Tritax Symmetry (Hinckley) Limited

HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

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ES Appendix 10.6 Northampton ES Noise Vibration Appendix 8.5 – Summary of Assumptions for SRFI Operational Activities

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

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

Appendix 8.5

Summary of Assumptions for SRFI Operational Activities

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HGVs and light vehicles travelling within the SRFI site

Based on data provided by the traffic consultant for a typical 24 hour traffic profile with the SRFI operating at full capacity, road traffic noise from HGVs and light vehicles travelling on the SRFI site's internal access roads has been predicted for the peak hour during the day (07:00-23:00) and the peak hour during the night (23:00-07:00) using the environmental noise modelling software IMMI and the methodology described in Calculation of Road Traffic Noise[1] (CRTN), which assumes that the receptor is downwind of the source.

The appropriate HGV and light vehicle flows has been modelled on the main access roads, around the car parks, warehousing service yards, intermodal freight terminal, 'rapid rail freight' facility and aggregates facility to represent typical vehicular routes. The speed used for all vehicles is 20 km/h.

The $L_{A10,1h}$ values calculated by CRTN has been converted to $L_{Aeq,T}$ using the relationship from paragraph 2.2.13 of the Department for Transport document TAG Unit A3[2]. Based on the assumption that the flow of traffic will be reasonably consistent over a night-time hour, equivalency has been assumed between the predicted 1 hour value and the 15 minute reference time interval used for assessment.

Freight trains travelling within the SRFI site

Based on discussions with the rail consultant, the following rail activities have been assumed for a train serving the SRFI:

1. A train enters from the north or south and pulls into one of the reception sidings;
2. The locomotive uncouples from the wagons and pulls around into a different reception siding;
3. A shunting locomotive, operating from the headshunt track at the north of the site, moves down to the reception siding containing the wagons, then pulls the wagons back into the headshunt;
4. The shunting locomotive pushes the wagons into the intermodal freight terminal or other facility as appropriate, uncouples and returns to the headshunt;

   Once the wagons have been unloaded/loaded, the shunting locomotive performs the same operations in reverse so that the wagons are back on a reception siding;

5. A locomotive pulls around from a different reception siding and couples to the wagons; and
6. The train departs to the north or south.

With regard to the type and number of activities assumed to be taking place within the 1 hour day and 15 minute night-time assessment periods, the following assumptions

[1] Calculation of Road Traffic Noise, Department of Transport (1988)
[2] Transport Appraisal Guidance Unit A3: Environmental Impact Appraisal, Department for Transport (2015)

have been made based on the predicted number of trains arriving to and departing from the SRFI during the day and night-time periods:

- For the daytime 1 hour assessment period:
  - One train arrives (activities 1 and 2);
  - Two shunts between the reception sidings and rail terminal are carried out (two sets of activities 3 and 4); and
  - One train departs (activities 5 and 6).
- For the night-time 15 minute assessment period;
  - Only one of the activity types would occur in this period, i.e. one arrival (activities 1 and 2), one shunt (activities 3 and 4) or one departure (activities 5 and 6).

This assumes that the SRFI is operating at full capacity.

For assessment purposes, the train arrivals and departures have been modelled in both directions, i.e. from/to both the north and south, and the higher predicted level selected at each receptor. For the night-time assessment, the single highest predicted level of the three different activity types has been selected at each receptor.

Noise from train movements within the SRFI has been modelled following the procedures in Calculation of Railway Noise[3] (CRN), which assumes that the receptor is downwind of the source. This has included the following assumptions:

- All trains have been assumed to comprise a single Class 66 Diesel Locomotive with 30 tread braked 4 axle tank wagons, with a total length of 750 metres;
- The speed of trains as they arrive or depart the SRFI has been advised by the rail consultant, with a minimum speed of 20 km/h;
- The speed of trains for wholly internal activities (i.e. activities 2 to 5) has been assumed to be 20 km/h;
- Periods where the locomotive is on-power (as oppose to rolling) during an arrival or departure activity have been advised by the rail consultant. For wholly internal activities, the associated locomotive has been assumed to be on-power at all times;
- CRN does not include a source term for a shunting type locomotive. Therefore, a Class 66 Diesel Locomotive has been assumed to be carrying out the shunting operations. This, while not typical, has been advised as a possible mode of operation by the rail consultant, and is considered worst-case in terms of noise emission.

Noise levels have been predicted using the CRN indices of $L_{Aeq,18hr}$ for the day and $L_{Aeq,6hr}$ for the night, and then logarithmically re-averaged to arrive at the 1 hour and 15 minute reference time intervals used for assessment.

