

**CATTLE BAY MARINA
DEVELOPMENT APPLICATION ACOUSTIC
REPORT
At
CATTLE BAY ROAD EDEN
for
EDEN RESORT HOTEL PTY LTD**

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Development Application Acoustic Report

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1. PROJECT DESCRIPTION

1.1. THE PROJECT

The project involves the construction of car parking, use of two portable buildings to house Marina Management, shower and toilet facility to be used by the Marina Tenants/Users, the reuse of the Cattle Bay Jetty, construction of the Cattle Bay Marina complete with pontoons and piles, wave attenuator, power, watering and lighting to each berth. Services provided by Marina Management include a portable sewage pump-out facility on a mobile cart for the Marina Tenants/Users vessels and discharge facility on-shore.

The project does not include any other onshore buildings, workshop, slipway or maintenance facilities.

1.2. REPORT TO SUPPORT DEVELOPMENT APPLICATION

This Development Application Acoustic Report (**DA Acoustic Report**) has been prepared to assist Eden Resort Hotel Pty Ltd with their submission of the Development Application for the proposed recreational Boating Marina at Cattle Bay Road, Cattle Bay Eden.

The report is based on the details given in the following documents:

1. Invitation Email dated 20/03/2015 from Mr. Michael Jarvin
2. Black Architectural Drawings No's DA-DA01/A, A02/B and A03/A
3. Advanced Marina Management Pty Ltd and Royal Haskoning DHV Operational Environmental Management Plan (**OEMP**) dated March 2015
4. The Acoustic Group Pty Ltd, Acoustic Assessment Rose Bay Marina dated 14/10/2008 and in particular:
 - Joint Conference Report Addenbrooke Pty Ltd V's Woollahra Municipal Council, Land & Environment Court Proceedings No. 11179 of **2007 (Rose Bay Marina Joint Conference Report)**



Photo-Proposed Site Entrance Cattle Bay Road

1.3. DESCRIPTION OF SITE

The Cattle Bay Marina site is on Cattle Bay Road Eden which is proposed to be built on the old Eden Cannery Site that was demolished several years ago. The street provides access as seen in the photo opposite.



The location of the portable building to house the Cattle Bay marina Office, toilet and shower facilities is shown on the Google aerial photo below and detailed in the Black Architectural drawings.

The existing jetty as seen in the photo opposite which was previously used for the Eden Cannery is proposed to be incorporated in the Cattle Bay Marina for access.

