specific mitigation measures are required. This is consistent with the assessment of noise from the rail terminal sources only.

7.8. Regarding the night-time assessment period, it can be seen from Tables 19 and 20 that, as for the day, the predicted cumulative rating levels of operational sound are higher at some of receptors, particularly receptors 5, 6, 7 & 9, when compared to sound from the rail freight terminal alone.

7.9. However, at the majority of receptors, the predicted night-time cumulative rating levels of operational sound remain below the modal and sensitivity test background sound levels under both of the wind directions considered, indicating that the impact of operational sound remains below the threshold for a low impact at these receptors, and therefore no adverse effects are expected, and no specific mitigation measures are required.

7.10. At one of the receptors where the night-time cumulative rating level has increased compared to sound from the terminal alone (receptor 7), the predicted cumulative level is equal to the modal background sound level, indicating a low impact, and under south westerly winds is 4 dB above the sensitivity test background sound level, indicating that there could be an adverse impact under these circumstances.

7.11. However, the night-time cumulative rating level of 38 dB $L_{Ar,15min}$ at receptor 7 is one of the lowest predicted in the assessment. When considering the context of the absolute level of sound inside a bedroom through a partially open window, the rating level would be reduced to 26 dB(A), which still includes the +3 dB(A) correction for acoustic features. This is 4 dB below the target threshold for bedrooms at night stated in Table 1, and as previously discussed, represents a worst-case of peak activity occurring at the rail freight terminal, rail link and all three plots at the same time. On this basis, while there may be occasions when operational sound may be audible at receptor 7, it would not be considered intrusive, and therefore no adverse effects are expected, and no specific mitigation measures are required.

7.12. For the cumulative assessment, the same minor night-time exceedances of the background sound level have been predicted at receptors 3 and 10 as for the rail freight terminal only assessment in section 6. This is because operational sound at these receptors is dominated by noise from the freight trains on the rail link and therefore the predicted level is largely unaffected by sound from the plots. On this basis, the same conclusions as stated in section 6 apply, and no adverse effects are expected at these receptors, and no specific mitigation measures are required.

7.13. Regarding receptor 9, the night-time cumulative rating level has increased by 1 dB at the first-floor level when compared to the sound from the rail freight terminal alone. The result is that it is now equal to the rating levels previously predicted at the second and third floor levels. On this basis, the assessment as detailed in section 6 for the rail freight terminal alone still applies, and therefore no adverse effects are expected, and no specific mitigation measures are required.

7.14. It should be noted that, as can be seen in Figure 2, when further units are built at the EMG SRFI site, the rail freight terminal will be largely screened by the new buildings to the receptors to the west, and plots 2, 3 & 4 will be screened in all directions except to the south, which is the boundary with East Midlands Airport. Therefore, the contribution to the cumulative rating levels, particularly from the plots, will be reduced.

8. CONCLUSIONS

8.1. Vanguardia has been appointed to undertake an assessment of the potential noise impacts and effects from operation of the rail freight terminal at the East Midlands Gateway (EMG) Strategic Rail Freight Interchange (SRFI) development, located around 10 miles to the south-west of Nottingham.

8.2. The Development Consent Order (DCO) for the EMG SRFI includes Requirement 22 which relates to the management of operational noise. Vanguardia have agreed a process with North West Leicester District Council (NWLDC) to satisfy this requirement.

