

16 April 2019

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Re: White Bay 6 - Operational noise compliance assessment 2019

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 13 February 2019 and the results, findings and discussions of the noise compliance assessment.

The following material was referenced as part of this assessment:

- Minister's Conditions of Approval (MP 06_0037) (MCoA); and
- Environmental Protection Authority 2000, *NSW 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, presented below, summarises time restrictions that apply at the site.

Condition A7 - Hours of Operation

Activity	Day	Time
Dry boat storage activities limited to moving boats in and out of the water and the operation of a marine forklift	From 1 September to 30 April only: - Monday – Saturday - Sunday and Public Holidays	- 7:00 am to 7:00 pm - 7:00 am to 7:00 pm
Mixed marine tenancies and commercial storage & work sheds	During the remainder of the year: - 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	Monday – Saturday Sunday and Public Holidays	7:00 am to 6:00 pm 8:00 am to 6:00 pm
General deliveries		
Disposal and collection of garbage including cans and bottles from vessels		
Recreational vessel arrivals, departures and mooring	Monday – Sunday	5:00 am to 10:00 pm
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 site's 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 ¹
Datchett St, Balmain	49	44	44	41	54 ¹
33 Adolphus St, Balmain	36	35	35	35	60 ¹
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:

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;

Evening is defined as the period from 6.00 pm to 10.00 pm; and

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

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.

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.

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).

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

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

Attended noise measurements were completed on 13 February 2019 to quantify noise emissions from the site during the day period. Measurements taken directly at noise sensitive receivers found that existing ambient noise levels were generally too high to determine a noise contribution from the site. Measurements were subsequently taken at three points on the boundary of the site, where extraneous noise sources did not significantly contribute to the noise profile. The relevant measurement points are indicated in Table 4.1 (measurement points 1, 2 and 3).

The site noise contribution at each noise sensitive location was determined as per condition 7.1 of the NSW Environmental Protection Authority's (EPA) 2000 Industrial Noise Policy (INP) requirements, which states that:

Where direct measurement of noise at a compliance location is not practical because of poor signal-to-noise ratios (that is, extraneous noise is louder than the noise under investigation), measurements at intermediate locations between the source and the receiver location, where signal-to-noise ratios are higher, may be a viable option.

The attended noise monitoring was carried out using a Brüel & Kjær 2250 Type 1 sound analyser (serial number 3008201). The sound analyser was calibrated before and on completion of the survey using a Brüel & Kjær Type 4230 calibrator (serial number 1442144). The instruments were within their NATA laboratory calibration period during the time of these readings, and also comply with *Australian Standard AS 2659.1 - 1998: Guide to the use of sound measuring equipment - Portable sound level meters*. All measurements were taken in accordance with *AS 1055.1-1997 Acoustics - Description and measurement of environmental noise - General procedures*. Refer to Appendix B for calibration certificates.

Based on site observations and experience from previous annual compliance monitoring, it was considered that the noise contribution from the plant and equipment operating during evening and night periods (refuelling only) would not be quantifiable over existing ambient noise levels at residential locations. Therefore, for evening and night operations site noise predictions were made using onsite sound power measurements. The adopted calculation method for evening and night operations accounts for measured sound power levels (at source), distance from sources to receivers, air absorption and any shielding effects from terrain or building structures.

4 Noise measurements

Short-term 15-minute attended noise measurements were conducted at the site boundaries and residential locations as shown in Figure 4.1.

The noise measurements were conducted in accordance with INP requirements. The weather conditions at the time of monitoring were slightly cloudy with calm to light southerly winds (<3 m/s).

Onsite plant and equipment items are provided in the list below. Note that concurrent operation of several items was captured during the measurement period, which is typical of the site's daytime operations.

- two boat hoists;
- two marina bulls;
- one 3.5 tonne forklift;
- one compressor in shed;
- one hand held water pressure cleaner; and
- one compressor and fuel pump.

One additional scissor lift was present on site at the time of measurements. This was a hire item and only used on site temporarily.



- The site
- Sensitive receiver
- Short-term attended noise monitoring location

Site locality and noise monitoring locations

White Bay 6
Operational noise compliance assessment
Figure 4.1

Table 4.1 summarises the attended noise measurements.

