Appendix 18.11: Site operational noise assumptions and calculation procedures

Content

Site Operational Noise Assumptions and Calculation Procedures

Assessment of on-site operational noise has been carried out in accordance with BS 4142:2014 *Methods for rating and assessing industrial and commercial sound*. As the site would operate continuously over a 24 hour period the noise model includes all sources that it is considered would be in operation at any one time, which would be the same during both that daytime and night time periods. The following operational noise sources have been considered:

- HGVs manoeuvring on site
- HGVs idling on site
- Chillers mounted on HGVs
- Small general purpose diesel forklift trucks manoeuvring
- Small general purpose electric forklift trucks manoeuvring
- Unit mechanical ventilation and cooling plant
- Intermodal gantry cranes
- Diesel locomotives idling continuously on-site
- Diesel rail shunters under full load
- Reach stackers
- Tugs manoeuvring
- Sub station

A list of the sound power input data used in the noise model is provided within this Appendix, including the numbers of each item that would be operational at any one time. The data has been taken from measurements of operating equipment carried out by Spectrum at other similar sites, manufacturers' data, and from other noise assessments carried out and reported in relation to other similar developments.

The assessment has been carried out against the background sound levels established during the most sensitive early night time period (23:00-01:00) when most people would be going to sleep. The background sound levels determined from the results of the long term noise measurement survey are typically lower during this period than those determined over the full eight hour night time period (23:00-07:00) and, therefore, provide for a more onerous and rigorous assessment. The early night time period is also considered to be the most critical period for an assessment of this type of activity as this is when people would typically be going to sleep and would be most sensitive to noise.

The following assumptions have been made as to the number and type of operational sources used in the noise model. The assumptions represent an inidicative worst case scenario where the site is operating at full capacity.

Four mechanical ventilation and cooling plant zones have been assumed for each warehouse. These sources have been located on each corner of each warehouse unit at high level.

Three electric rail mounted gantry cranes (RMG) have been assumed to be operational on the intermodal platform. The noise sources used to model the RMGs have been split between low level (bogies) and high level (trolley/hoist gear) items. Four broad band alarms have been assumed for each RMG, one on each corner at low level.

Two small general purpose diesel forklift trucks have been assumed to be operational in each warehouse yard for most units. Units 8, 12, and 13 are smaller units and, therefore, one diesel forklift truck has been assumed to be operational at any one time in their respective yards. An additional four diesel forklift trucks have been assumed to operate on the express cross dock platform.

One small general purpose electric forklift truck has been assumed to be operational at the rail served warehouse platforms of Units 5, 6, and 7.

Two diesel locomotives idling continuously on-site have been assumed, one on the intermodal platform, the other on the express cross dock platform.

Two diesel rail shunters operating under full load have been assumed operating between the intermodal platform and rail served warehouse units.

Three reach stackers have been assumed to be operational on the intermodal platform.

Six tugs have been assumed shuttling trailers between the intermodal platform and warehouses. One tug has been modelled in each zone, including the intermodal platform.

Typically four idling HGVs and two manoeuvring HGVs have been assumed in yards, except for at the smaller units (Units 8, 12, and 13) where two idling HGVs and one manoeuvring HGV has been assumed. One idling HGV and two manoeuvring HGVs have been assumed on the intermodal platform. An additional manoeuvring HGV has been assumed in the truck park.

It has been assumed that 10% of all HGV bays in yards, based on the capacity indicated by the size of each warehouse, and 10% of all HGV/trailer parking spaces in the truck park and intermodal platform would have diesel driven HGV/trailer mounted chillers in operation. HGV mounted diesel driven chillers in yards, however, would operate in electric standby mode to reduce noise emissions from the site.

Figure 1 of this appendix shows the distribution of noise sources across the site as used in the noise model.

