INNER WEST COUNCIL

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Council Ref: DWS2203279

30 January 2017

Phillip Vander Reest – Project Manager, Noise Attenuation Program
Port Authority of New South Wales
PO Box 25
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noisestrategy@portauthoritynsw.com.au

Dear Mr Vander Reest,

Re: **Submission in response to public exhibition of the White Bay Cruise Terminal Noise Impact Mitigation Strategy and Operational Noise Management Plan**

I am writing in response to the public exhibition of the White Bay Cruise Terminal Noise Impact Mitigation Strategy and Operational Noise Management Plan.

As you are aware, Council has been active in raising community concerns associated with cruise ships berthed at the White Bay Cruise Terminal to the State Regulators and Members of Parliament. In particular, Council has made submissions in relation to a range of community issues including health concerns, odour, air quality, noise and vibrations.

It is acknowledged that the Noise Mitigation Strategy and Operational Management Plan seek to provide a positive step forward in the management of noise pollution and vibration impacts from cruise ships berthed at White Bay Cruise Terminal.

In response to the public exhibition of the draft Strategy and Plan; with the limited time provided, Council has sought independent expert advice from an acoustic consultant in relation to:

- The strength, accuracy and validity of the Strategy and Plan,
- The level of enforceability of the Strategy and Plan,
- Any complications for enforcement that could be foreseen from the wording in the Strategy and Plan,
- Any improvement of the Strategy and Plan in terms of environmental health impacts and mitigation works, and
- Any other general comments and/or concerns.

As a result, Rodney Stevens (Principal/Manager, Rodney Stevens Acoustics) has provided a review of the draft Strategy and Plan. The key points of his review are detailed as follows:

- Deck announcements and music were clearly audible from some cruise ships when in port;
- Noise monitoring has identified that there is likely going to be breaches of the Project Approval noise limits during the evening and night time periods;
- Implementation of real time noise monitoring would result in transparency of noise levels emanating from noise sources;
- Shore to ship power would result in considerable noise reductions of up to 10dBA;
- Installation of a permanent noise barrier/wall would reduce noise levels however could have significant visual impact;
- Dwelling noise attenuation to a defined area of residences should be based on the Amenity Criteria and would reduce noise levels within those homes, however continue to cause disturbances to those residences not currently identified in the defined area; and
- Noise in external residential recreation areas will remain as an adverse impact to residents.

To provide greater detail and clarity for your consideration on the key points listed above, a copy of Rodney Stevens' advice is attached to this letter (Appendix A).

In addition to this, Council held a public meeting on 24 January 2017 at Balmain Town Hall to present the findings of Rodney Stevens' peer review and to inform residents on how to make a submission on the draft Noise Impact Mitigation Strategy and Operational Noise Management Plan. I have also provided a copy of the main topics discussed at this meeting (Appendix B).

It is the opinion of both Inner West Council and affected residents that implementation of real time noise monitoring and the installation of ship to shore power be the two (2) main priorities for Ports of New South Wales in terms of short and long term noise mitigation.

One of the key benefits of real time noise monitoring is the ability for cruise ship operators to effectively use the received feedback as a mitigation tool. This means that the operator can view or be notified of the noise levels that are being recorded a certain distance away in real time and adjust the activity accordingly. Secondly, receiving live feedback on noise emissions can aid the quick identification of potential mechanical faults.

Real time noise monitoring will also strengthen transparency associated with regulatory action, in that, the community and stakeholders would know when a noise breach is occurring and take action accordingly. This would assist in the successful and accurate implementation of the three (3) warning letters procedure.

Shore to ship power is the best long term noise solution for White Bay Cruise Terminal in that, it allows cruise ships to turn off their diesel engines whilst in port and connect to the local power grid. Not only does this result in a significant reduction in noise levels by 25% but it also assists in reducing the health impacts associated with toxic airborne pollutants such as particulate matter and sulphur dioxide.

Shore to ship power is the only mitigation option that provides a holistic solution for both noise and air pollution at White Bay Cruise Terminal. Council strongly recommends that ship to shore power be investigated in great depth with a further feasibility study to be undertaken and made available to the public.

Thank you for the opportunity to provide comment on the draft Noise Mitigation Strategy and Noise Management Plan. If you or your office requires any further information, please do not hesitate to contact Mrs Kursty Delmas, Team Leader Environmental Health, on 9367 9068.

Regards,

Elizabeth Richardson
Group Manager Development Assessment and Regulatory Services

RODNEY STEVENS ACOUSTICS
Acoustic Consultants
Member Australian Acoustical Society

Peer Review
The Port Authority of NSW
Operational Noise Management Plan
SLR Consulting Noise Management Plan

Balmain NSW

REPORT R160697R1
Revision 0

"The Port Authority of NSW (Port Authority) shall design, construct, operate and maintain the White Bay Cruise Terminal (WBCT) using all reasonable and feasible precautions and measures to achieve the objective that noise contributions from activities on Cruise Ship Days associated with the project do not contribute to an exceedance of the specified noise criteria".

Prepared for:

Inner West Council

9 January 2017

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The Port Authority of NSW

Operational Noise Management Plan

Balmain NSW

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
R160697R1	Revision 0	9/01/2017	Rodney Stevens	Desmond Raymond	Rodney Stevens

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1 BACKGROUND

1.1 Planning Proposal

Rodney Stevens Acoustics has been requested by Inner West Council to provide a 'Peer Review' of the Operational Noise Management Plan (ONMP) and associated SLR Consulting NIS and to determine if the ONMP is adequate for the residences adjacent to the White Bay Cruise Terminal (WBCT).

The Port Authority of NSW (Port Authority) manages the White Bay Cruise Terminal (WBCT) within the White Bay Port Precinct on the Balmain Peninsula. The development was approved in February 2011.

On days when a cruise ship is present, the WBCT is used for the processing of passengers embarking and disembarking a cruise ship berthed at White Bay Wharf 5 (WB5) and associated activities. The approval also provides for a cruise terminal to be located at White Bay Wharf 4 (WB4).

The purpose of the Port Authority Operational Noise Management Plan (ONMP) is to outline the method of compliance with statutory requirements for the management of noise, and realising the specific noise limits set out in the Project Approval.

The ONMP is intended to detail methods available to mitigate noise during the use of the WBCT, including the behavioral noise controls (regarding music and non-safety announcements) and restrictions related to cruise ship noise.

The WBCT was assessed and approved under the Environmental Planning and Assessment Act 1979. As part of that assessment and approval the facility was assessed in accordance with the Industrial Noise Policy. The Project Approval gives force to the outcomes of the noise impact assessment which was carried out as part of the environmental impact assessment, and the Port Authority is required to comply with the various conditions set out in the Project Approval.

The White Bay Cruise Terminal (WBCT) Noise Restriction Policy is a commitment by the Port Authority of New South Wales that all passenger vessels utilising the White Bay Cruise Terminal (WBCT) are required to ensure that noise does not exceed a level which the Port Authority of NSW considers inappropriately impacting on the neighbours of the White Bay Cruise Terminal at Balmain.

1.2 Legislation and Nominated Noise Criteria

The White Bay Cruise Cruise Terminal Operations noise criteria nominated in the approval are derived from noise assessment outcomes presented in the White Bay Cruise Terminal Noise Impact Assessment prepared in support of the White Bay Cruise Terminal development application. The DP&E's Director General Requirements (DGRs) included the requirement that the noise assessment take into account the Industrial Noise Policy.

It should be noted that, the INP is specifically aimed at assessing noise from (24/7) continuous industrial noise sources scheduled under the POEO Act, and discussed in Section 3.1.2 the WBCT operations are not scheduled activities under the POEO Act. Hence, the INP does not specifically address situations, such as the WBCT passenger shipping operations, where there is a potential for infrequent elevated noise levels from a small number of cruise vessels for a limited number of nights in the year.

The internal criteria is based on the Australian Standard ASNZ 2107:2000. The recommended intrusive ($L_{Aeq(15minute)}$) WBCT VNAP Eligibility Noise Criteria are given as night-time 55 dBA, evening 60 dBA and daytime 70 dBA.

