

Operational Noise Compliance Assessment



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1.0 Introduction

1.1 Background

AECOM Australia Pty Ltd (AECOM) was commissioned by White Bay 6 Pty Ltd, to conduct an operational noise compliance assessment of the marine refuelling facility at Berth 6, White Bay, NSW (the project).

This report:

- Identifies the noise limits as presented in the Minister's Condition of Approval (MCoA) as modified;
- Presents noise measurements taken onsite and at the nearest residential receiver;
- Provides noise level estimates at the nominated residences; and
- Provides an assessment of compliance with the operational noise limits during times of operation.

Attended noise measurements were conducted on Wednesday, 5 June 2014.

The acoustic terminology used in this report is presented in **Appendix A**.

1.2 The project

The approval originally granted by the then Minister for Planning allowed for the construction and operation of the following at Berth 6:

- Marine refuelling facilities consisting of a tank farm capable of storing 385,000 litres (L) of diesel fuel and 55,000 L of unleaded fuel, eight card-operated refuelling dispensers and associated pipe work;
- A building approximately 11 metres high and 50 metres long for bulk storage and a small number of office leases for commercial marine service businesses (Building 1);
- A building approximately 10 metres high and 50 metres long for bulk indoor storage space for boat storage and marine equipment, including rope, buoys, lifeboats or other marine hardware and work shed for refit and repair of boats (Building 2);
- A roll-on/roll-off (RoRo) ramp for intermodal freight operations to service Sydney Harbour islands, with an associated laydown area for temporary storage of goods for water transport;
- A 75-tonne capacity travel-lift with associated construction of dual ramps adjacent to the RoRo ramp;
- Grey water and sillage pump facilities, consisting of a card-operated pump to remove sillage from vessels;
- A supply point for commercial vessels to collect pre-ordered supplies; and
- Three temporary vessel moorings.

The approval has since been modified on four occasions, as detailed below:

- Modification 06_0037 MOD 1 and Modification 06_0037 MOD 2 which related to minor modifications to administrative conditions and noise limits;
- Modification 06_0037 MOD 3, approved on 14 August 2012, which related to the installation of additional temporary moorings, an increase to the mooring period and the introduction of de-fouling and anti-fouling activities to the site; and
- Modification 06_0037 MOD4, approved on 28 March 2014, which related to the dry storage of up to 50 boats within Building 2, additional car parking, new floating pontoons, a caretaker's accommodation in Building 1, and demountable style buildings for office purposes and amenities.

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1.3 Site description and activities

The site is located at Berth 6, White Bay as shown in **Figure 1**. The site is bounded by water to the north east and south, and developing Passenger Cruise Terminal to the west. The nearest residential receivers are adjacent to the site approximately 10 metres to the northwest of the site boundary.

The boat repair and maintenance, refuelling, grey water and sullage pump facilities aspects of the project are now operational. Plant and equipment on site consists of a shed housing a fully enclosed compressor, pumps for waste water and two diesel petrol pumps, a marine bull and a boat lift. Refuelling facilities are located along the southern boundary of the site, which is used by recreational and commercial vessels. Other general site activities at the site include the use of hand tools, boat defouling and light vehicles moving within the car park.

Figure 2 provides the site layout, as approved. Construction of Building 2 has commenced, however, this was currently not actively under construction during the site visit. Building 1, Office 1 and Office 2 have not been constructed.