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

Appendix 8.5 Summary of Assumptions for SRFI Operational activities

HGV manoeuvres and loading/unloading

Noise levels have also been predicted for HGV manoeuvres and loading/unloading activities at the warehousing units, intermodal freight terminal, 'rapid rail freight' facility and aggregates facility.

Based on data provided by the traffic consultant for a typical 24 hour traffic profile with the SRFI operating at full capacity, the estimated number of HGV movements at each unit has been identified for the peak hour during the day (07:00-23:00) and the peak hour during the night (23:00-07:00). These have been categorised as external movements, i.e. those which originate from off site or will depart and leave the SRFI, and internal movements, i.e. those which would travel between the warehousing units and intermodal freight terminal etc in either direction.

The peak hours of the day and night for external movements associated with the intermodal freight terminal do not coincide with those at the other units. However, as a cautious approach for the assessment it has been assumed that they occur at the same time.

A summary of the two-way HGV flows for the peak hour of the day and the night is provided in Table 1 below.

Table 1 Two-way HGV flows in peak hour of SRFI operation

SRFI Area	Day		Night	
	External HGVs	Internal HGVs	External HGVs	Internal HGVs
	08:00 – 09:00		05:00 – 06:00	
Unit 1	21	6	12	3
Unit 2	21	6	12	3
Unit 3	27	7	16	4
Unit 4	32	9	19	5
Unit 5	21	6	13	3
Unit 6	27	8	16	4
Unit 7	47	13	27	8
Intermodal Freight Terminal#	103*	55	70^	32
'Rapid Rail Freight' Facillty	13	0	13	0

Notes:
#HGV flows for aggregates facility are included in these values
*peak hour value is 12:00 – 13:00 hours
^peak hour value is 06:00 – 07:00 hours

From the two-way flow values, the number of manoeuvres (reverse and pull-away) and loading/unloading activities have been derived for the day and night-time assessment periods, presented in Tables 2 and 3 below.

Based on experience of similar developments, it is assumed that during the 1 hour daytime assessment period an HGV would arrive at a warehouse, reverse up to the unit dock leveller mechanism and be loaded or unloaded by forklift truck for 30 minutes, then pull away. Therefore, of the two-way flow, half of the HGVs would reverse, be loaded or unloaded and then pull away.

During the 15 minute night-time assessment period, it has been assumed that a quarter of the two way flow would reverse, a quarter would load or unload, and a quarter would pull away.

At the intermodal freight terminal, it is assumed that an HGV would arrive at the gatehouse and then either reverse into a parking bay or be directed where to go within the terminal to be loaded or unloaded.

For the 1 hour daytime assessment period, it is assumed that of the two-way HGV flow for the hour:

- A quarter go to a parking bay and reverse, and pull away from the bay within the hour; and
- A quarter go straight to the main area to be loaded/unloaded. It is assumed that for safety reasons there would be no reverse activity associated with this, but there would be a pull away manoeuvre.

For the 15 minute night time assessment period, the same assumptions have been applied to the two-way HGV flow that would be expected in 15 minutes of the peak hour at night.

At the 'rapid rail freight' facility, it is assumed that an HGV would arrive at the gatehouse and be directed where to go within the facility to be load or unloaded. Of the two-way HGV flows, it assumed that half would pull away during the 1 hour daytime assessment period, and a quarter would pull away during the 15 minute night-time assessment period.

At the aggregates facility, it is assumed that an HGV would arrive at the gatehouse and be directed where to go within the facility to be load or unloaded. A single pull away has been assumed during both the day and night-time assessment periods.

The loading/unloading activities at the intermodal freight terminal, 'rapid rail freight' facility and aggregates facility have been included by modelling of the other operational sources, such as reach stackers. This is discussed later in this appendix.

Appendix 8.5 Summary of Assumptions for SRFI Operational activities

Table 2 Number of HGV sources assumed in daytime assessment period

SRFI Area	External HGVs			Internal HGVS		
	Reverse	Load/ Unload	Pull Away	Reverse	Load/ Unload	Pull Away
Unit 1	10	11	11	3	3	3
Unit 2	10	11	11	3	3	3
Unit 3	13	14	14	3	4	4
Unit 4	16	16	16	4	5	5
Unit 5	13	14	14	4	4	4
Unit 6	10	11	11	3	3	3
Unit 7	23	24	24	6	7	7
Intermodal Freight Terminal	26	*	52	14	*	28
'Rapid Rail Freight' Facillty	^	*	6	^	^	^
Aggregates Facility	^	*	1	^	^	^
Notes: *loading/unloading activity not predicted using HGV source, see main text. ^this source is not anticipated at this location.						