1.3 Nature of Noise Concerns

The primary concern for noise intruding into the nearby residential areas are from the operation of cruise ships at the White Bay Cruise Terminal. Noise sources include:

- Noise from ship horns
- Noise from chimes, whistles, sirens and alarms
- Noise from ship engines, generators, ventilation systems and air conditioning
- Noise from PA announcements
- Noise from entertainment, music
- Noise from emergency drills
- Noise from maintenance activities
- Noise from overnight stays of ships
- Noise from multiple berths of cruise ships
- Noise from very early morning arrival of ships
- Noise from various ancillary services associated with the terminal garbage and sewerage services traffic and transport services.
- Vibrations in the surrounding area caused by cruise ships

1.4 Operational Noise Management Plan (ONMP) and Policy

The commencement of the WBCT operations resulted in appreciable noise complaints from the local community (primarily located in Balmain to the north of the terminal). These concerns have been generally supported by noise monitoring results, which demonstrate cruise ships can generate operational noise levels in excess of the noise criteria specified in condition D1.

As a result, in accordance Project Approval (MP 10_0069) condition D1, which states “where these criteria cannot be met, the Proponent shall take appropriate measures to limit any impacts and shall submit a report to the Director General upon the implementation of those measures. These measures may include operational changes, further on-site mitigation to infrastructure or off-site mitigation measures” Port Authority prepared an initial report outlining potential noise mitigation and management measures for investigation as presented in the Noise Impact Mitigation Strategy (NIMS) Cruise Operations dated September 2014. Following the progress of these investigations, Port Authority prepared a follow-up NIMS Cruise Operations Interim Findings Report dated April 2015.

A Final NIMS Cruise Operations Report (SLR, November 2016) reviewed the outcome of these investigations and recommended additional actions in accordance with the requirements of the Project Approval.

This updated Cruise Operations ONMP has been amended to ensure that the environmental management framework adequately addresses any identified issues (i.e. noise impacts) and appropriate mitigation identified in the SLR Final NIMS Cruise Operations Report.

2 DISCUSSION

2.1 Unattended Noise Monitoring

In order to characterise the existing acoustical environment of the area unattended noise monitoring was conducted between 27th December 2016 and 3rd January 2017 at the logging location shown in Figure 2-1**.** The purpose of the logger was to determine the accuracy of the SLR Consulting levels and the validity of the current background noise criteria proposed by SLR Consulting and The Port Authority. A copy of the logging results is in the appendix of this review.

Figure 2-1 Logging Location

The logger provides the baseline background noise environs. Logger location was selected with consideration to other noise sources which may influence readings, security issues for noise monitoring equipment and gaining permission for access from residents and landowners.

Instrumentation for the survey comprised of a RION NL-42 environmental noise logger (serial number 133013) fitted with microphone windshields. Calibration of the logger was checked prior to and following measurements. Drift in calibration did not exceed ±0.5 dB(A). All equipment carried appropriate and current NATA (or manufacturer) calibration certificates. Measured data has been filtered to remove data measured during adverse weather conditions upon consultation with historical weather reports provided by the Bureau of Meteorology (BOM).

The logger determines L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1}, L_{A10}, L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Glossary for definitions in Appendix A). Detailed results at the monitoring location are presented in graphical format in Appendix B. The graphs show measured values of L_{A1}, L_{A10}, L_{A90} and L_{Aeq} for each 15-minute monitoring period.

The monitoring identified a number of Operational Noise Management Plan - Mitigation measures that are currently not being complied.

“A notification to the ‘Staff Captain’ or ‘Deputy Captain’ of all cruise ships berthing at the WBCT, reminding them of the proximity of the Terminal to residential areas and outlining certain expectations of the ships whilst they are berthed, including no deck announcements or music from open decks is permitted while in port, with the exception of safety announcements. All music and non-safety related announcements must be kept to internal ship areas until well clear of the berth.

The Pacific Pearl and the Crystal Symphony had clearly audible loud speaker announcements at docking 6.20am.

The following cruise ships were on schedule:

- 27/12/16: Pacific Pearl (6:20 to 14:20)
- 28/12/16: Pacific Eden (8:00 to 16:00)
- 29/12/16: No Ships
- 20/12/16: Pacific Pearl (6:50 to 16:00) and The World at Terminal #4: (18:00 to present)
- 31/12/16 (6:15) to 2/1/17 (18:30) – Crystal Symphony (Speaker announcement at docking – 6:20)

2.2 Data Processing

2.2.1 Noise Emission (Industrial Noise Policy)

In order to establish the construction noise criteria, the data obtained from the noise logger has been processed in accordance with the procedures contained in the NSW Environmental Protection Authority's (EPA) *Industrial Noise Policy* (INP, 2000) to establish representative noise levels that can be expected in the residential vicinity of the site. The monitored baseline noise levels are detailed in Table 2-1.

Table 2-1 Measured Baseline Noise Levels Corresponding to Defined INP Periods

Location	Measurement Descriptor	Measured Noise Level – dB(A) re 20 µPa		
		Daytime 7 am - 6 pm	Evening 6 pm – 10 pm	Night-time 10 pm – 7 am
Logger at rear of site	L_{Aeq}	56	57	54
	RBL (Background)	47	43	42

Notes: All values expressed as dB(A) and rounded to nearest 1 dB(A);
L_{Aeq} Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.
L_{A90} Noise level present for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

2.3 Operational Noise Criteria

Responsibility for the control of noise emissions in New South Wales is vested in Local Government and the EPA.

The EPA oversees the Commercial Noise Policy (INP) January 2000 which provides a framework and process for deriving noise criteria. The INP criteria for Commercial noise sources have two (2) components:

- Controlling the intrusive noise impacts for residents and other sensitive receivers in the short term; and
- Maintaining noise level amenity for particular land uses for residents and sensitive receivers in other land uses.

Intrusiveness Criterion

For assessing intrusiveness, the background noise generally needs to be measured. The intrusiveness criterion essentially means that the equivalent continuous noise level (LAeq) of the source should not be more than 5 dB(A) above the measured Rated Background Level (RBL), over any 15 minute period.

Amenity Criterion

The amenity criterion is based on land use and associated activities (and their sensitivity to noise emission). The cumulative effect of noise from industrial sources needs to be considered in assessing the impact. The criteria relate only to other industrial-type noise sources and do not include road, rail or community noise. The existing noise level from industry is measured. If it approaches the criterion value, then noise levels from new industrial-type noise sources, (including air-conditioning mechanical plant) need to be designed so that the cumulative effect does not produce total noise levels that would significantly exceed the criterion.

Area Classification

The INP characterises the "Urban" is an area often has the following characteristics:

- Is dominated by 'urban him' or industrial source noise
- Has through traffic with characteristically heavy and continuous traffic flows during peak periods
- Is near commercial districts or industrial districts
- Has any combination of the above

This area may be located in either a **rural, rural-residential or residential zone**, as defined on an LEP or other planning instrument, and also includes mixed land use zones such as mixed commercial and residential uses.

Project Specific Noise Levels

Having defined the area type, the processed results of the attended noise monitoring have been used to determine project specific noise criteria. The intrusive and amenity criteria for nearby residential premises are presented in Table 2-2. These criteria are nominated for the purpose of assessing potential noise impacts from the proposed development.

In this case, the ambient noise environment is not controlled by industrial noise sources and therefore the amenity criteria become equal to the Recommended Amenity Criteria for Residences in an Urban Area (ie ANL or Acceptable Noise Level). For each assessment period, the lower (ie the more stringent) of the amenity or intrusive criteria are adopted. These are shown in bold text in Table 2-2.

Table 2-2 Operational Noise Criteria

Receiver	Time of Day	ANL [1] $L_{Aeq(15min)}$	Measured		Criteria for New Sources	
			RBL [2] $L_{A90(15min)}$	L_{Aeq} Noise Level)	Intrusive $L_{Aeq(15min)}$	Amenity [3] $L_{Aeq(15min)}$
Residential	Day	60	47	56	**52**	58
	Evening	50	43	57	48	**47**
	Night	45	42	54	47	**44**

Note 1: ANL = "Acceptable Noise Level" for residences in Urban Areas.
Note 2: RBL = "Rating Background Level".
Note 3: Assuming existing noise levels are unlikely to decrease in the future
Note 4: Current measured RBL meets the ANL requirement

In summary, the project specific noise level for the assessment of (continuous $L_{Aeq(15minute)}$) operational noise emissions between 7:00 am and 6:00 pm, based upon the procedures documented within the NSW INP, is **52 dBA** at the residential receivers and evening between 6:00 pm and 10:00 pm is **47 dBA**. For any plant operating at night-time, between 10:00 pm and 7:00 am, the project specific noise limit is **44 dBA**.