Photo-Existing Cannery Jetty, Cattle Bay Road Eden

The existing site is seen outlined in the Google Area Map below

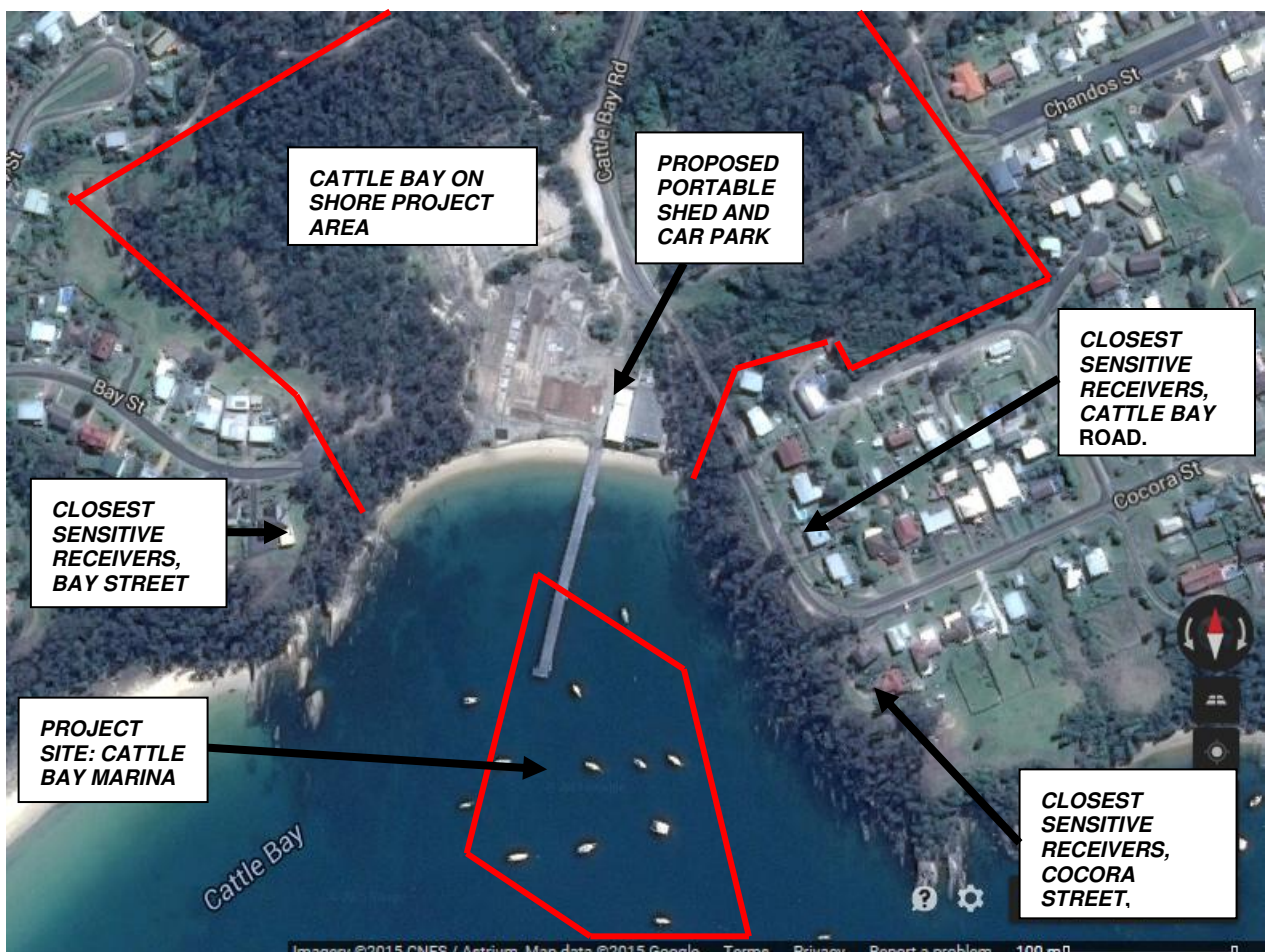


Figure 1: Google Aerial Photo

The closest sensitive receivers to the project site are the following Lots:

- The residential properties at 32 and 40 to 46 Cattle Bay Road which are separated from the marina pontoons by 100 to 150 metres and 90 metres to the entry/exit channel on the north eastern side of the marina project site. These sites are slightly elevated from the water's edge and overlook the project site

- The residential properties at 1, 3, 5 and 7 Cocora Street which are also separated from the marina pontoons by 80 to 200 metres and 75 metres to the entry/exit channel on the north eastern side of the marina project site. These sites are slightly elevated from the water's edge and overlook the project site
- The residential properties at Lot 10, Lot 7086 and at 1 to 8 Bay Street which are separated from the marina jetty by 130 to 150 metres where space has been allocated for commercial and super-yacht berthing, at ~120 metres from the berthing channel. These sites are slightly elevated from the water's edge and overlook the project site

The site is located in an area zoned residential and all closest residences are identified on the Google Aerial Photo above.

1.4.CURRENT NOISE AFFECTING CLOSEST SENSITIVE RECEIVERS

1.4.1.Current Noise from Cattle Bay Boat Traffic

The noise currently affecting the closest sensitive receivers is noise from permanent boats on moorings as they arrive and leave their moorings at Cattle Bay in the same approximate location that will be occupied by the proposed project.

1.4.2.Current Noise from Cattle Bay Road Traffic

The noise currently affecting the closest sensitive receivers is also noise from local and through traffic using Cattle Bay Road. This road loops behind the Eden Shopping Precinct and carries traffic serving the immediate area only.

1.4.3.Current Noise At Site

The site was operating as the Eden Cannery which had road traffic for staff, deliveries and dispatching goods associated with the cannery process. At present, the site and the existing jetty is not being used so there is no noise from the current site.

1.5.PROPOSED HOURS OF OPERATION

The project is proposed to be available to boat owners using the marina continuously, 7 days a week.

2.RELEVANT GUIDELINES

2.1.NOISE GUIDELINES-GENERALLY

2.1.1.Intrusiveness Criteria Generally

The NSW EPA Noise Guide For Local Government 2010 (**NG**) is the document typically used by Local Government to interpret and administer the main legal framework for community noise which is addressed in the Protection of the Environment Operations Act 1997.

The NG requires that background noise be measured as a $L_{A90, t=15 \text{ min}}$ descriptor at the period of the day and location where and when the disturbance occurs.

The NG cross references the NSW EPA Industrial Noise Policy 2000 (**INP**) which is used to give a more precise method to determine single figure background noise levels

and equipment noise levels and uses terms including; Rating Background Levels (**RBL**), Project Specific Noise Level (**PSNL**) which are being used in this report. The RBL is required by the NG to be determined without any erroneous noise coming from the project site. The INP divides the day into the following 3 periods: day (7am to 6 pm), evening (6 pm to 10 pm) and night period (10 pm to 7 am).

