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Re: White Bay 6 - Operational noise compliance assessment

1 Introduction

EMM Consulting Pty Limited (EMM) has been engaged by White Bay 6 Pty Ltd to complete an operational noise compliance assessment of the marine storage and refuelling facility (the site) at Berth 6, White Bay, NSW.

The purpose of the assessment is to address the requirements of the Minister's Condition of Approval (MCoA).

This report presents noise measurement data collected on 19 January 2016 and the results, findings and discussions of the compliance noise assessment.

The following material was referenced as part of this assessment:

- Minister's Condition of Approval (MP 06_0037) (MCoA); and
- Environmental Protection Authority 2000, *Industrial Noise Policy* (INP).

2 Minister's Condition of Approval (MCoA)

The Minister's Condition of Approval (MCoA) for the site was granted on 14 September 2009 and has been modified four times to date. The site is currently operating under restrictions during day, evening and night periods. Condition A7 of the MCoA summarises time restrictions that apply at the site.

Condition A7 - Hours of Operation

Activity	***Day***	***Time***
Mixed marine tenancies and commercial storage & work sheds & dry boat storage use	*Monday – Saturday* *Sunday and Public Holidays*	*7:00 am to 6:00 pm* *8:00 am to 6:00 pm*
All activities on hardstand/lay down areas eg. Power tools, travel lifts, roll on roll off ramp, cranes forklifts		
Truck movements to and from the site		
General deliveries		
Disposal and collection of garbage including cans and bottles from vessels		
Recreational vessel arrivals, departures	*Monday – Sunday*	*5:00 am to 10:00 pm*

Condition A7 - Hours of Operation

Activity	***Day***	***Time***
and mooring		
*Recreational vessel refuelling and grey water sewerage pump out *(refer to Condition F15)*		
Commercial vessel arrivals, departures and mooring	*Monday – Sunday*	*Anytime*
Commercial vessel refuelling and grey water and sewerage		
Commercial offices		
Office buildings mechanical services e.g. A/C plant, compressors for chiller room etc.		

The MCoA summarises the sites noise contributions limits in Conditions F1, F2 and F3 as follows.

"Condition F1 - Noise Limits:

The use of any part of the premises including vessel refuelling and other activities, and the operation of the plant, machinery or other equipment on the site must not exceed the sound pressure (noise) limits presented in the table below

a) Noise limits – During operation of the facility

Residential location	***Day***	***Evening***	***Night***		
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(9\ hours)}$	$L_{A1(1\ minute)}$
1 Grafton St, Balmain	*54*	*48*	*48*	*45*	*59**
Datchett St, Balmain	*49*	*44*	*44*	*41*	*54**
33 Adolphus St, Balmain	*36*	*35*	*35*	*35*	*60**
2 Point St, Pyrmont	*40*	*35*	*35*	*35*	*61*

*Notes: 1.*The sleep disturbance limits do not apply to trucks whilst engaged in movements on the access road to enter or leave the site.*

b) For the purpose of clause (a) of this condition:

i. Day is defined as the period from 7.00 am to 6.00 pm Monday to Saturday and 8.00 am to 6.00 pm Sundays and Public Holidays;
ii. Evening is defined as the period from 6.00 pm to 10.00 pm; and
iii. Night is defined as the period from 10.00 pm to 7.00 am Monday to Saturday, and 10.00 pm to 8.00 am Sundays and Public Holidays.

Condition F2 – Noise measurements

(1) Noise from the premises is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance with the noise level limits in Condition F1 unless otherwise stated.

(2) Noise from the premises is to be measured at 1 metre from the dwelling facade to determine compliance with the LA1(1 minute) noise level in Condition F1.

(3) Where it can be demonstrated that direct measurement of noise from the premises is impractical, the DECC may accept alternative means of determining compliance (See Chapter 11 of the Industrial Noise Policy).

(4) The modification factors presented in section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where practicable.

(5) The noise emission limits identified in F1 apply under meteorological conditions of wind speed up to 3 metres per second at 10 metres above ground level, and temperature inversion conditions.

Condition F3 – Noise Compliance Monitoring

A noise compliance assessment must be undertaken within three months of commencement of operations at the premises and submitted to the Director General. The assessment must be prepared by a suitably qualified and experienced acoustical practitioner and must assess compliance with noise limits in Condition F1.

Should the assessment indicate any non-compliance with the specified noise limits the Proponent must take appropriate measures to limit any impacts and must submit a further report upon the implementation of the measures. Further reporting must be undertaken every 12 months unless otherwise directed by the Director General."

3 Assessment methodology

To quantify noise emissions from the site, attended noise measurements were completed by EMM during February 2015 compliance period to capture the individual plant and equipment activities as outlined in condition A7, with associated sound power levels. These noise measurements were used to predict the noise contribution from site at the surrounding residences in accordance with condition F2(3) using a noise propagation model. This model was validated using operator attended noise measurements conducted at relevant site boundaries and sensitive receiver locations shown in Figure 1. The noise contributions were assessed against noise limits in condition F1(a).