2.4 Port Authority Control Measures

A notification is given to the 'Staff Captain' or 'Deputy Captain' of all cruise ships berthing at the WBCT, with requirements related to this OEMP and reminding them of the proximity of the Terminal to residential areas and outlining certain expectations of the ships whilst berthed.

These requirements include:

- No on-deck announcements or music from open decks is permitted while in port, with the exception of safety announcements.

- All music and non-safety related announcements must be kept to internal ship areas until well clear of the berth.

- Ensure ship generators/engines are maintained and operated efficiently to help reduce noise and air emissions while in port.

- Ships are to run on minimum generator/engine power required whilst at berth and minimise light spill from ship lighting after sunset.

Previous noise monitoring has identified that there is likely to be ongoing exceedance of the Project Approval noise limits particularly at night time, as a result of cruise related activities. The investigations undertaken for the NIMS have determined the cause and extent of the exceedances, and the appropriate feasible and reasonable mitigation measures have been identified.

The Noise Impact Mitigation Strategy Cruise Operations for the White Bay Cruise Terminal outlined a number of potential mitigation measures in accordance with the requirements of Condition of Approval. The Strategy noted that despite reductions in noise resulting from mitigation measures implemented to date, it is anticipated that exceedances of noise criteria will continue to occur, particularly in circumstances where ships are at berth during the evening (6pm to 10pm) and night time (10pm to7am) periods.

Since September 2014, investigation of more complex and technically difficult options into further on-site and off-site measures has been occurring. The focus has been on noise barriers, shore power as a noise mitigation option, architectural façade treatments of dwellings, at-source noise control measures and an investigation into 'vibration' as a source of some community complaints.

On-ship Noise Control

The Port Authority has stated that some improvement to existing on-ship noise controls are technically feasible, such mitigation measures are not reasonably achievable as each individual vessel would be require significant vessel mechanical redesign, retrofitting and/or repurposing.

Shore Based Power

It is concluded that shore based power, as an alternative to on-ship power, would result in a noise reduction of up to 10 dBA, but only where a cruise vessel can accept shore based power. According to the Port Authority the installation of shore power is to be in the order of tens of millions of dollars, and with low current utilisation of 25% by cruise vessels makes this potential noise mitigation essentially ineffective and unreasonably cost prohibitive.

Potential Site Boundary Noise Wall (Barrier)

The installation of an approximate 8 metre high noise wall along the northern perimeter of the WBCT site boundary (i.e. similar to the acoustic barriers used to mitigate road and rail noise) may be technically feasible - subject to detailed constructability assessments (i.e. geotechnical, wind loading, safety and associated structural and civil engineering assessments).

It is concluded, however, the installation of a permanent noise barrier would introduce significant visual impact and is therefore, considered unlikely to be reasonably acceptable to the nearest residential land users if only to address elevated WBCT operating noise levels which occur with such infrequency.

Dwelling Noise Attenuation:- The recommended noise reduction treatments to properties should comprise as an absolute minimum:

The program is designed to provide physical treatments to homes that will reduce the levels of noise experienced in areas affected by cruise ships. The program will include the following noise reduction treatments:

- Upgrading windows or external doors
- Enclosing or sealing gaps, vents and openings, where practical
- Installing new windows or external doors
- Installation of ventilation systems to allow for the circulation of fresh air when windows are closed.

The Port Authority has requested continuous noise monitor to supplement the current noise data. Results of the monitoring will be available in near real time and Port Authority will provide a weekly summary of results on the Port Authority website. The locations of the continuous noise monitoring devices are opposite 32 Grafton Street and opposite 12 Grafton Street. To achieve the objective that noise contributions from activities on Cruise Ship Days associated with the WBCT do not contribute to an exceedance of the noise criteria specified as being an LAeq15 min - Day 56 dBA, LAeq15 min - Evening 54 dBA and LAeq15 min - night 49 dBA.

A first warning letter will be issued if noise reasonably considered by Port Authority to have originated from a passenger vessel is non-compliant with noise restrictions for the first time.

A second warning letter will be issued if noise reasonably considered by Port Authority to have originated from a passenger vessel is non-compliant with noise restrictions for the second time. If this non-compliance occurs at night, the vessel will also be notified that future overnight stays will be required to be relocated (at the vessel's cost) to an alternative mooring between the hours of 2200 and 0700 (subject to availability).

A third warning letter will be issued if noise reasonably considered by Port Authority to have originated from a passenger vessel is non-compliant with noise restrictions for the third time. A third letter will be issued to the vessel master and copied to the relevant cruise line/cruise company, advising of the third breach of the noise restrictions set in this policy. A third non-compliance by a vessel will have the consequence that the vessel will not be permitted to utilise the White Bay Cruise Terminal facility in future visits/years.

2.5 Operational Noise Management Plan - Mitigation Measures

Noise monitoring and reporting will be undertaken in accordance with the program and procedures of Sections 6 and 7 of the ONMP.
Ground service equipment (e.g. baggage cages) are moved and prepared the evening before rather than in the early morning hours before the arrival of a cruise ship in the case of consecutive cruise ship days.
PANSW's Cruise Terminal Operations Coordinators (CTOC) delivers a notification to the 'Staff Captain' or 'Deputy Captain' of all cruise ships berthing at the WBCT, reminding them of the proximity of the Terminal to residential areas and outlining certain expectations of the ships whilst they are berthed, including: - No all deck announcements or music from open decks is permitted while in port, with the exception of safety announcements. All music and non-safety related announcements must be kept to internal ship areas until well clear of the berth. - Ensure ship generators/engines are maintained and operating efficiently to help reduce noise and air emissions while in port. - Ships are to run on minimum generator/engine power required whilst at berth. - Minimise light spill from ship lighting after sunset.
Any 'live' complaints received about deck announcements / music are communicated directly to the ship via the port agent.

The Port Authority will enforce the policy by limiting or excluding the use of the White Bay Cruise Terminal facility by non-compliant vessels, which is complementary to the current Harbour Master's Directions in relation to the use of the White Bay Cruise Terminal. This policy expressly prohibits external non-safety announcements and or music on-deck whilst at berth.

The Port Authority has been committed to a program of providing noise attenuation to residences in the vicinity of WBCT, based on an expected maximum ship noise level (including noise from WBCT cruise ship engines, generators and ventilation).

The Port Authority will provide attenuation to a defined area of residences where noise modelling indicates that current noise levels reach or exceed 55dBA at night ('attenuation eligibility threshold'). Cruise ship noise which causes further disturbance to residences, other than those currently identified, are considered to exceed the attenuation eligibility threshold and therefore will be considered non-compliant.

The noise restrictions set out in this policy apply to any noise originating from a passenger vessel, and are defined as no external non-safety announcements; no music played on-deck; and any non-compliant noise including, but not limited to engine, generator or ventilation noise.

3 DISCUSSION

There are a number of defining points that need to be addressed prior to the RSA recommendation of Noise Mitigation Measures

The White Bay Cruise Terminal (WBCT) is a permanent location and White Bay Wharf 4 (WB4) and White Bay Wharf 5 (WB5) will remain as a Cruise Ship docking venue for the foreseeable future. The recommendation from residents that evening and night time restrictions should be imposed on 'all cruise ships' is not expected to be supported/enforced and therefore, appropriate acoustic measures/treatments must be instigated immediately to ensure residential criteria is achieved.

Regardless of the Noise Management Plan to be implemented, noise will always be a source of annoyance to the residential areas surrounding the terminal and noise levels from cruise ships will, on occasions, exceed the noise control limits. Low frequency noise and vibration was evident in noise measurements and acoustic treatment to houses in the Balmain area may make this low frequency noise and vibration more evident.

Even though internal residential noise levels may be controlled, noise in 'external' residential recreation areas and low frequency noise and vibration will remain an annoyance.

- Rodney Stevens Acoustics (RSA) requires as a 'First Step' to be implemented immediately, the establishment of a continuous noise monitoring system in at least two (2) locations, operated by Inner West Council or an 'independent acoustic body' must take place and be in operation by February 2017. The locations of the continuous noise monitoring devices are opposite 32 Grafton Street and opposite 12 Grafton Street. The results will be available in near real time and Port Authority and Innerwest Council will provide a weekly summary of results on their websites. The exceedance levels are an $L_{Aeq\ 15\ min\text{-}Day}$ 56 dB, $L_{Aeq\ 15\ min\text{-}Evening}$ 54 dB and $L_{Aeq\ 15\ min\text{-}night}$ 49 dB. The data will provide a record of noise from all sources and an estimated contribution from port activities.