Table 4.1 Attended daytime noise measurements – 13 February 2019

ID	Location (Refer to Figure 1)	Time ¹ (24-hour)	Noise measurement, dB			Comments/observations
			L _{Aeq, 15min}	L _{A90}	L _{Amax}	
1	South east boundary of site	10:18	67	53	89	Marina bull – traversing with boat (67 – 69 dB), distant reverse “quacker” (53 dB). Boat pulling up to dock (55 dB). Hand tools from nearby workers (54 – 62 dB). Passer-by conversations (55 – 60 dB). Boat lowering engine (56 dB). Nearby boat motor idling in yard (86 dB). Hand tools and buffer on nearby boat (58 – 60 dB). Boat hoist with boat traversing (60 – 62 dB). City traffic and industrial background hum (51 dB).
2	North east boundary of site	9:57	67	50	87	Boat horn on harbour (70 dB). Pushing hand trolley (58 dB). Water pressure cleaner 10m away (80 - 83 dB). Passer-by talking (56 dB). Marina bull traversing with boat (58 – 68 dB). Hand tools and buffers. Distant car engine (58 dB). City traffic and industrial background hum (48 dB).
3	North west boundary of site	9:39	55	49	73	Marina bull traversing with boat (54 – 65 dB). Gate closing nearby (70 dB). Marina bull reversing “quacker” (50 dB). Hand tools and collisions (64 dB). Car pass-by (60 dB). Lawnmower in park to North (52 dB). Birdsong in nearby park (50 – 55 dB). City traffic and industrial background hum (47 dB).
4	Grafton Street, Balmain	11:01	51	49	70	Hand tools (buffers) audible occasionally in but below background. Car pass-by (51 dB). Tugboat on harbour. Aircraft fly-over (52 dB). Car doors closing nearby (70 dB). Cicadas intermittently (58 dB). Helicopter fly-over (52 dB). City traffic and industrial background hum (47 dB).
5	Further west on Grafton Street, Balmain	11:29	54	52	67	Hand tools audible occasionally but below background. Car pass-by (66 dB). Truck movements at Passenger Terminal (56 dB). Two aircraft fly-overs (55 dB). City traffic and industrial background hum (50 dB).
6	Datchett Street, Balmain	12:06	53	50	66	Hand tools audible occasionally but below background. Dogs barking in park (56 dB). Lawn mower in distance. Barge pass-by (55 dB). Passer-by conversation (65 dB). Ferry pass-by (54 dB). Other boat pass-by (57, 60 dB). Trees rustling (up to 53 dB). Aircraft fly-over (55 dB). Industrial breaks/screech across harbour (59 dB). City traffic and industrial background hum (47 dB).
7	2 Point Street, Piermont	12:45	54	50	76	Barge pass-by (56 dB). Aircraft fly-over (57 dB). Passer-by conversations (55 dB). Car pass-by on Pirrama Rd (56 – 65 dB). Boat pass-by (56 dB). Constant hum of air-conditioner/other services at apartments behind and city traffic/industrial background hum (~49 dB).

Notes: 1. All measurements were 15 minutes in duration.

5 Noise compliance assessment

Table 5.1 summarises the predicted site noise contributions at the noise sensitive receivers based on measured noise levels at positions 1, 2 and 3 in Table 4.1. The total noise levels presented for these locations are assumed to be generated by White Bay 6. This is a conservative assumption given that other extraneous noise sources were also observed during the noise measurements. At all receivers, the predicted noise levels satisfy the limits specified in the MCoA.

Table 5.1 Noise compliance assessment

Location	Criteria					Calculated noise levels, dB					Compliance			
	Day		Evening		Night	Day ²		Evening ³		Night ³	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(9 hour)}	L _{A1(1min)}	L _{Aeq(15min)}	L _{Aeq(15min)}	L _{Aeq(15min) / L_{Aeq(9 hour) / L_{A1(1min)}}}	
1 Grafton Street, Balmain	54	48	48	45	59	43	<25	<25	<25	<25	Yes	Yes	Yes	
Datchett Street, Balmain	49	44	44	41	54	38	<25	<25	<25	<25	Yes	Yes	Yes	
33 Adolphus Street, Balmain	36	35	35	35	60	33	<25	<25	<25	<25	Yes	Yes	Yes	
2 Point Street, Pyrmont	40	35	35	35	61	36	<25	<25	<25	<25	Yes	Yes	Yes	

Notes:

1. Only refuelling activities included during evening and night-time periods.

2. Noise contribution from site determined by applying distance attenuation adjustments to reference measurements from Table 4.1.