The NG and the INP defines the Intrusiveness Criteria (**IC**) as a $L_{A\text{ eq }t=15\text{ min}}$ single figure of RBL + 5 dB(A) for each period of the day which is the PSNL for the project site.

The NG and the INP both require the application of a modifying factor to be applied to any intrusive source noise and allows for the additional annoyance resulting from factors including: tonal noises, low frequency noises, impulsive noises, intermittent noises duration of noises and gives a maximum adjustment requirement, all as detailed in the INP.

2.1.2.Sleep Disturbance Criteria Generally

The NG addresses the term; sleep disturbance. This concept is reported as not having a definitive guideline and suggests that “a source noise if it exceeds background noise by +15 dB(A) when measured $L_{A1\text{ t}=1\text{ min}}$ may cause sleep disturbance”.

2.1.3.Construction Noise Criteria Generally

The NSW EPA have published the document “ Interim Construction Noise Guidelines 2009” which is a guideline sometimes used for construction sites in NSW.

2.2.NOISE GUIDELINES ADOPTED FOR THE ROSE BAY MARINA, SYDNEY

2.2.1.Project Specific Noise Level Determination for the Rose Bay Marina

This DA Acoustic Report is being prepared and assessed based on the relevant sections and descriptions found in the legal proceedings, site testing measurements and conclusions formulated by the joint acoustic experts documented in the Land and Environmental hearing for the Rose Bay Marina-Sydney; Joint Conference Report in 2006 and 2007.

The Rose Bay Marina Joint Conference Report accepted that the Intrusiveness Criteria be used to determine the $L_{A\text{ eq }t=15\text{ min}}$ night period PSNL for the Rose Bay Marina which equalled 43 dB(A) at the quietest sensitive receiver and 54 dB(A) at the noisiest sensitive receiver(on new South Head Road).

These levels at Rose Bay were determined by continuous unattended monitoring over a lengthy period of time by independent acoustic consultants and results accepted by experts so we assume that monitoring was carried out according the required EPA methods, during the required meteorological periods, using the required instrumentation and the single figures calculated according to the requirements set out in the NG and so we believe it is acceptable for us to consider the results are reliable and cross referenced them in the Cattle Bay Marina project acoustic assessment.

The report commented that the amenity goal for a industrial /commercial site would be easily satisfied and did not analyse any noise levels for this consideration and have adopted this recommendation in the Cattle Bay Marina project acoustic assessment.

2.2.2.Modifying Factor Determination for the Rose Bay Marina

The Rose Bay Marina Joint Conference Report did not mention the requirement to apply any modifying factor to allow for any additional annoyance due to tonal and time related characteristics of noise from site generated by marine vessels, presumably because

their joint assessment of the hand held analysis results was sufficiently detailed not to warrant such an application.

However the Rose Bay Marina Joint Conference Report did place the specific condition on noise that may be generated by combined use of “*all other mechanical plant (air conditioning), sewerage pumps and fuel pumps*” which can only be verified by measurement after construction and/or managed by a Project Management Plan for the Rose Bay Marina project.

2.2.3. Sleep Disturbance Criteria for the Rose Bay Marina

The Rose Bay Marina Joint Conference Report assessed noise that could cause Sleep Disturbance as the marina would be operational 24 hours a day, 7 days a week. In this respect, they set the $L_{A1\ t=1\ min}$ sleep disturbance criteria at 53 dB(A) at the quietest sensitive receiver and 64 dB(A) at the noisiest sensitive receiver.

However, there was no record of the application of the Sleep Disturbance Criteria at the Rose Bay Marina project.

2.2.4. Other Noise Sources at the Rose Bay Marina

The Rose Bay Marina project did mention pier maintenance, slipway operation and workshop operating times be restricted to the day period, Monday to Friday.

The Rose Bay Marina project did not mention Intruder Alarms, rigging noise and use of signal horns on moving vessels.

2.2.5. Construction Noise Criteria for the Rose Bay Marina

The Rose Bay Marina Joint Conference Report did include an assessment of the EPA's Construction Noise Guideline (from the Environmental Noise Control Manual) which utilises an average maximum noise level criterion rather than the Leq descriptor.

Their report concluded the only construction noise that was applicable to this site was the pile driving activity in Rose Bay with levels dependent upon the period of construction works. They concluded that details be included in the Environmental Impact Statement for the project that pile drivers be used during approved construction periods, incorporate an acoustic shroud around the operational hammer and have a $L_{A\ 10\ t=15\ min}$ Sound Power Level limitation of no greater than 105 dB(A).