- To achieve the objective that noise contributions from activities on Cruise Ship Days associated with the WBCT do not contribute to an exceedance of the noise criteria is specified as being an LAeq 15 min-Day 56 dB, LAeq 15 min-Evening 54 dB and LAeq 15 min-night 49 dB.

- The First, second and third warning letters (as outlined above) must be issued immediately by Port Authority if noise is non-compliant with noise restrictions. If the second non-compliance occurs at night, the vessel will also be notified that future overnight stays will be required to be relocated (at the vessel's cost) to an alternative mooring between the hours of 2200 and 0700 (subject to availability). A third non-compliance by a vessel will have the consequence that the vessel will not be permitted to utilise the White Bay Cruise Terminal facility in any future visits.

- Shore power is technically feasible and will achieve a 25% reduction in noise, therefore, this should be instigated and be fully operational by the end of 2017.

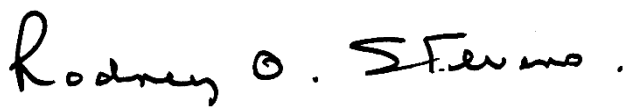
- Non-compliant vessels on overnight stays will be required to be relocated (at the vessel's cost) to an alternative mooring between the hours of 2200 and 0700 (subject to availability).

- The acoustic treatment for affected houses in the Balmain area should be based on the Amenity Criteria "Urban" being night-time 45 dBA, evening 50 dBA and daytime 60 dBA. The internal residential criteria should be based on the Australian Standard ASNZ 2107:2000. The recommended noise reduction treatments to achieve AS 2107 internal requirements within properties should comprise as an absolute minimum, enclosing external building penetrations (vents, openings and eaves) where practical to do so; upgrading seals to existing external windows and doors; installing ducted air conditioning; new or 'heritage' upgraded external windows and doors.

- An 8 metre high Glass/Perspex wall along the northern perimeter rock wall adjacent to Grafton Street would give a noticeable reduction of ground level 'external recreation' noise in Grafton Street and beyond. Architectural/structural drawings/visual prospective drawing should be provided by the end of February 2017 to all Grafton Street residents to make an informed decision of the visual impact.

- A noise fee based structure should be developed and applied to shipping using the facility as an incentive for port users to investigate and implement noise reduction works on their ships.

Approved:-

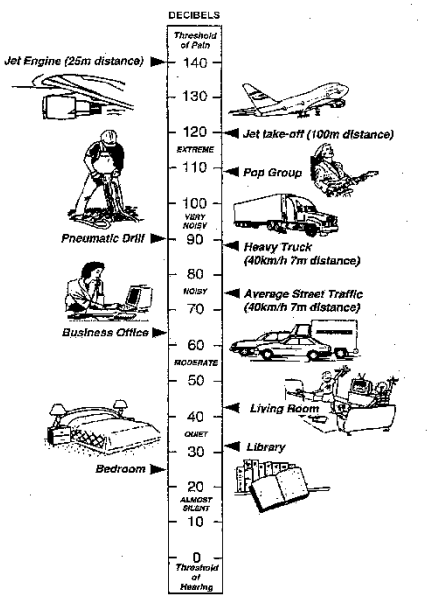


Rodney Stevens – MAAS
Principal/Manager

Appendix A – Acoustical Terminology

A-weighted sound pressure	The human ear is not equally sensitive to sound at different frequencies. People are more sensitive to sound in the range of 1 to 4 kHz (1000 – 4000 vibrations per second) and less sensitive to lower and higher frequency sound. During noise measurement an electronic '*A-weighting*' frequency filter is applied to the measured sound level *dB(A)* to account for these sensitivities. Other frequency weightings (B, C and D) are less commonly used. Sound measured without a filter is denoted as linear weighted dB(linear).
Ambient noise	The total noise in a given situation, inclusive of all noise source contributions in the near and far field.
Community annoyance	Includes noise annoyance due to: • character of the noise (e.g. sound pressure level, tonality, impulsiveness, low-frequency content) • character of the environment (e.g. very quiet suburban, suburban, urban, near industry) • miscellaneous circumstances (e.g. noise avoidance possibilities, cognitive noise, unpleasant associations) • human activity being interrupted (e.g. sleep, communicating, reading, working, listening to radio/TV, recreation).
Compliance	The process of checking that source noise levels meet with the noise limits in a statutory context.
Cumulative noise level	The total level of noise from all sources.
Extraneous noise	Noise resulting from activities that are not typical to the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
Feasible and reasonable measures	Feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors: • Noise mitigation benefits (amount of noise reduction provided, number of people protected). • Cost of mitigation (cost of mitigation versus benefit provided). • Community views (aesthetic impacts and community wishes).

	• Noise levels for affected land uses (existing and future levels, and changes in noise levels).
Impulsiveness	Impulsive noise is noise with a high peak of short duration or a sequence of these peaks. Impulsive noise is also considered annoying.
Low frequency	Noise containing major components in the low-frequency range (20 to 250 Hz) of the frequency spectrum.
Noise criteria	The general set of non-mandatory noise levels for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (e.g. noise levels for various land use).
Noise level (goal)	A noise level that should be adopted for planning purposes as the highest acceptable noise level for the specific area, land use and time of day.
Noise limits	Enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels, which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.
Performance-based goals	Goals specified in terms of the outcomes/performance to be achieved, but not in terms of the means of achieving them.
Rating Background Level (RBL)	The rating background level is the overall single figure background level representing each day, evening and night time period. The rating background level is the 10th percentile min L_{A90} noise level measured over all day, evening and night time monitoring periods.
Receptor	The noise-sensitive land use at which noise from a development can be heard.
Sleep disturbance	Awakenings and disturbance of sleep stages.
Sound and decibels (dB)	Sound (or noise) is caused by minute changes in atmospheric pressure that are detected by the human ear. The ratio between the quietest noise audible and that which should cause permanent hearing damage is a million times the change in sound pressure. To simplify this range the sound pressures are logarithmically converted to decibels from a reference level of 2 x 10-5 Pa. The picture below indicates typical noise levels from common noise sources.



dB is the abbreviation for decibel – a unit of sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.

Sound power level (SWL)

The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in *dB(A)*.

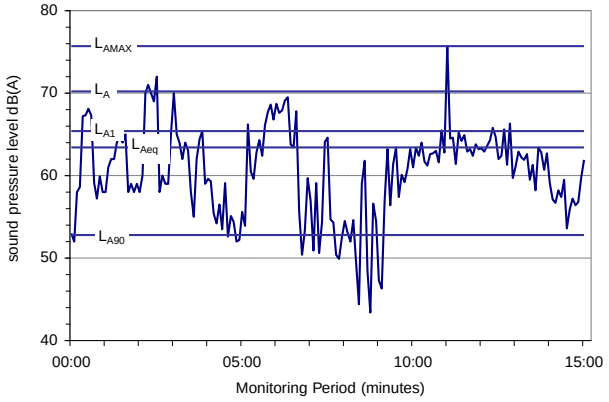
Sound pressure level (SPL)

The level of noise, usually expressed as SPL in *dB(A)*, as measured by a standard sound level meter with a pressure microphone. The sound pressure level in *dB(A)* gives a close indication of the subjective loudness of the noise.

Statistical noise levels

Noise levels varying over time (e.g. community noise, traffic noise, construction noise) are described in terms of the statistical exceedance level.

A hypothetical example of A weighted noise levels over a 15 minute measurement period is indicated in the following figure:



Key descriptors:

L_{Amax} Maximum recorded noise level.