Figure 1: Distribution of on-site operational noise sources used in model

Rail Central - On-Site Operation - Equipment List Sound Power Levels

Revision	Date	Comment
0	18/03/2016	Generic data for assumed sources
1	05/01/2017	Revised data based on measurement and manufacturers' data
2	03/02/2017	Including mitigation - electric HGV chillers in yards and revised unit mech. vent. Lw allowance
3	03/05/2017	Reduced unit mech. vent. and cooling plant zone Lw allowance
4	02/06/2007	Additional sources - shunter under load, reach stackers, tugs, substation, revised number of idling locos, electric forklift trucks

Equipment or Source	Octave Band Sound Power Level, Lw (Linear)								LwA	Frequency shaping (L/M/H)	Comments	% On-time	% On-time correcte	No. off
	63	125	250	500	1k	2k	4k	8k						
HGV manoeuvring	105	100	93	96	95	93	89	79	**100**		1.2m high. Articulated road HGV measured by Spectrum (slow moving HGV at DIRFT II)	100	**100**	27
HGV idling	107	93	91	92	90	88	83	76	**95**		1.2m high. Articulated road HGV measured by Spectrum at an Advanced Manufacturing Facility in Nottingham.	100	**95**	47
Chiller mounted on HGV – standard diesel operation (as used in truck park and intermodal parking)	105	105	100	95	90	87	83	80	**97**	L	4m high. Based on average of noise data provided by Hubbard, 70-78dB(A) at 7.5m depending on size/power	100	**97**	22
Chiller mounted on HGV – electric standby operation (as used in yards)	81	86	86	83	83	81	78	76	**88**	M	4m high. Based on average of noise data provided by Hubbard, 62-68dB(A) at 7.5m depending on size/power. (M).	100	**88**	84
Small general purpose diesel forklift manoeuvring	109	106	93	88	88	87	80	71	**95**		2m high. 56KW operating diesel forklift measured by Spectrum at an Advanced Manufacturing Facility in Nottingham.	100	**95**	27
Small general purpose electric forklift manoeuvring	81	78	80	83	80	85	87	68	**91**		2m high. Operating electric forklift measured by Spectrum at manufacturing facility in Newcastle.	100	**91**	3
Unit mechanical ventilation and cooling plant zone	83	88	88	85	85	83	80	78	**90**	M	4 per unit at high level. Assumed LwA 90 dB. (M).	100	**90**	52
Intermodal gantry crane low level drive system (bogies)	84	89	90	98	97	95	95	85	**102**		1.5m high. Sound output split evenly between high and low levels sources. Based on data provided by Konecranes (fully electric RMG)	100	**102**	3
Intermodal gantry crane high level drive system (trolley/hoist gear)	84	89	90	98	97	95	95	85	**102**		20m high. Sound output split evenly between high and low levels sources. Based on data provided by Konecranes (fully electric RMG)	100	**102**	3
Intermodal gantry crane broadband noise alarm					103	107	101	91	**110**		2m high. Brigade BBS-107 White Sound Reversing Alarm. (Frequency spectrum from measured data University of New South Wales for Department of Climate Change, Australia.	100	**110**	12
Diesel locomotive idling continuously	112	106	108	104	96	94	86	79	**105**		3m high. Idling diesel loco measured by Spectrum at DIRFT II. One idling on intermodal platform and one idling at express cross dock platform.	100	**105**	2
Diesel rail shunter under full load	117	117	112	107	102	99	95	92	**109**	L	3m high. (L). LwA data from DIRFT III Environmental Statement (2013). Primarily handling trains to and from the intermodal terminal and the rail-linked warehouses.	100	**109**	2
Reach stacker	119	119	114	109	104	101	97	94	**111**	L	3m high. (L). LwA data from Konecranes (reach stackers for intermodal handling, 41 to 45 tons)	100	**111**	3
Tug manoeuvring	105	104	103	107	98	95	93	84	**106**		2m high. Manoeuvring tug measured by Spectrum at DIRFT II (2012). Six tugs shuttling containers to and from warehouses and within the terminal itself. One tug modelled in each Zone, including Intermodal platform.	100	**106**	6
Sub station	96	96	86	81	76	73	69	66	**85**		2m high. LwA data supplied by Hydrock.	100	**85**	1