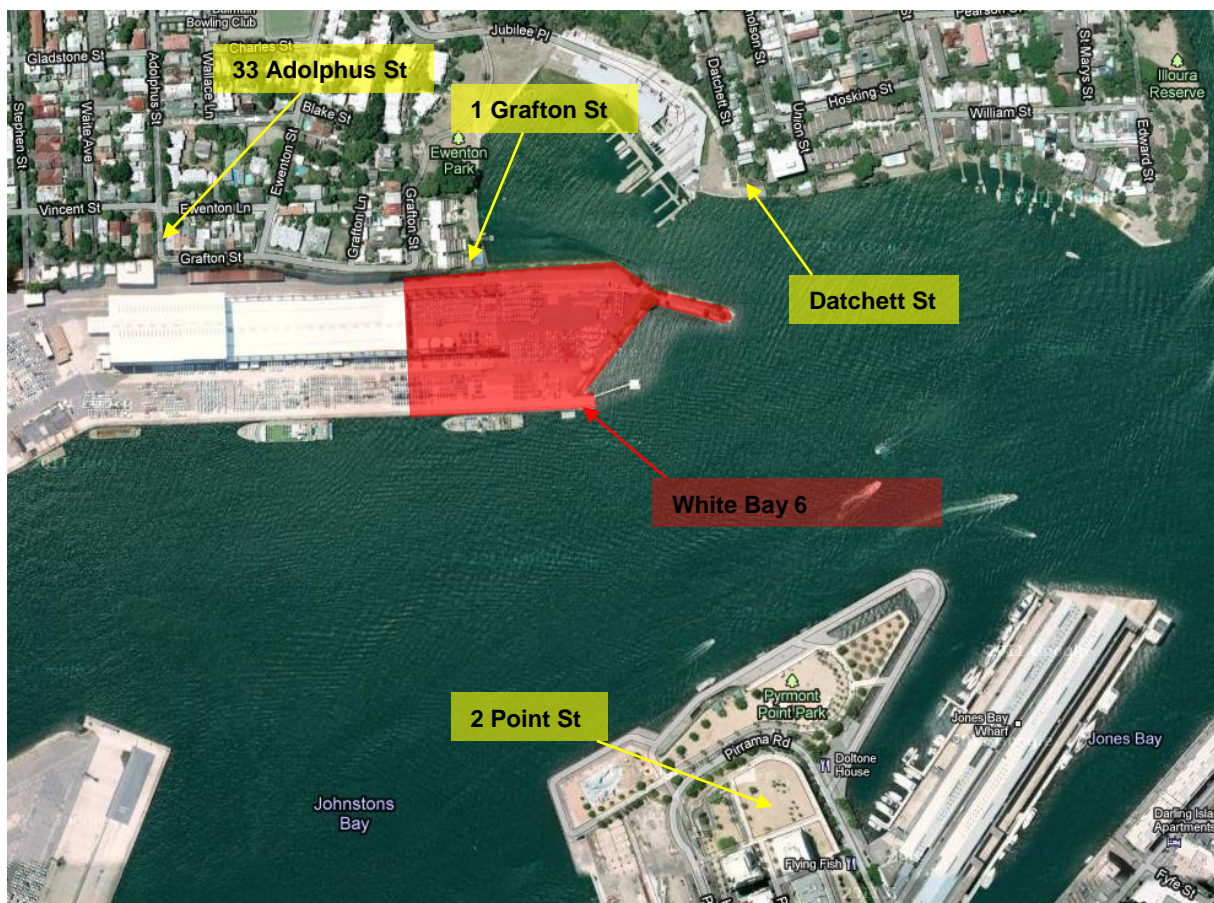


Image courtesy of Google (2011).

Figure 1 Location plan

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Figure 2 Site layout (as approved)

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The Minister's Conditions of Approval (MCoA) for the project were granted on 14 September 2009, and have since been modified on four occasions. The operation for the project has restricted hours and days which equipment and activities can be used. These restrictions are provided in Condition A7 of the MCoA. This table has been reproduced at the end of this section. Conditions F1, F2 and F3 of the MCoA stipulate the noise contribution limits applied to the operation of the facility and the requirements for compliance noise monitoring.

A7 Hours of Operation

Activity	Day	Time
Mixed marine tenancies & commercial storage & work sheds & dry boat storage use	Monday – Saturday	7.00 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	Sunday and Public Holidays	8.00 am to 6.00 pm
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 building mechanical services e.g. A/C plant, compressors for chiller room etc		

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 level pressure (noise) limits presented in the table below. Note the limits represent the sound pressure level (noise) contribution, at the nominated receiver locations in the Table

(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

*The sleep disturbance limits do not apply to trucks whilst engages 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.

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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 $L_{A1(1\text{ minute})}$ 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.*

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.

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3.0 Noise measurements

3.1 Attended noise monitoring

Noise measurements were taken on Wednesday 5 June 2014 between 1:30 pm and 3:30 pm. The noise measurements were taken on site of the plant and equipment and predictions were made to determine the noise contribution from the facility at the other nominated residences in accordance with condition F2(3) of the MCoA. Weather conditions during the measurement were sunny with little wind.

Compliance or non-compliance will be established via a suitable propagation model. The most sensitive receiver is 1 Grafton Street Balmain, NSW, which was used to calibrate the noise emission from the site to other potential affected receivers. The sensitive receiver (1 Grafton Street Balmain) has been identified as the most affected receiver in condition F1 of the MCoA (refer to **Chapter 2.0**). A compliance noise measurement was taken on the Grafton Street side of this residence, and this measurement has been used to calibrate the noise emissions from the site to predict noise levels at other potentially affected receivers (discussed further in **Section 3.2**).