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

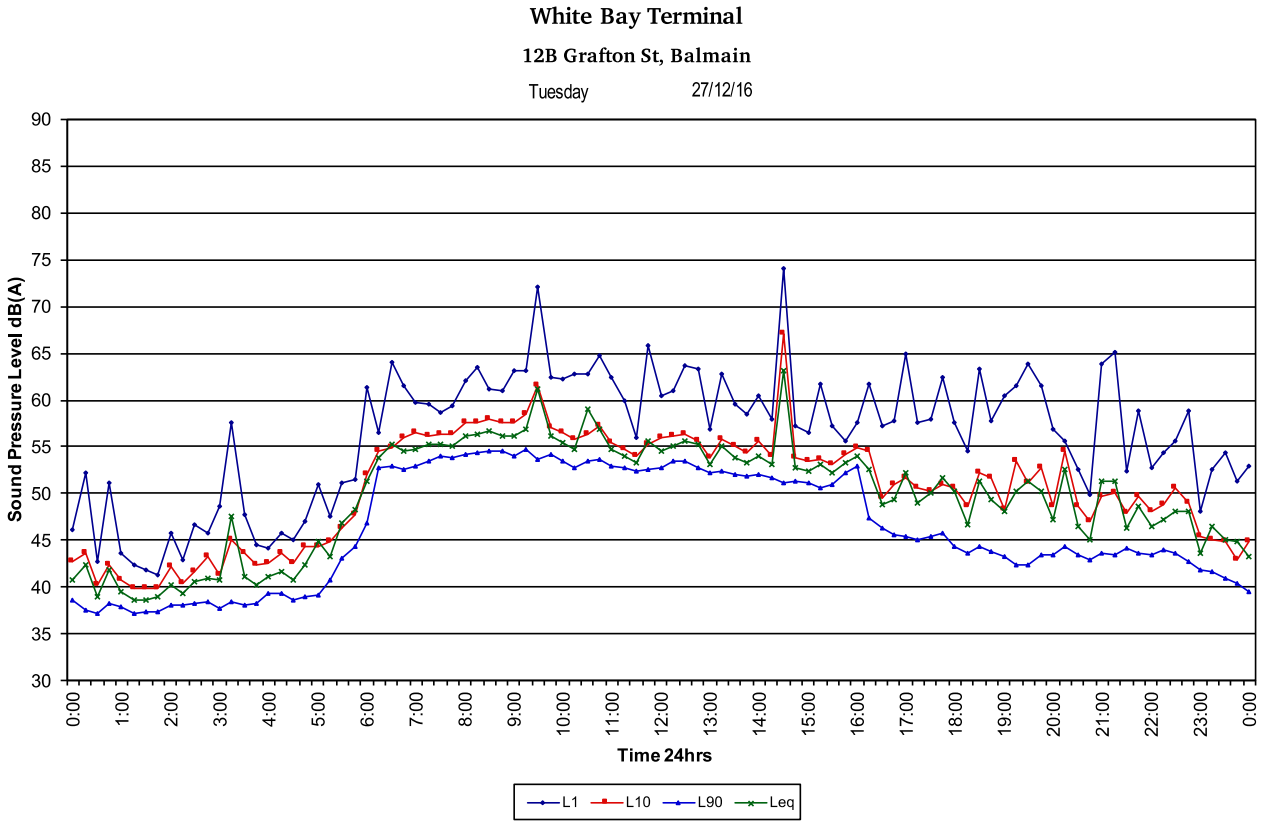
L_{A10} Noise level present for 10% of the 15 minute interval. Commonly referred to the average maximum noise level.

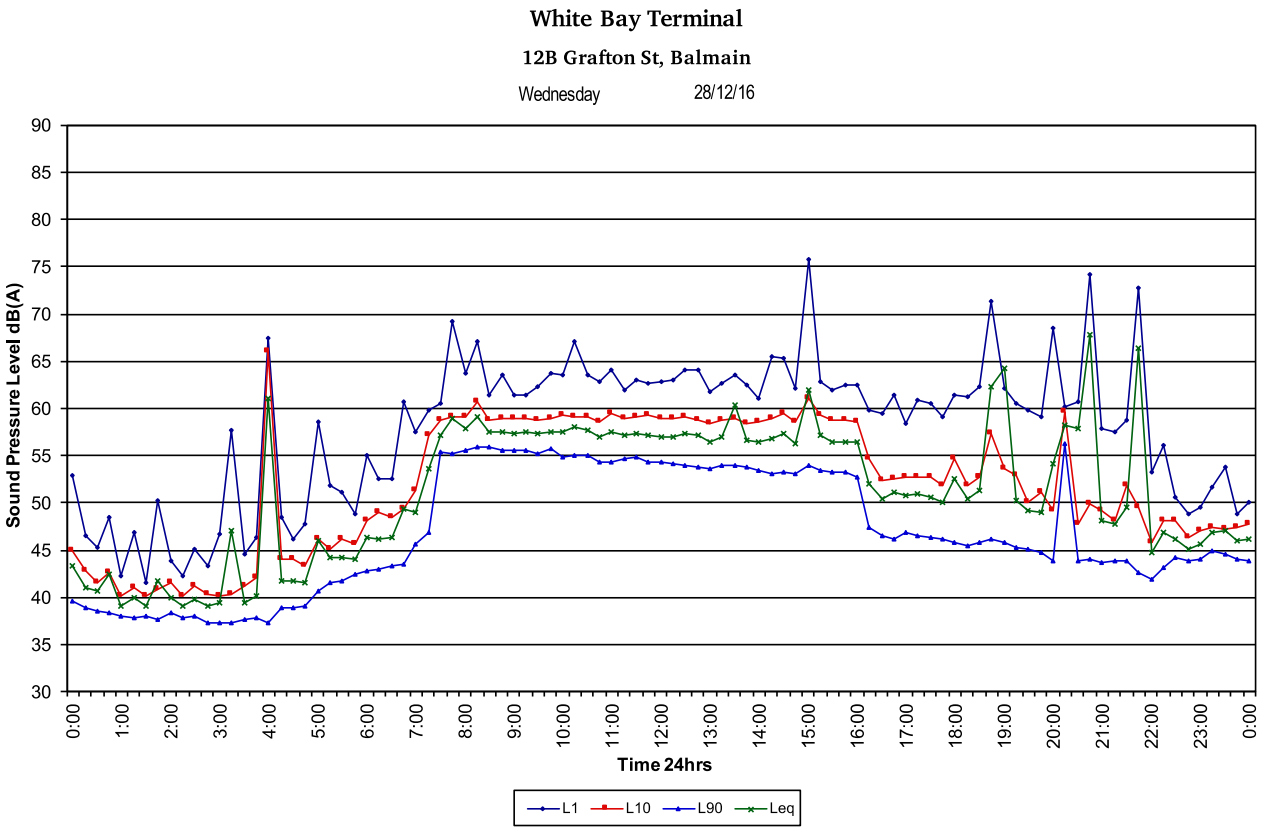
L_{Aeq} Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.

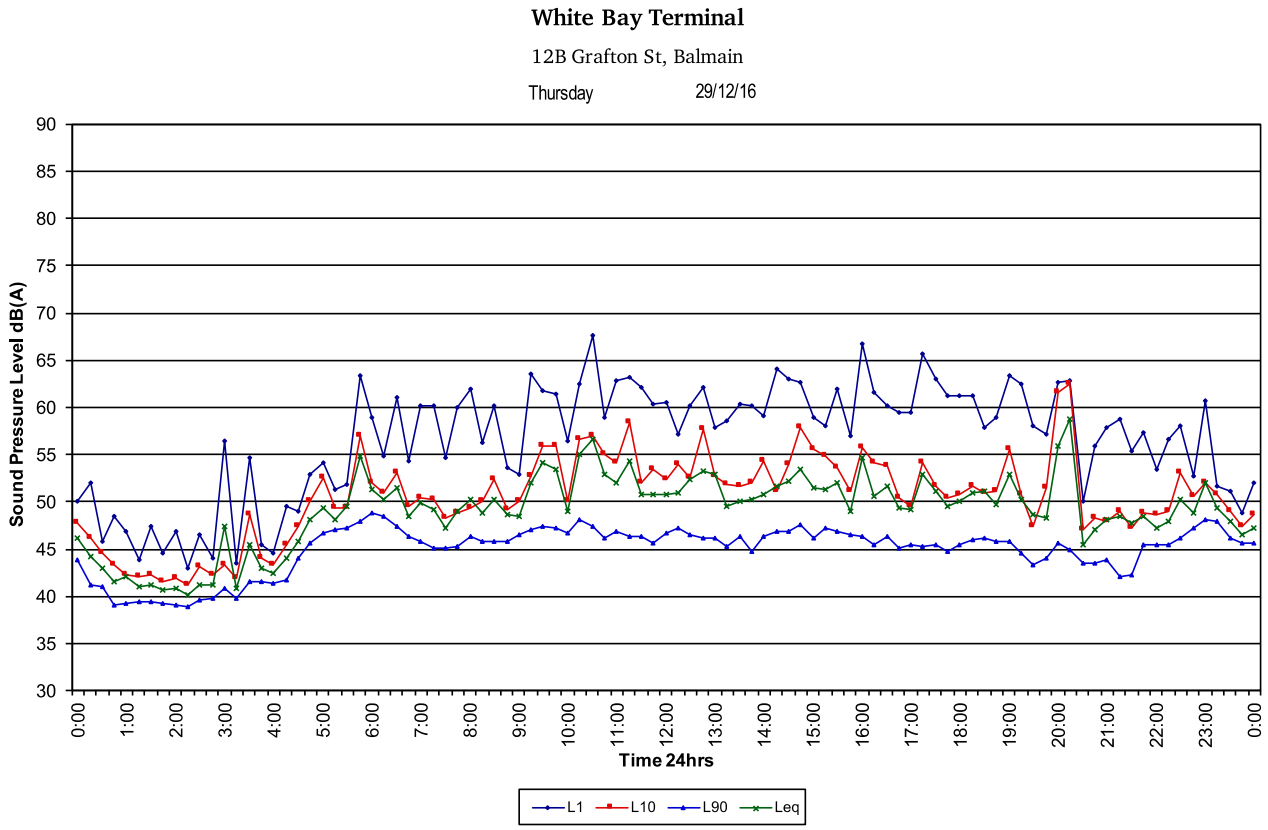
L_{A90} Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