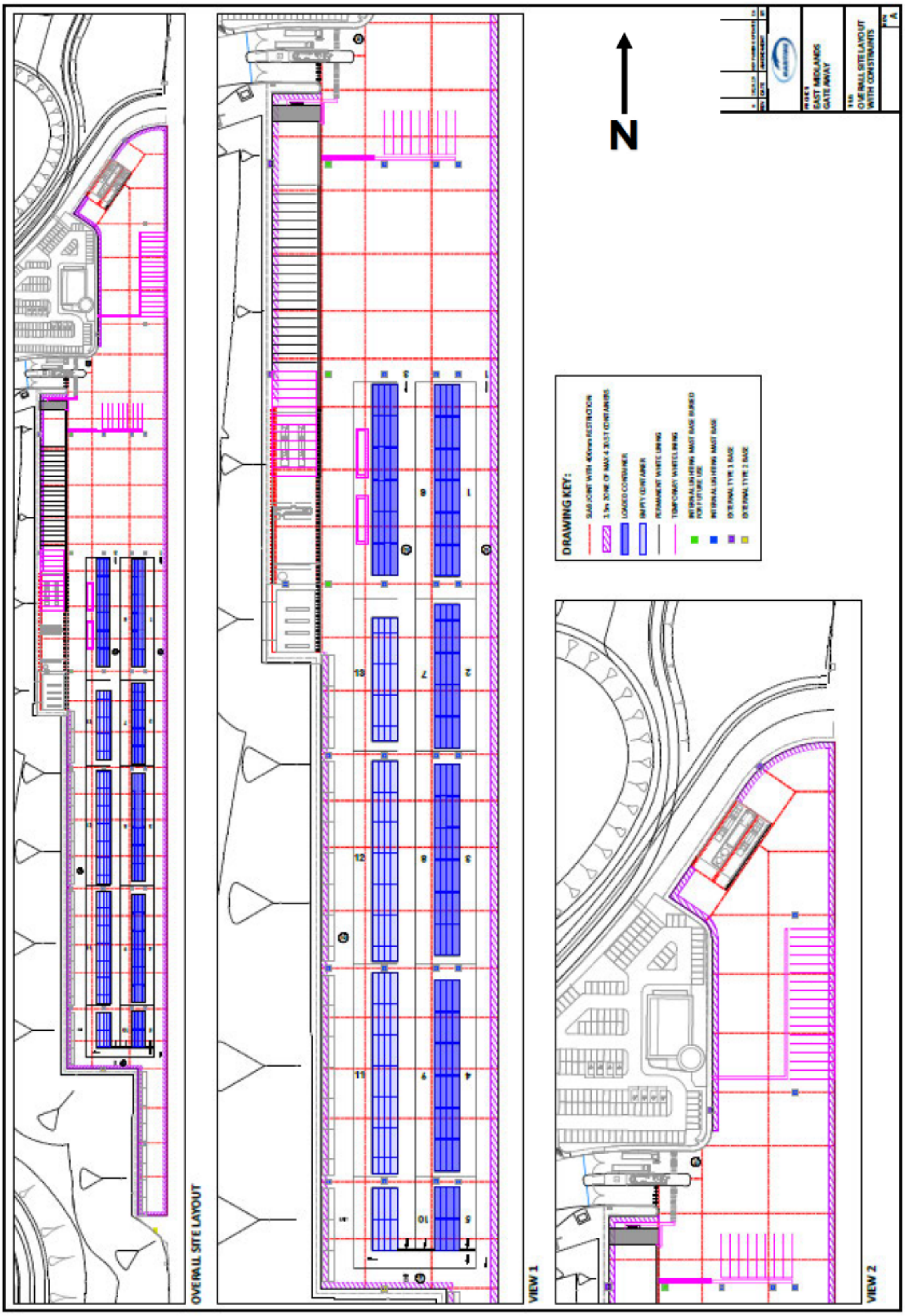
8.3. The assessment has been based on the peak periods of operation during both the day and night-time hours, and includes operational sound from activities inside the rail freight terminal and from freight trains travelling on the 2.5 km long rail link between the terminal and the Castle Donnington freight railway line.

8.4. The results of the assessment indicate that no adverse noise effects are expected at the relevant receptors during either day or night-time hours as a result of operational sound from the EMG rail freight terminal and rail link, and therefore no specific mitigation measures are required.

8.5. Consideration has also been given to the potential cumulative noise impacts of the rail freight terminal and rail link together with the operational sound from the three warehouse units at EMG previously assessed by Vanguardia. The results of the cumulative assessment also indicated that no adverse noise effects are expected at the relevant receptors during either day or night-time hours, and therefore and no specific mitigation measures are required.

8.6. In summary, the results of the assessment indicate that the potential effects of operational sound from the EMG rail freight terminal, including use of the rail link, comply with Government noise policy and that no specific mitigation measures are required. This assessment therefore satisfies DCO Requirement 22 in terms of the process agreed with NWLDC.

APPENDIX A – INDICATIVE SITE LAYOUT



APPENDIX B – GLOSSARY OF TERMS

DECIBELS - DB

Noise is commonly defined as unwanted sound. The range of audible sound is from 0dB to 140dB, which is taken to be the threshold of pain. The sound pressure detected by the human ear covers an extremely wide range. The decibel (dB) is used to condense this range into a manageable scale by taking the logarithm of the ratio of the sound pressure and a reference sound pressure.