The noise monitoring was conducted in accordance with the NSW Environment Protection Authority's (EPA) NSW *Industrial Noise Policy* (INP) (EPA, 2011) requirements.

The main sources of plant and equipment noise onsite were:

- Two pumps located on a plinth located inside a fully enclosed shed;
- A compressor in its own enclosure inside the shed;
- A marina bull (35 tonne forklift);
- 3.5 tonne forklift;
- A boat lift;
- Boats refuelling; and
- General site activities e.g. boat cleaning, boat repairs and car movements.

The attended measurement at 1 Grafton Street and its noise limits in the MCoA are summarised in **Table 1**.

3.2 Instrumentation

Attended noise measurements were conducted using a Brüel & Kjær Type 2270 (S/N: 3000860). The Brüel & Kjær Type 2270 integrating sound level meter is designated as Type 1 instrumentation and has accuracy suitable for laboratory and field use. The sound level meter was calibrated before and after the measurements with a drift in calibration not exceeding ± 0.5 dB.

The acoustic instrumentation employed during the noise measurements comply with the requirements of *AS 1259.2-1990 Acoustics - Sound Level Meters. Part 2: Integrating - Averaging* and have current calibration certificates (i.e. calibrated in the last two years).

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Table 1 – Measured noise levels

Measurement location	Time	Comments	Measured noise levels, dB(A)			Noise limits, dB(A)		
			L _{Aeq} (15 min)	Estimated site contribution	L _{A90} (15 min)	Day L _{Aeq} (15 min)	Evening L _{Aeq} (15 min)	Night L _{Aeq} (15 min) / L _{Aeq} (9 hr) / L _{A1} (1min)
1 Grafton St, Balmain (high street level)	2:53 pm	Horn trumpet – 48 dB(A)	54	54	51	54	48	48 / 45 / 59
		Boat hoist idling at the far corner of the site – 50 dB(A) – Dominant source						
		Car pass by – 58 dB(A)						
		Boat hoisting lowering at the far corner of the site – 54 dB(A) – Dominant source						
		Distant traffic – faint – background noise						
		Hissing noise from the site – 54-55 dB(A)						
		Boat hoist moving to centre of site – 55 dB(A) – Dominant source						
		Plane pass by – 56 dB(A)						
		Boat hoist moving – 56 dB(A) – Dominant source						
		Car pass by – 56 dB(A)						

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4.0 Noise assessment

4.1 Methodology

A method using site measurements and propagation calculations has been used to determine the contribution of the plant and equipment, associated with the project, at the residences in accordance with condition F2 (3) of the MoCA. Chapter 11 of the INP allows the measurement of plant and equipment at a closer location and to back calculate the contribution to the noise sensitive locations. The calculation method takes into account distances of receivers relative to the sources, measured sound power levels, air absorption, estimated shielding effects from terrain and building structures. The estimated noise contributions were calibrated against the measurement taken on street level at 1 Grafton Street.

4.2 Results

The project currently operates over a 24 hour period, in accordance with condition A7 of the MCoA.

It is understood that in any one 15 minute period the plant and equipment presented in **Section 1.2** may be in operation for the whole 15 minute period during the daytime. However, during the evening and night-time period, operations are restricted to fuel pumping only.

Attended measurements confirmed that noise emission from the project is dominant at the nearest residential receiver. The dominant noise source which was identified at the residential receiver location was the boat hoist. On-site observations also noted the boat hoist to be a potential concern for noise compliance. Noise from the boat hoist is slightly variable during different operations such as idle, lifting, lowering and driving. It was also observed that the location of the boat hoist changed frequently as well.

The following table presents the estimated noise levels at the most affected point within the residential boundary (or the facade of the closest residences). For 1 Grafton Street, the results are estimated at the site level, where the receivers are more affected than at the Grafton Street level.

Table 2 – Estimated noise contribution from the facility

Measurement location	Estimated noise contribution, dB(A)					Compliance		
	Day	Evening	Night			Day	Evening	Night
	L _{Aeq} (15 min)	L _{Aeq} (15 min)	L _{Aeq} (15 min)	L _{Aeq} (9 hrs) ¹	L _{A1} (1 min) ²			L _{Aeq} (15 min) / L _{Aeq} (9 hr) ¹ / L _{A1} (1min) ²
1 Grafton St, Balmain (site level)	57	25	25	> 20	25	No	Yes	Yes / Yes / Yes
Datchett St, Balmain	50	> 20	> 20	> 20	> 20	No	Yes	Yes / Yes / Yes
33 Adolphus St, Balmain	33	> 20	> 20	> 20	> 20	Yes	Yes	Yes / Yes / Yes
2 Point St, Pyrmont	35	> 20	> 20	> 20	> 20	Yes	Yes	Yes / Yes / Yes

Notes:

- 1 Night-time (9 hr) – assumed that plant and equipment is in operation for not more than 2 hours during the whole night-time period.
- 2 Night-time (1 min) – assumed no truck deliveries occur at night. Given that the operations of the facility are constant, there are no maximum noise events at the nearby residential receivers.