3. Noise contribution from site determined by calculating sound pressure levels from activity sound power measurements of refuelling activities on site.

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).

Section 7.1 of the INP states that where direct measurement of noise at a compliance location is not practical because of poor signal-to-noise ratios (that is, extraneous noise is louder than the noise under investigation), measurements at intermediate locations between the source and the receiver location, where signal-to-noise ratios are higher, is permissible. This method has been adopted to calculate the site noise contribution at residential locations listed in the MCoA.

The calculated site noise contributions, based on a three-dimensional model that was calibrated using measurements at intermediate locations, satisfied the MCoA noise limits at all residences outlined in the MCoA, for all periods.

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

Yours sincerely,



Rick Scully
Acoustic Consultant

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Reviewed by: **Najah Ishac (Director)** 26/2/19

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

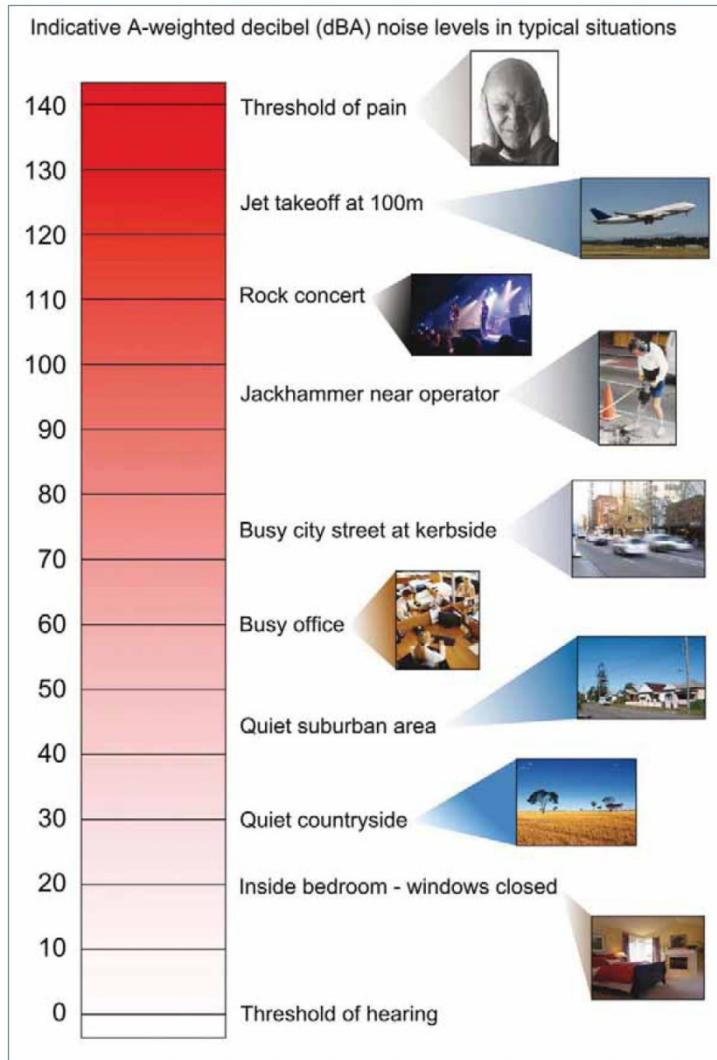
Term	Description
dB	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
L_{A1}	The 'A-weighted' noise level which is exceeded 1% of the time.
$L_{A1(1\text{-min})}$	The 'A-weighted' noise level exceeded for 1% of the specified time period of 1 minute.
L_{A10}	The 'A-weighted' noise level which is exceeded 10% of the time. It is approximately equivalent to the average of maximum noise level.
L_{A90}	Commonly referred to as the background noise level. The 'A-weighted' noise level exceeded 90% of the time.
L_{Aeq}	The energy average noise from a source. This is the equivalent continuous 'A-weighted' sound pressure level over a given period. The $L_{Aeq(15\text{-min})}$ descriptor refers to an L_{Aeq} noise level measured over a 15-minute period.
L_{Amin}	The minimum 'A-weighted' noise level received during a measuring interval.
L_{Amax}	The maximum root mean squared 'A-weighted' sound pressure level (or maximum noise level) received during a measuring interval.
L_{Ceq}	This is the equivalent continuous 'C-weighted' sound pressure level over a given period. The $L_{Ceq(15\text{-min})}$ descriptor refers to an L_{Ceq} noise level measured over a 15-minute period. C-weighting can be used to measure low frequency noise.
Day period	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening period	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Morning shoulder	Monday – Saturday: 6 am to 7 am.
Temperature Inversion	A meteorological condition where the atmospheric temperature increases with altitude.