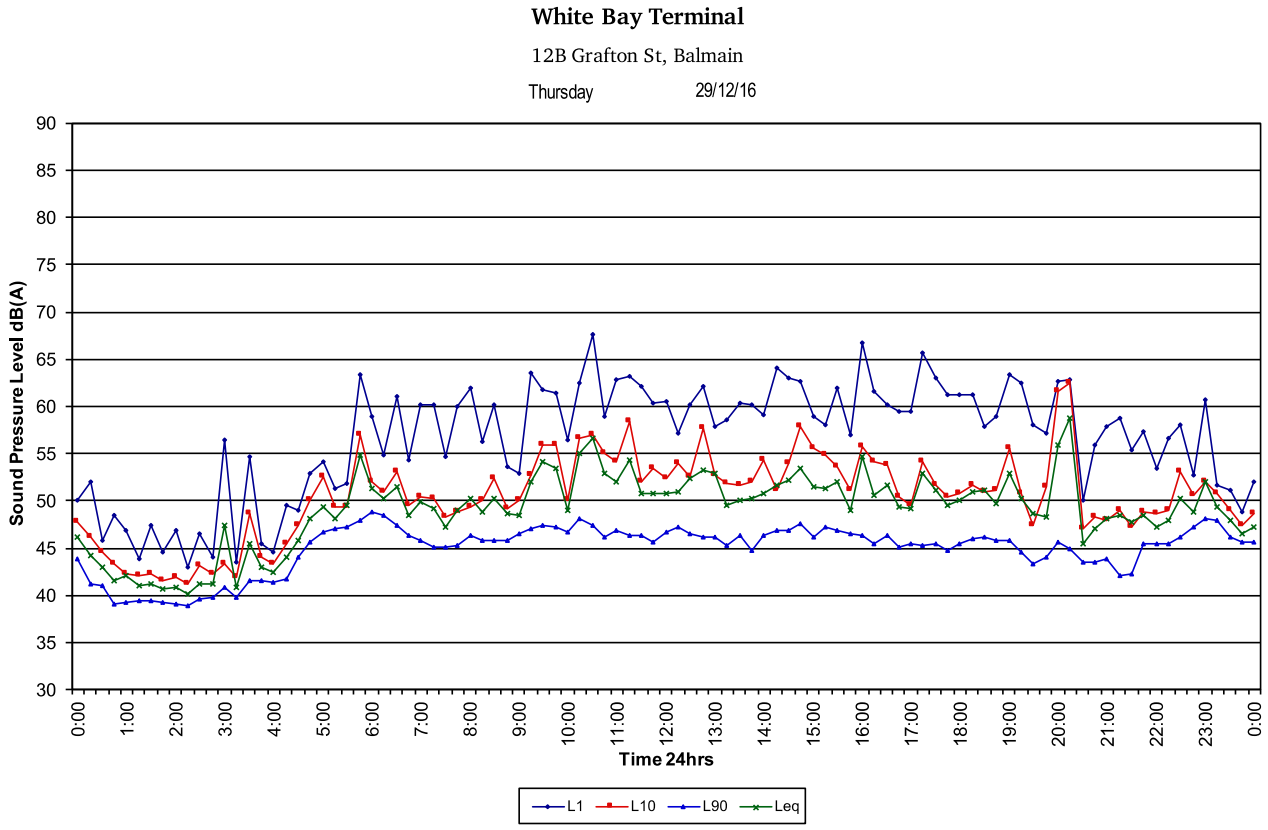
Threshold	The lowest sound pressure level that produces a detectable response (in an instrument/person).
Tonality	Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dBA penalty is typically applied to noise sources with tonal characteristics.

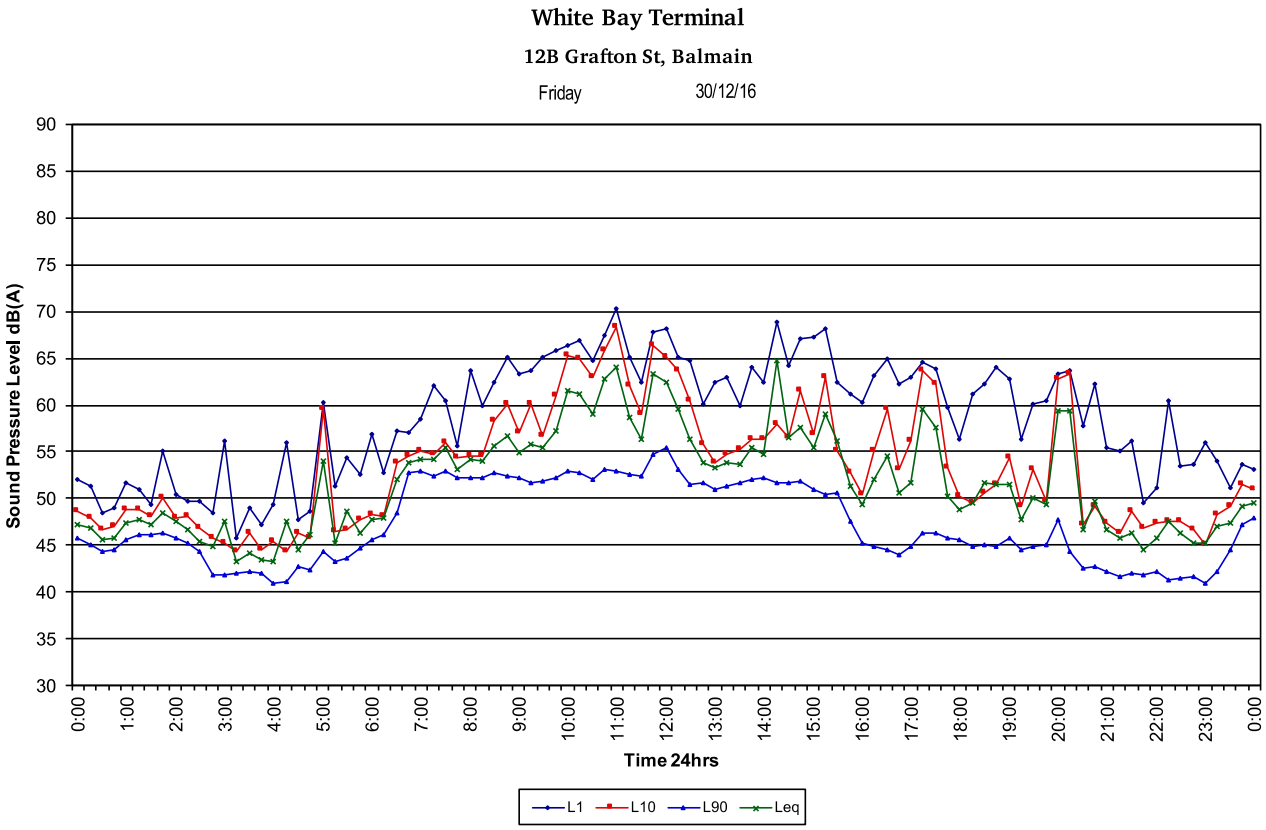
Appendix B – Baseline Noise Survey Graphs