The noise monitoring was carried out using a Bruel and Kjear 2250 Type 1 integrating sound level meter (s/n 3008201). The unit carries current manufacturer conformance certificates and complies with *Australian Standard AS 2659.1 - 1998: Guide to the use of sound measuring equipment - Portable sound level meters*. The sound level meter was calibrated in the field prior to and following the noise measurements and the drift in noise level was found to be within acceptable limits (+/- 0.5 dB(A)).

4 Noise measurements

EMM undertook short-term 15-min attended noise measurements on 19 January 2016 at the site boundaries and nearest representative noise sensitive receivers as shown on Figure 1.

The noise measurements were conducted in accordance with NSW Environmental Protection Authority's (EPA) 2000 *NSW Industrial Noise Policy* (INP) requirements. Table 1 summarises the attended noise measurements. The weather conditions at the time of monitoring included clear skies, no rain and very mild northerly winds (<3m/s).

The site activity at the time of measurements was typical of a standard day of operations with the following items operating in normal cycles:

- two boat hoists;

- one marina bull;
- one 3.5 tonne forklift;
- one compressor in shed;
- one gerni; and
- one compressor and fuel pumps.

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Site locality and noise monitoring locations

White Bay 6

Operational noise compliance assessment

Figure 1

Table 1 Attended noise measurements – 19 January 2016

ID	Location (Refer Figure 1)	Time	Duration	Noise measurement, dB				Comments/ noise source observations
				L_{Aeq}	L_{A90}	L_{Amax}	$L_{Aeq,site}$ [1]	
1	South east extent of site	9:11	15 minutes	59	51	88	56	Forklift manoeuvring (55 to 57dB); Boat hoist idling (continuous) (<51dB); Ferry horn when leaving pump-out (82dB); Ferry leaving pump-out (57 to 60dB); Ferry entering pump-out (60 to 65dB); Boat hoist moving (up to 57dB).
2	North east extent of site	9:32	15 minutes	49	45	66	<43	Generally less activity at this location compared to south east extent; Aircraft events (up to 65dB); Distant construction (Barangaroo) (<49dB); Boat leaving pump-out (45 to 50dB).
3	North-western extent of site – representative of 1 Grafton Street, Balmain (site level)	9:51	15 minutes	53	46	66	<46	Cruise terminal activity dominant (construction up to 57dB, general "hum" approx 46dB); Boat hoist operation from boat shed (up to 58dB); Distant screeching noise from cruise terminal (<50dB).
4	Grafton St, Balmain	10:32	15 minutes	56	51	76	<41	Cruise terminal dominant (construction up to 65dB, general hum approx 51dB); Construction maintenance on Grafton St (impacts up to 76dB, general activity approx 53dB)
5	Datchett Street	11:04	15 minutes	51	47	73	<41	Barangaroo construction (approx 45dB) 1 x boat hoist and 1 x forklift operating through measurement however mostly inaudible; Reverse alarm from forklift audible on occasion (<45dB).
6	2 Point Street	11:52	15 minutes	54	50	68	<40	Local traffic noise (55 to 60 dB); General harbour noise (up to 60dB); Natural noise sources (eg birds)

Notes: 1.The noise contribution from site only.

5 Noise compliance assessment

Chapter 11 of the INP states that where existing ambient noise levels are too high, measurements may be taken closer to the source and then calculated back to a specific location. This method has been adopted to determine the site noise contribution at residential locations listed in the MCoA. The adopted calculation method accounts for measured sound power levels (at source), distance from sources to receiver, air absorption and any shielding effects from terrain and building structures. Measurements at relevant site boundaries and nearest noise sensitive receivers were also conducted to further verify noise predictions as far as practicable.

The marine storage and refuelling facility is currently operating over a 24 hour period, with limited activities during the evening and night periods. Based on observations on-site and information provided by the proponent, it is understood that the activities presented in condition A7 can be in operation for a full 15 minute period during daytime operations at any one time. However, the site operations are restricted to fuel pumping only during evening and night periods. This has been accounted for in noise calculations.

Table 2 summarises the predicted noise levels. Estimated measured noise level emissions for the day period have been provided for comparison.

Table 2 Noise compliance assessment, dB(A)

Location	Criteria					Measurement[1]	Calculated noise levels, dB[2]					Compliance		
	Day	Day	Night			Day	Day	Evening	Night			Day	Evening	Night
	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(9\ hour)}$	$L_{A1(1min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(9\ hour)}$	$L_{A1(1min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$	$L_{Aeq(15min)}$ / $L_{Aeq(9\ hour)}$ / $L_{A1(1min)}$
1 Grafton St, Balmain	54	48	48	45	59	<46	53	<25	<25	<25	<25	Yes	Yes	Yes/Yes/Yes
Datchett St, Balmain	49	44	44	41	54	<41	49	<25	<25	<25	<25	Yes	Yes	Yes/Yes/Yes
33 Adolphus St, Balmain	36	35	35	35	60	<35[3]	33	<25	<25	<25	<25	Yes	Yes	Yes/Yes/Yes
2 Point St, Pyrmont	40	35	35	35	61	<40	40	<25	<25	<25	<25	Yes	Yes	Yes/Yes/Yes

Notes: *1. Estimated from Table 1.*

2. All activities included in the daytime. Only refuelling activities included during evening and night-time periods.

3. Based on the measured noise level at ID 4 minus 6 dB to account for added distance attenuation.

The predicted and measured site noise contribution satisfies the noise limits at all residential locations as listed in the MCoA.