The estimated operational noise contribution from the refuelling facility at White Bay only exceeds the daytime criteria for two receivers – 1 Grafton Street and Datchett Street.

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Noise emission from the facility marginally exceeds the criteria at Datchett Street receivers. A noise level predicted of 50 dB(A) at this residence is 1 dB above the day time criteria of 49 dB(A). This is considered as marginally exceeding as it is difficult to perceive a noise level difference of 2 dB. The exceedances are attributed to use of the boat hoist.

At 1 Grafton Street, the noise level at the closer façade to the facility exceeds the criteria by 3 dB. This exceedance is attributed to the boat hoist. It was observed from on-site measurements that the operation of the boat hoist can span periods equal or greater than that of 15 minutes. Operation of the boat hoist consists of idle, moving, lifting and lowering. As operational constraints on the facility would reduce the operational efficiency, it is recommended that attenuation options are investigated and applied for the engine shroud and exhaust muffler.

All other receivers comply during the day, evening and night-time periods.

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5.0 Conclusion

AECOM has conducted an operational noise compliance assessment for Berth 6, White Bay, NSW on behalf of White Bay 6 Pty Ltd. The assessment has been undertaken in accordance with the requirements of the Minister's Conditions of Approval (MCoA) and the EPA's *NSW Industrial Noise Policy*.

To determine compliance with the MCoA, noise measurements of plant and equipment at the site, next to the equipment and at the closest receiver location, were used to calculate and determine the contribution from the project at other nearby noise sensitive locations. This is in accordance with Chapter 11 of the NSW Industrial Noise Policy.

The results of the measurements and the assessment show that the project exceeds the operational noise limits identified in the MCoA at two residences during the day. However, one receiver is only considered to be exceeding marginally. All other receivers comply during the day, evening and night-time periods. Mitigation measures have been recommended to the boat hoist to achieve compliance against the criteria.

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Appendix A

Acoustic Terminology

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Appendix A Acoustic Terminology

The following is a brief description of acoustic terminology used in this report.

Sound power level	The total sound emitted by a source
Sound pressure level	The amount of sound at a specified point
Decibel [dB]	The measurement unit of sound
A-weighted decibels [dB(A)]	The A-weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).
Decibel scale	The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows: <ul style="list-style-type: none"> 0 dB(A) Threshold of human hearing 30 dB(A) A quiet country park 40 dB(A) Whisper in a library 50 dB(A) Open office space 70 dB(A) Inside a car on a freeway 80 dB(A) Outboard motor 90 dB(A) Heavy truck pass-by 100 dB(A) Jackhammer / subway train 110 dB(A) Rock concert 115 dB(A) Limit of sound permitted in industry 120 dB(A) 747 take off at 250 m
Frequency [f]	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.
Equivalent continuous sound level [Leq]	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.
Lmax	The maximum sound pressure level measured over the measurement period
Lmin	The minimum sound pressure level measured over the measurement period
L10	The sound pressure level exceeded for 10 per cent of the measurement period. For 10 per cent of the measurement period it was louder than the L10.
L90	The sound pressure level exceeded for 90 per cent of the measurement period. For 90 per cent of the measurement period it was louder than the L90.

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Ambient noise	The all-encompassing noise at a point composed of sound from all sources near and far.
Background noise	The underlying level of noise present in the ambient noise when extraneous noise (such as transient traffic and dogs barking) is removed. The L90 sound pressure level is used to quantify background noise.
Traffic noise	The total noise resulting from road traffic. The Leq sound pressure level is used to quantify traffic noise.
Day	The period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays.
Evening	The period from 6pm to 10pm Monday to Sunday and Public Holidays.
Night	The period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.
Assessment background level [ABL]	The overall background level for each day, evening and night period for each day of the noise monitoring.
Rating background level [RBL]	The overall background level for each day, evening and night period for the entire length of noise monitoring.

*Definitions of a number of terms have been adapted from Australian Standard AS1633:1985 "Acoustics – Glossary of terms and related symbols", EPA NSW Industrial Noise Policy and EPA Road Noise Policy.