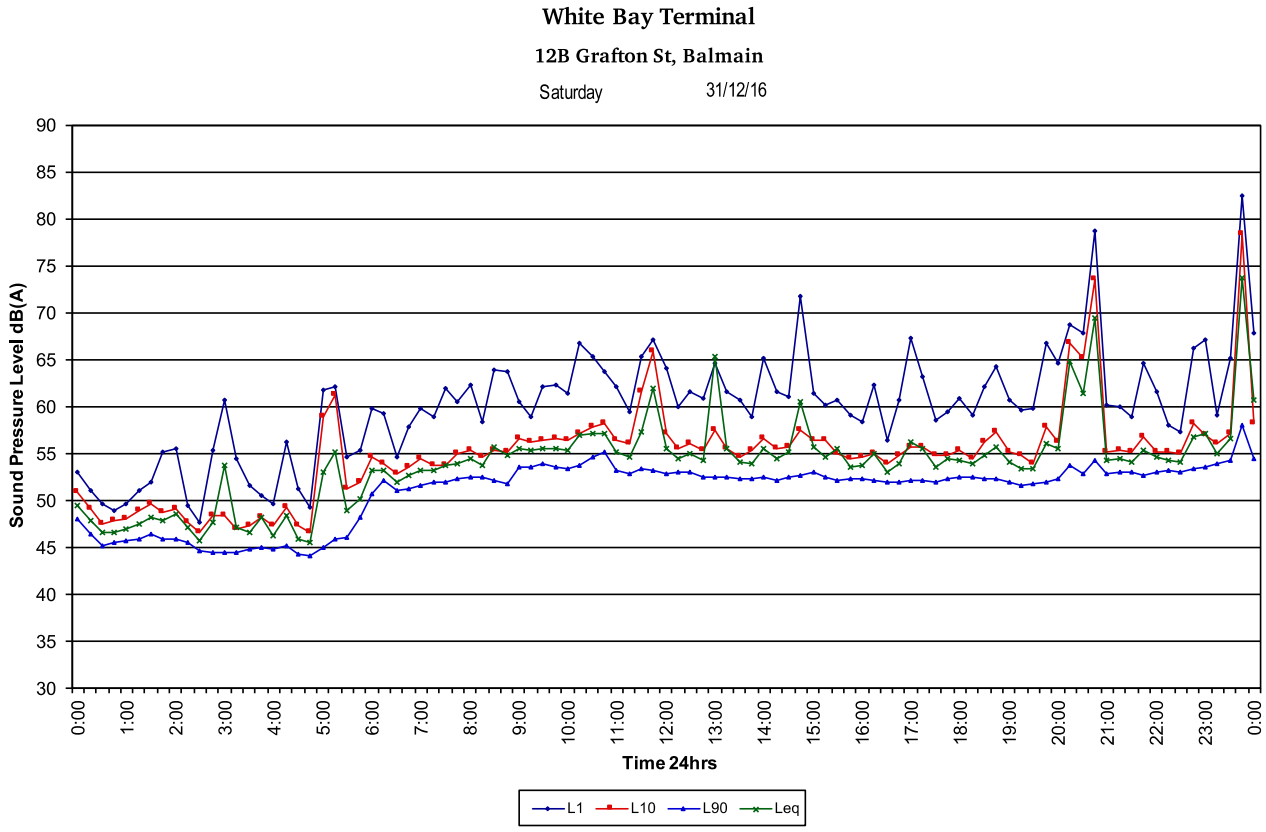


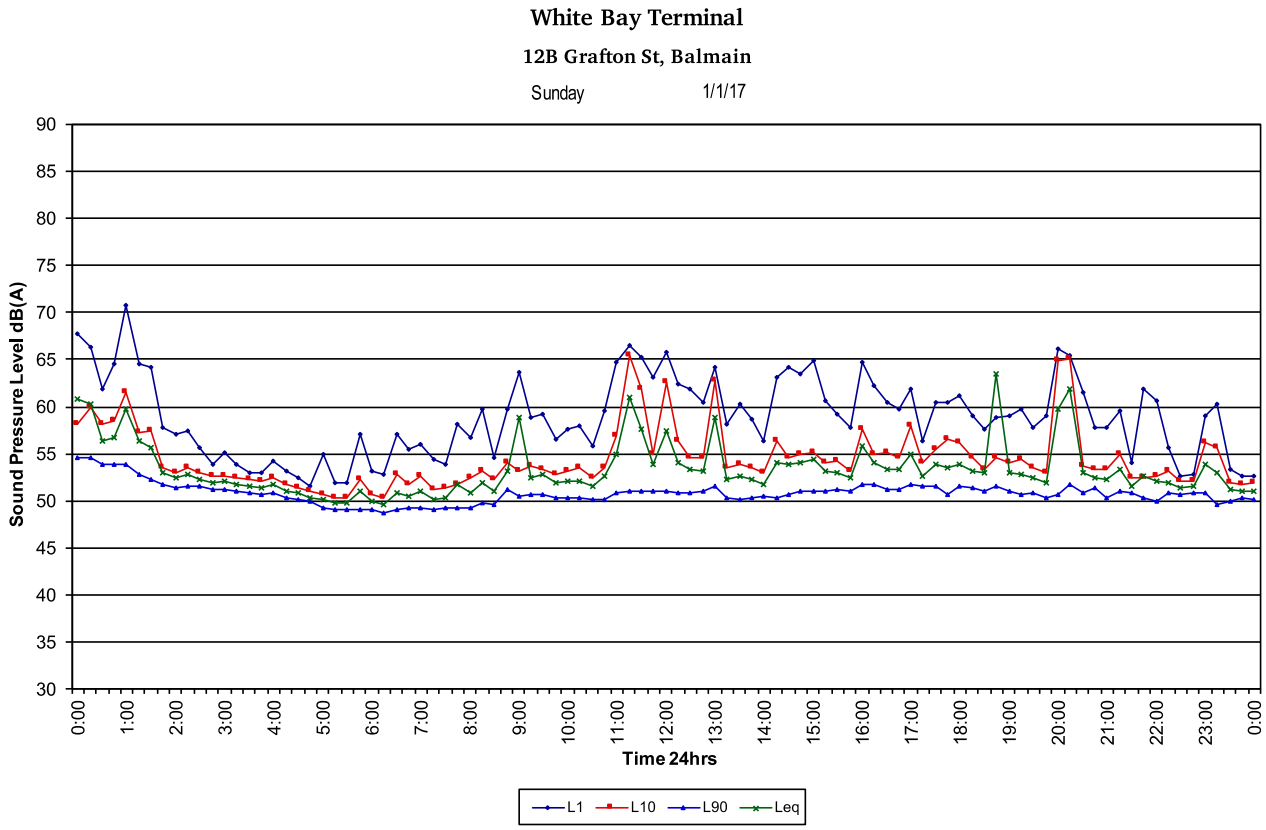


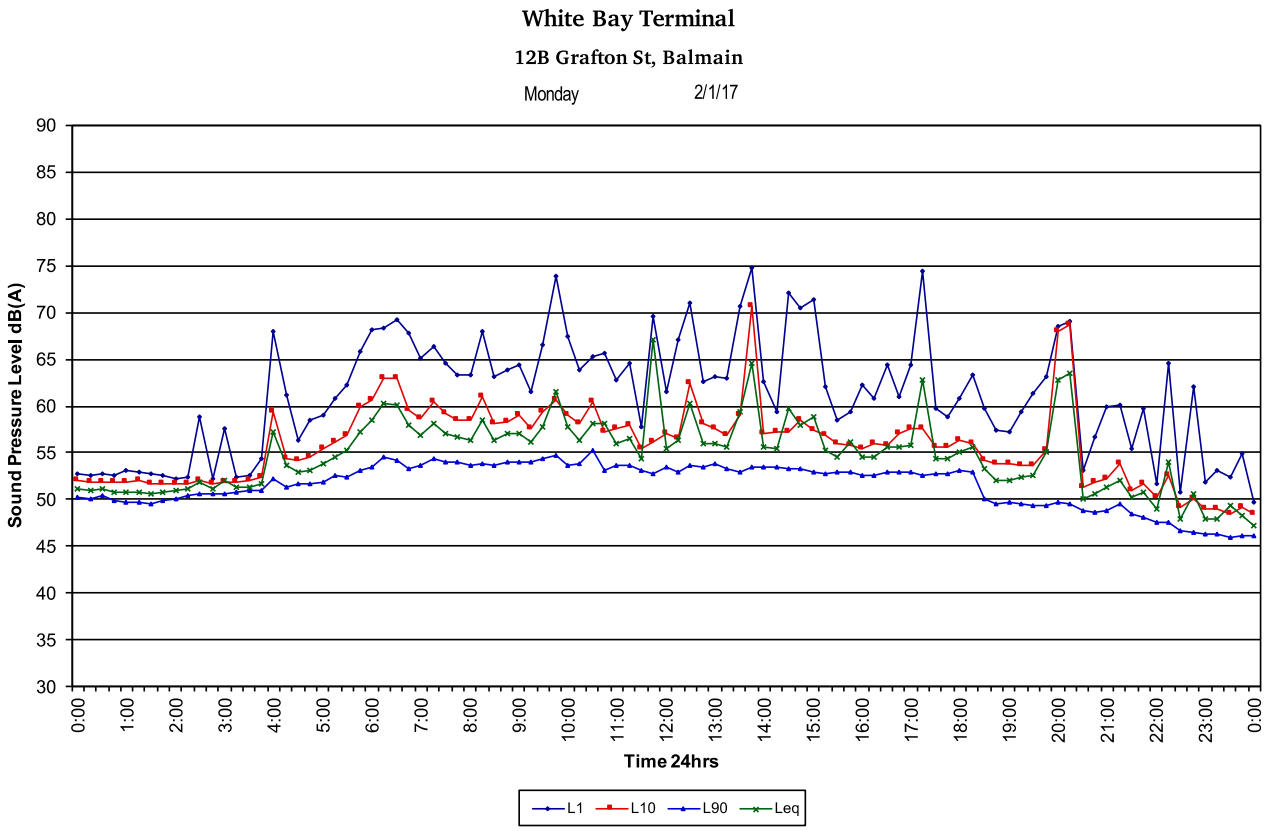

White Bay Terminal
12B Grafton St, Balmain
Thursday 29/12/16
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00
Time 24hrs
L1 L10 L90 Leq

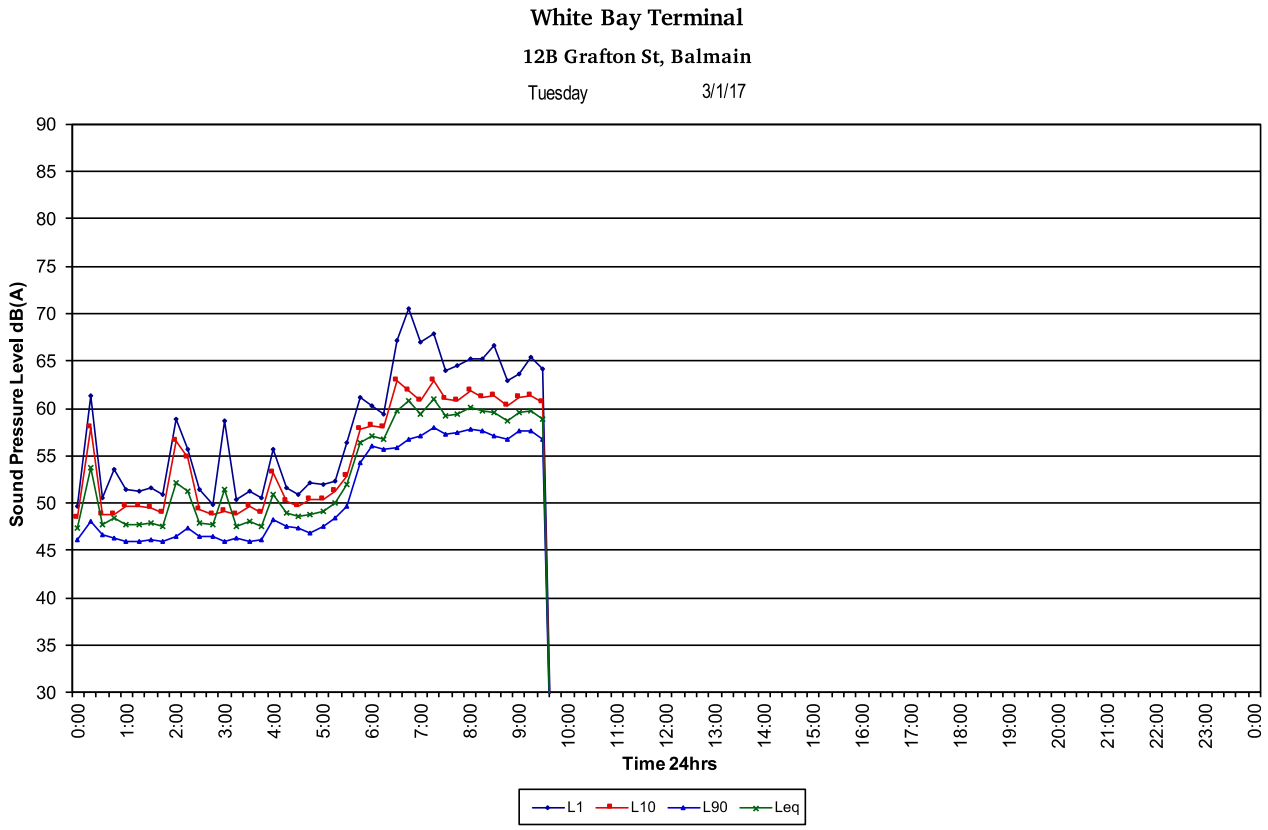

White Bay Terminal
12B Grafton St, Balmain
Thursday 29/12/16
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00
Time 24hrs
L1 L10 L90 Leq


White Bay Terminal
12B Grafton St, Balmain
Friday 30/12/16
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
L90
Leq


White Bay Terminal
12B Grafton St, Balmain
Saturday 31/12/16
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
L90
Leq


White Bay Terminal
12B Grafton St, Balmain
Sunday 1/1/17
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00
Time 24hrs
L1 L10 L90 Leq


White Bay Terminal
12B Grafton St, Balmain
Monday 2/1/17
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00 1:00 2:00 3:00 4:00 5:00 6:00 7:00 8:00 9:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 0:00
Time 24hrs
L1 L10 L90 Leq


White Bay Terminal
12B Grafton St, Balmain
Tuesday
3/1/17
Sound Pressure Level dB(A)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
L90
Leq

Appendix C – Feasibility Table

Mitigation Alternative	Technically Feasible	Noise Reduction	Reasonably Achievable	Recommendation
Source Noise Mitigation				
Engineering Noise Control	YES - such as installation of fan attenuators and or acoustic louvres to major on-ship mechanical noise sources	Vessel dependent, but potentially appreciable and could be designed to achieve at least 5 dBA per noise source	**NO** - while some improvement to existing on-ship noise controls are technically feasible, such mitigation measures are not reasonably achievable as each individual vessel would be require significant vessel mechanical redesign, retrofitting and or repurposing.	