Calculations assume that equipment is operating at full duty for a full 15 minute period. Based on discussions with the operator and our own site observations it is apparent that this is not general practice for the site. The noise level calculations are therefore considered conservative. This is evident in the measured noise levels in Table 2 during the day, whereby generally they were far less than the predicted noise level. It is likely this would also apply to noise emission during evening and night period given the conservative assumptions behind noise level calculations.

6 Conclusion

EMM has completed a noise compliance assessment for Berth 6 White Bay, Balmain. The assessment was completed in accordance with the requirements of the Minister's Conditions of Approval (MCoA) and the EPA's Industrial Noise Policy (INP).

Chapter 11 of the INP states that where existing ambient noise levels are too high, measurements may be taken closer to the source and then calculated back to a specific location. This method has been adopted to determine the site noise contribution at residential locations listed in the MCoA. Measurements at relevant site boundaries and nearest noise sensitive receivers were also conducted to further verify noise calculations as far as practicable.

In summary, the calculations and measured noise contribution from the site satisfies the MCoA noise limits at all residences outlined in the MCoA.

We trust this information satisfies your requirements and if you require any further details please contact the undersigned.

Yours sincerely

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Reviewed by: NI

Appendix A

Glossary of acoustic terms

Several technical terms are discussed in this report. These are explained in Table A.1.

Table A.1 Glossary of acoustic terms

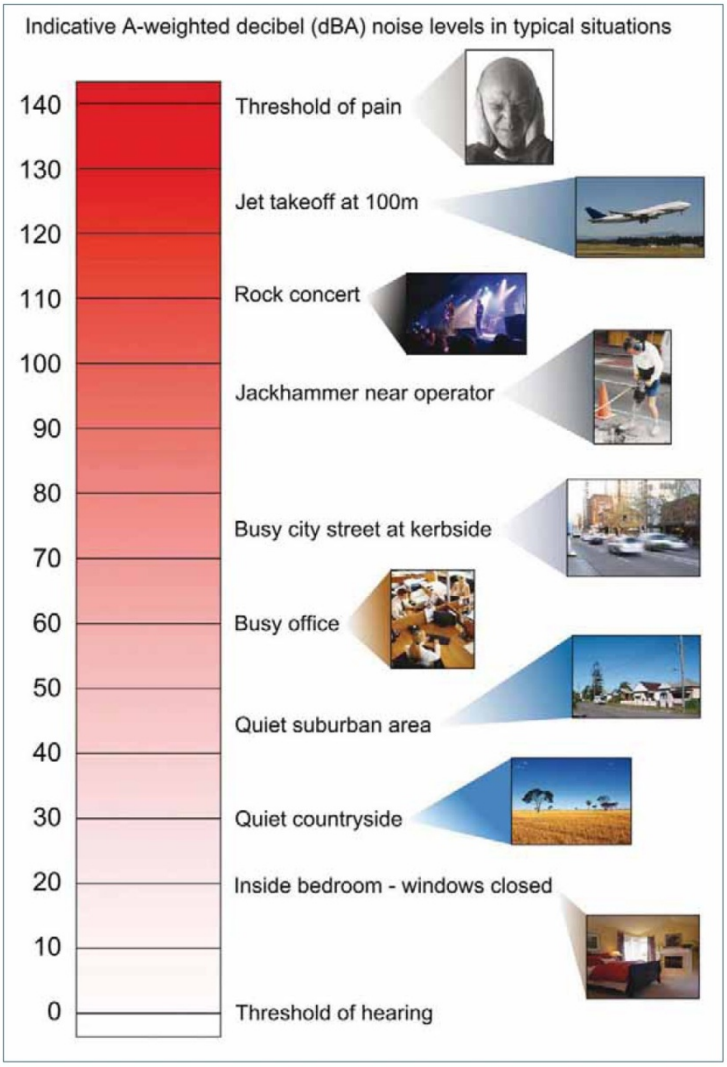
Term	Description
dB(A)	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
L_{90}	Commonly referred to as the background noise level. The noise level exceeded 90% of the time.
L_{eq}	The energy average noise from a source. This is the equivalent continuous sound pressure level over a given period. The $L_{eq(15min)}$ descriptor refers to an L_{eq} noise level measured over a 15 minute period.
L_{max}	The maximum root mean squared sound pressure level received during a measuring interval.

It is useful to have an appreciation of decibels, the unit of noise measurement. Table A.2 gives an indication as to what an average person perceives about changes in noise levels:

Table A.2 Perceived change in noise

Change in sound level (dB)	Perceived change in noise
0-2	Typically indiscernible
3	just perceptible
5	noticeable difference
10	twice (or half) as loud
15	large change
20	four times as loud (or quarter) as loud

Examples of common noise levels are provided in Figure A.1.



Source : RNP (Department of Environment, Climate Change and Water (DECCW), 2011)

Figure A.1 Common noise levels