It is useful to have an appreciation of decibels (dB), the unit of noise measurement. Table A.2 gives an indication as to what an average person perceives about changes in noise levels. Examples of common noise levels are provided in Figure A1.

Table A.2 Perceived change in noise

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

Figure A1 Common noise levels



Source: Road Noise Policy (Department of Environment, Climate Change and Water 2011)

Appendix B

Calibration certificates

CERTIFICATE OF CALIBRATION

Certificate No: CAU1700759

Page 1 of 10

CALIBRATION OF:

Sound Level Meter:	Brüel & Kjær	2250	No: 3008201
Microphone:	Brüel & Kjær	4189	No: 2983733
Preamplifier:	Brüel & Kjær	ZC-0032	No: 22666
Supplied Calibrator:	Brüel & Kjær	None	No: NONE
Software version:	BZ7222 Version 4.7.3	Pattern Approval:	PENDING
Instruction manual:	BE1712-22	Identification:	

CUSTOMER:

EMM Consulting
Suite 01, 20 Chandon Street
St Leonards NSW 1590

CALIBRATION CONDITIONS:

Preconditioning: 4 hours at 23 °C

Environment conditions: *see actual values in Environmental conditions sections*

SPECIFICATIONS:

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-3:2006 class 1. Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

PROCEDURE:

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 6.0 - DB: 6.00) and test procedure 2250-4189.

RESULTS:

	Initial calibration	Calibration prior to repair/adjustment
X	Calibration without repair/adjustment	Calibration after repair/adjustment

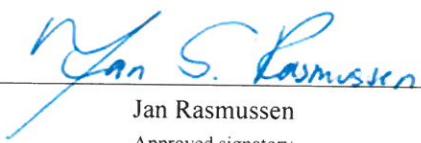
The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of Calibration: 18/08/2017

Certificate issued: 18/08/2017



Craig Robert Patrick
Calibration Technician



Jan Rasmussen
Approved signatory

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: 23146

EQUIPMENT TESTED: Sound Level Calibrator

Manufacturer:

B & K

Type No:

4230

Serial No: 1442144

Owner:

EMM Consulting

Ground Floor, Suite 01, 20 Chandos St
St Leonards NSW 2065

Tests Performed:

Measured output pressure level was found to be:

Parameter	Pre-Adj	Adj Y/N	Output: (db re 20 µPa)	Frequency: (Hz)	THD&N (%)
Level 1:	NA	N	94.11	987.9	1.12
Level 2:	NA	N	NA	NA	NA
Uncertainty:			±0.11 dB	±0.05%	±0.20 %

Uncertainty (at 95% c.l.) k=2

CONDITION OF TEST:

Ambient Pressure: 998 hPa ±1.5 hPa Relative Humidity: 25% ±5%

Temperature: 24 °C ±2°C

Date of Calibration: 17/07/2018 Issue Date: 17/07/2018

Acu-Vib Test Procedure: AVP02 (Calibrators)

Test Method: AS IEC 60942 - 2004

CHECKED BY:  AUTHORISED SIGNATURE: 
Jack Kiell

.Accredited for compliance with ISO/IEC 17025 - Calibration

The results of the tests, calibration and/or measurements included in this document are traceable to
Australian/national standards.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the
Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of
approximately 95%.



Accred Lab. 9262
Acoustic and Vibration
Measurements



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