Table 3 Number of HGV sources assumed in night-time assessment period

SRFI Area	External HGVs			Internal HGVS		
	Reverse	Load/ Unload	Pull Away	Reverse	Load/ Unload	Pull Away
Unit 1	3	3	3	1	1	1
Unit 2	3	3	3	1	1	1
Unit 3	4	4	4	1	1	1
Unit 4	5	5	5	1	2	2
Unit 5	4	4	4	1	1	1
Unit 6	3	4	4	1	1	1
Unit 7	7	7	7	2	2	2
Intermodal Freight Terminal	18	*	36	8	*	16
'Rapid Rail Freight' Facillty	^	*	3	^	^	^
Aggregates Facility	^	*	1	^	^	^
Notes: *loading/unloading activity not predicted using HGV source, see main text. ^this source is not anticipated at this location.						

Noise from the HGV sources has been predicted using the environmental noise modelling software IMMI and the principles of the ISO 9613-2:1996[4] methodology, which assumes moderate downwind propagation between the source and receptor. The HGV sources have been modelled as point sources at appropriate locations in the

[4] ISO 9613-2: Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of calculation, ISO (1996)

warehousing service yards and other areas, at a height of 1 metre above local ground level.

The source sound levels for each source type used in the predictions, taken from Vanguardia's library of measurements, are presented in Tables 4 and 5 for the day and night-time respectively. The source levels include the appropriate on-time correction for each reference time interval used for assessment.

Note that the HGV source level for reversing includes the sounding of a narrowband alarm while the manoeuvre is taking place.

HGVs fitted with chillers for the transport of chilled goods have not been considered as it is not yet known who will occupy the warehousing units. If HGVs with chillers were to be used, the potential noise impact would be considered as part of the assessment for the occupation of that unit. A potential mitigation measure would be the provision of electrical hook-ups at the warehousing unit docks so that HGV engines could be turned during loading/unloading.

Table 4 HGV source levels for daytime assessment period

Source	On-time (mins)	Sound Power Level - corrected for daytime on-time (dB $L_{Aeq,T}$)								
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Reverse	1	83	76	76	73	76	77	66	61	81
Load	30	87	86	87	86	83	80	76	70	88
Start-up/ pull away	1	89	83	80	79	79	76	69	60	83

Table 5 HGV source levels for night-time assessment period

Source	On-time (mins)	Sound Power Level - corrected for night-time on-time (dB $L_{Aeq,T}$)								
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Reverse	1	89	82	82	79	82	83	72	67	87
Load	15	90	89	90	89	86	83	79	73	91
Start-up/ pull away	1	95	89	86	85	85	82	75	66	89

Operational sources at the intermodal freight terminal, 'rapid rail freight' facility and aggregates facility

Following discussions with the rail consultant, noise from operational activities at the intermodal freight terminal, 'rapid rail freight' facility and aggregates facility has been predicted based on the sources in Table 6. The activities are based around the loading/unloading of freight trains and HGVs and the movement of intermodal and other types containers and aggregate and assume the SRFI is operating at full capacity. The table includes the number of sources and the height of each source above local ground level for modelling purposes.

It is understood that the proposed gantry cranes used at the intermodal freight terminal will be electrically powered and fitted with broadband noise movement alarms.

Appendix 8.5 Summary of Assumptions for SRFI Operational activities

Table 6 Details of operational sources

Location	Source	No. of sources		Height (m)
		Day	Night	
Intermodal Freight Terminal	Gantry crane – movement (drive, trolley and hoist motors)	2	2	18*
	Gantry crane – broadband movement alarm	2	2	3
	Gantry crane – spreader impact	2	2	6^
	Gantry crane – container placement	2	2	6^
	Reach stacker – handling and movement	4	3	1.5
	Telehandler – handling and movement	4	3	1.5
'Rapid Rail Freight' Facility	Forklift – handling and movement	3	2	1.5
Aggregates Facility	Excavator with grab – unloading trains	1	1	1.5
	Wheeled loader – loading HGVs	1	1	1.5
Notes: *The drive motors may be at a significantly lower height, just above the wheels. However, for the purposes of the predictions, all movement noise is assumed to be located at the top of the gantry crane as a worst-case. ^Approximately the height of two stacked containers.				