**MONITOR** - Port Authority to maintain discussion with cruise vessel operators and monitor the progress of improved design and acoustical performance of cruise vessels
Operational Management	Yes - such as minimising the use of major on-ship mechanical noise sources	Vessel dependent, but marginal up to 1 dBA	**YES** Relatively low cost measure but only marginal noise benefit	**MONITOR** - while only a marginal noise benefit, could be incorporated into cruise vessel operator awareness programme
Shore Based Power	Yes - but only useful for cruise vessels that can accept shore based power	Vessel dependent, but potentially significant and up to 10 dBA	**YES** With current utilisation (25%) makes it essentially effective and cost effective	**IMPLEMENT**
Propagation Path Control				
Noise Wall	Yes - but subject to detailed constructability assessment	Dwelling location dependent, but potentially significant and up to 9 dBA from an 11.5 m barrier	**YES** The installation of a permanent glass/Perspex noise barrier would introduce a ground level noise reduction.	**DISCUSS** subject to consultation with community

Receiver Noise Control				
Dwelling Noise Attenuation	Yes - but subject to individual property assessment	Dwelling construction dependent, but potentially significant with Type 1 treatment design 8 dBA to 10 dBA; and Type 2 treatment design 12 dBA to 16 dBA	**YES** - the WBCT Vessel Noise Attenuation Program (VNAP) is a targeted and cost effective noise mitigation measure, which can be delivered in a timely manner. **Include ducted Air Conditioning to all living areas within affected residences.**	**IMPLEMENT** - subject to consultation with community