‘A’ WEIGHTED DECIBELS - DB(A)

The frequency response of the ear is usually taken to be about 18Hz (number of oscillations per second) to 18,000Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than at the lower and higher frequencies, and because of this, the low and high frequency component of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most used, and which correlates best with the subjective response to noise, including that of music, is the dB(A) weighting. This electronic filter matches the variation in the frequency sensitivity of the meter to that of the human ear. This is an internationally accepted standard for noise measurements.

EQUIVALENT CONTINUOUS SOUND LEVEL - LAEQ

The subjective response to a noise is dependent not only upon the sound pressure level and its frequency, but also its intermittency. Various indices have been developed to try and correlate annoyances with the noise level and its fluctuations. The parameter used for this measure is the Equivalent Continuous Sound Pressure Level (LAeq). The A-weighted sound pressure level of a steady sound that has, over a given period, the same energy as the fluctuating sound under investigation. In essence, the LAeq provides a single value to express the average sound energy over the measurement period and is the most widely used indicator for environmental noise.

The decibel scale is logarithmic and therefore when two noise sources are present together, they have to be combined logarithmically. Therefore, when two sound sources of the same sound pressure level are combined the resultant level is 3dB(A) higher than the single source. However, in subjective terms the ear can distinguish a difference in 'loudness' between two simple noises sources when there is a 3dB(A) difference between them. Loudness, not a measure of annoyance. Again, for simple sources, when two sounds differ by 10dB(A) one is said to be twice as loud as the other.

OTHER NOISE UNITS:

$L_{A90,T}$: This is the 'A' weighted noise level exceeded for 90% of the measurement period, T. This is normally used to describe the background noise.

Façade Level: The sound level at a position 1 m in front of a reflecting façade of a building. The façade noise level is assumed to be 3 dB(A) higher than the level measured or predicted at an equivalent position away from the noise reflected from the building façade i.e. in the free-field.

Free-field Level: The sound level in an open area well away from any buildings or other sound reflecting surfaces other than the ground. Generally, the minimum distance from building facades for free-field measurements is taken to be 3.5 m.

BS414:1997 TERMINOLOGY

Background Noise Level: The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of a given time interval. Expressed as LA90,T and generally considered to be the average minimum noise level.

Ambient Noise Level: Totally encompassing sound in a given situation at any given time interval and usually composed of sound from many sources near and far. Usually expressed in terms of LAeq,T

Residual Noise Level: The ambient noise remaining at a given position in a given situation where the specific noise source is suppressed to such a degree that it does not contribute to the ambient noise. Expressed in terms of LAeq,T

Specific Noise Level: The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source (source being assessed) over a given reference time interval (LAeq,Tr)

Rating Noise Level: The specific noise level plus any adjustment for the characteristic features of the noise. Expressed in terms of LAr,Tr. The standard indicates that a +5 dB correction should be added to the noise if it was tonal, impulsive or irregular enough to attract attention.

OBSERVED EFFECTS

The Noise Policy Statement for England (2010) defines several key terms in relation to the observed effects of noise. The three key terms are defined below;

No Observed Effect Level (NOEL): This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

Lowest Observed Adverse Effect Level (LOAEL): This is the level above which adverse effects on health and quality of life can be detected.

Significant Observed Adverse Effect Level (SOAEL): This is the level above which significant adverse effects on health and quality of life occur.

APPENDIX C – RAILWAY NOISE INDUCED AWAKENING METHODOLOGY

- The single event level (SEL) values at each assessed receptor was determined from the CRN noise model for the relevant train/wagon types;
- The duration of each train pass-by was determined from the assumed speed and length of train;
- The L_{Amax} value was determined using the following relationship: L_{max} = 0.973*SEL – 3.9*log(tp), where tp is the duration of the train pass-by in seconds. This relationship has its origins in the work associated with the West Coast Main Line upgrade of c 1998 – 2002 and is assumed to provide results in terms of L_{Amax} with a ‘fast’ response;
- The relationship between the probability of a noise induced awakening for a given L_{Amax} level is identified from Figure 2 of the paper “Health effects from high-speed railway noise – a literature review”, Fenech et al, Internoise 2013;
- Figure 2 of that paper uses an external L_{Amax} with a ‘slow’ response and an assumed 15 dB(A) reduction for the attenuation of sound through a partially open window;
- A difference of 4 dB(A) was assumed between maximum levels with a ‘fast’ response compared with a ‘slow’ response (‘fast’ has the higher value);
- As a more cautious approach than that stated in the paper, 12 dB(A) was the assumed attenuation through a partially open window used for the assessment; and
- For closed windows at the Hilton hotel, a reduction of 30 dB(A) was assumed (see main text for more details).

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