2.3. NOISE GUIDELINES RECOMMENDATIONS FOR THE CATTLE BAY MARINA,

2.3.1. Project Specific Noise Level Determination for the Cattle Bay Marina

Based on the combined agreement for the Rose Bay Marina, the Intrusiveness Criteria (IC) is to be used as the basis of the PSNL for the Cattle Bay Marina project

Unattended $L_{A\ 90\ t=15\ min}$ descriptor monitoring of district noise is typically used over a period, (7 days maximum) to determine the single figure Rating Background Level (RBL) for each period of the day. The IC is calculated based on RBL + 5 for each period which is equal to the PSNL for the site for each period.

The INP adopts 30 dB(A) as the minimum background noise that need to be considered. West and Associates did not have the opportunity to monitor district noise at the project site so we have assumed the following reasonable levels considering the area is in a rural setting and during the day and evening periods in a rural setting, the background noise levels rise due to insect and bird activity:

Table 1: Summary of District Noise Monitored

Background Noise Monitored	Day L_{A90}, 7am-6pm	Evening L_{A90} 6pm-10pm	Night L_{A90} 10pm-7am
Rating Background Noise levels L _{A90} T=15 min,	45dB(A) ①	40 dB(A) ①	30 dB(A) ②
Intrusiveness Criteria L _{Aeq} T=15 min, (Background + 5 dB in day & evening period, background in night period) ③	50 dB(A)	45 dB(A)	35 dB(A)
Project Specific Noise level (PSNL)-	50 dB(A)	45 dB(A)	35 dB(A)

① *Estimated*② *Minimum, NG Clause 2.3.11 IC,*③ *NG Clause 2.2.3*

2.3.2. Modifying Factor Determination for the Cattle Bay Marina

Based on the Rose Bay Marina experts combined recommendations, we nominate the following:

- That no modify factor need to be applied to marine vessel operation
- That noise of all mechanical services plant or pumps to be installed or used on the site be measured and analysed at the nearest sensitive receiver locations, modifying factors as required by the INP be applied if appropriate and compliance with the relevant criteria be confirmed and if not complying, design and install appropriate additional attenuation to bring into compliance.

2.3.3. Sleep Disturbance Criteria for the Cattle Bay Marina

Based on the Rose Bay Marina experts combined recommendations, we nominate the following:

- That the 15 dB(A) above L_{A 90 t=15 min} background sleep disturbance criteria be applied to all noise sources from the project which are to be measured as a L_{A 1 t=1 min} immediately outside the bedrooms of the nearest sensitive receivers in the night periods only
- The occurrence of sleep disturbance can only be verified after project completion and can be monitored by use of unattended and attended noise monitoring

2.3.4. Construction Noise Criteria for the Cattle Bay Marina

The EPA Noise Manual Construction Noise guidelines used at the Rose Bay Marina have been superseded since the time of agreement for the construction of that project so it's use is not appropriate.

We alternatively nominate the application of the NSW EPA Interim Construction Noise Guidelines 2009 for Cattle Bay Marina project

3. CATTLE BAY PROJECT NOISE DETERMINATION

3.1. PROJECT NOISE GENERALLY

The Rose Bay Marina Statement of Agreed (Acoustic) Opinions nominated the principal source noise of the operation the marina to be noise emission from boat movements including manoeuvring to the allocated berths, docking and departing.

Our assessment of the portable building, the services nominated to be provided to the marina conclude the following noise emissions will be present at the site

- Marina patron road vehicle noise
- Marina patron noise caused by onboard meeting of guests, music and shouting during manoeuvring
- Marina portable sewage pump out facilities
- Construction noise

The Cattle Bay Marina noise sources specifically excludes the inclusion of any restaurants, workshops, slip ways, tender vessels, on shore accommodation and overnight stay aboard berthed vessels at the marina, every day heavy vehicle delivery or dispatch to and from the marina, no parties, no amplified voice and music, no refuelling and restriction of the use of hand tools for minor vessel maintenance to be carried out by marina tenant/users.

3.2.CATTLE BAY BOAT MOVEMENT NOISE

3.2.1.Boat Movement Noise Sound Power Levels

The Rose Bay Marina Statement of Agreed (Acoustic) Opinions (**The Joint Opinion**) recorded that in their opinion, the legal restriction of 4 knots for vessels in the vicinity of the Rose Bay Marinas placed on it by the New South Wales Maritime, based on their observations is very rarely exceeded.