Noise from operational sources has been predicted using the environmental noise modelling software IMMI and the principles of the ISO 9613-2:1996 methodology, which assumes moderate downwind propagation between the source and receptor. The operational sources have been modelled as point sources at appropriate locations within the different areas. As the intermodal freight terminal has a larger area and the associated sources will move around within it, multiple point sources for each source have been modelled at different locations within their area of operation with an appropriate source level correction to more realistically represent the distribution of sound during the reference time intervals.

The source sound levels for each source type used in the predictions are taken from Vanguardia's library of measurements and BS 5228-1:2009+A1:2014[5] and are presented in Tables 7 and 8. Following discussions with the rail consultant, appropriate on-time corrections have been applied to each source level to represent their typical maximum utilisation during the day and night-time reference time intervals. For the non-continuous gantry crane sources, i.e. spreader impact and container placement, the source level and on-time correction has been calculated assuming that one freight train loading/unloading cycle takes two minutes, and one instance of each source occurs per cycle.

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

Appendix 8.5 Summary of Assumptions for SRFI Operational activities

Table 7 Operational source levels for daytime assessment period

Location	Source	On-time (no.)	Sound Power Level - corrected for daytime on-time (dB $L_{Aeq,T}$)								
			63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Intermodal Freight Terminal	Gantry crane – movement	75% (2)	102	98	98	93	93	88	82	71	97
	Gantry crane – broadband alarm	75% (2)	88	89	86	85	84	88	83	73	92
	Gantry crane – spreader impact	75% (2)	96	92	91	90	87	82	75	65	92
	Gantry crane – container placement	75% (2)	89	84	84	79	77	74	68	58	82
	Reach stacker	100% (2)	114	114	113	109	105	108	97	90	113
		50% (2)	111	111	110	105	102	105	94	87	110
	Telehandler	100% (2)	122	111	105	103	99	97	93	85	106
		50% (2)	119	108	102	100	96	94	90	82	103
'Rapid Rail Freight' Facility	Forklift	100% (3)	110	100	91	93	95	92	84	77	99
Aggregates Facility	Excavator with grab	100% (1)	110	115	110	105	100	98	94	87	108
	Wheeled loader	100% (1)	115	115	113	103	104	102	97	90	110

Table 8 Operational source levels for night-time assessment period

Location	Source	On-time	Sound Power Level - corrected for night-time on-time (dB $L_{Aeq,T}$)								
			63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Intermodal Freight Terminal	Gantry crane – movement	100% (2)	103	99	99	95	95	90	83	73	99
	Gantry crane – broadband alarm	100% (2)	89	90	88	86	85	89	84	74	93
	Gantry crane – spreader impact	100% (2)	98	93	92	92	88	83	77	67	93
	Gantry crane – container placement	100% (2)	90	86	85	81	78	76	69	59	84
	Reach stacker	100% (2)	114	114	113	109	105	108	97	90	113
		50% (1)	111	111	110	105	102	105	94	87	110
	Telehandler	100% (2)	122	111	105	103	99	97	93	85	106
		50% (1)	119	108	102	100	96	94	90	82	103
'Rapid Rail Freight' Facility	Forklift	100% (3)	110	100	91	93	95	92	84	77	99
Aggregates Facility	Excavator with grab	100% (1)	110	115	110	105	100	98	94	87	108
	Wheeled loader	100% (1)	115	115	113	103	104	102	97	90	110

Appendix 8.5 Summary of Assumptions for SRFI Operational activities

Maximum short-term noise levels from SRFI operations

Typical maximum short-term noise levels have been predicted from HGV activities at the warehousing units and from operational activities at the intermodal freight terminal and aggregates facility using the environmental noise modelling software IMMI and the principles of the ISO 9613-2:1996 methodology, which assumes moderate downwind propagation between the source and receptor.

The sources have been modelled as point sources at multiple locations within their area of operation to more realistically represent the potential variation in maximum noise levels at the relevant receptors. When determining the results presented in Appendix 8.18, the highest predicted maximum noise levels has been selected.

The source sound levels for each source type used in the predictions are taken from Vanguardia's library of measurements and BS 5228-1:2009+A1:2014 and are presented in Table 9.

Table 9 Source data for maximum noise levels

Location	Source	Height (m)	Sound Power Level (dB L_{AFmax})								
			63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Warehousing	HGV coupling	1	113	106	107	108	108	107	102	92	113
Intermodal Freight Terminal	Gantry crane – spreader impact	6	102	116	115	115	111	106	100	92	116
	Reach stacker – container placement	6	120	122	121	120	116	115	106	102	122
Aggregates Facility	Wheeled loader – transporting material	1.5	111	117	120	108	99	97	92	86	113