The noise levels agreed to by The Joint Opinion for boat movement noise are as follows:

- “Pass by noise at a constant speed of 4 knots indicates typical maximum sound power level (**L_w**) of 91dB(A)”.
- “Use of bow thrusters on bigger boats and instantaneous noise from boats accelerating up to 4 knots can be 10-15 dB(A) noisier. This requires consideration in relation to night time use of the proposed marina and qualification by the Applicant where the bow thrusters would be used at the marina or prohibited being used at night as part of the Marina Management Plan. To resolve this issue the experts consider additional measurements for the entire range of vessels to use the Point Piper Marina (for comparison) should be undertaken” In conclusion, we have considered the use of vessel speed limited to 4 knots in Cattle Bay Marina area, bow thrusters for larger vessels, possibility of the instantaneous noise, (inboard and outboard) motor type and skipper conduct and boat size in a Marina Noise Management Plan including a Code of Conduct and hours of certain allowed operation

We note that the Joint Opinion did not take an issue with noise due to variable vessel speed at the Rose Bay Marina and handled this issue by the Noise Management Plan for the site.

We also note that the Joint Opinion did not take an issue with sleep arousal noise at the Rose Bay Marina and handled this issue by the Noise Management Plan for the site.

We conclude that the $L_{A, Eq, t=15 \text{ min}}$ descriptor of 91 dB(A) sound power level (or **L_w**) as agreed to for the Rose Bay Marina is suitable and representative to be used to calculate the intrusion noise levels of vessels operating while berthing, leaving and moving in the immediate Cattle Bay Marina area and that other aspects of vessel movement be addressed in Berthing Terms and Conditions for Noise (**Terms and Conditions for Noise**) to be agreed with and accepted by the Marina Tenants/Users

3.2.2. Boat Movement Noise at Closest Residences

Based on the use of the 91 dB(A) L_w for boat movement, we have calculated the expected resulting noise levels for the different closest sensitive receivers being local residences at representative locations around Cattle Bay and also identified on the Google Map.

We have taken the following typical diesel engine 1 octave sound pressure profile at 10 metres for the basis of our frequency distribution in our distance calculation.

Table 2 Typical Diesel octave Noise Profile

Hz		63	125	250	500	1K	2K	4K	8K	dB(A)
Typical Diesel Engine L_{Aeq}		49	53	55	62	64	64	63	57	70 @ 10 M

The formula we have used to determine sound pressure at the receiving locations from plant and patron noise is as follows:

$$L_{p2} = L_w + 10 \log_{10} Q - 20 \log_{10} r - 11 - Att$$

Where:

L_{p2} = sound pressure at receiver

L_w = sound power source

Q = directivity factor, 2 for roof discharges, 4 for traffic on driveway or through basement car park entrance

r = distance from outdoor unit to boundary

Att = attenuation of a noise barrier or other means where used

Table 3 Single Figure L_{Aeq} Vessel Noise Level at Closest Residences

Closest Sensitive Receiver Locations	Calculated L_{Aeq}	Day/ Evening/ Night Criteria	Day/ Evening/ Night Compliance
Cattle Bay Rd.	44 dB(A)	50/ 45/ 35 dB(A)	Yes/Yes/No
Cocora St.	45 dB(A)	50/ 45/ 35 dB(A)	Yes/Yes/No
Bay Rd.	41 dB(A)	50/ 45/ 35 dB(A)	Yes/Yes/No

3.2.3. Comments on Boat Movement Noise Compliance

With reference to Table 3 above, the calculated noise from vessel movement both manoeuvring into and out of berths and travelling along the channel complies with the day and evening criteria established for the project site. The night period criteria, determined as being the threshold value that needs to be considered by the INP and NG does not comply.

In practice, the L_{A90} t=15 min background noise level of the typical areas will vary over the seasons and often rises to 38 dB(A) as was the case at the quietest sensitive receiver location monitored for the Rose Bay Marina and if this was the case at this site, the night period PSNL criteria would comply.

These calculations are based on the agreed, single figure vessel sound level accepted for the Rose Bay Marina and depends on the appropriation of the Operational Noise Management Plan to handle the anticipated variables and are detailed later in this report.

3.2.4. Intruder Alarms for the Cattle Bay Marina

The Marina Management shall allow the use of Intruder Alarms on vessels. We recommend that the noise restrictions and requirements specified in the Protection of

the Environment Operation Regulations 2008 for motor vehicles in Australia fully apply to the intruder alarms if fitted to vessels.

3.2.5. Animal Noise

The Marina Management shall allow the presence of pet animals on the marina tenant/User vessels. We recommend that the noise restriction applied to the NSW EPA Noise Guide for Local Government 2010 relating to animal noise in build up areas fully apply to the pets if brought onto site or are on vessels berthed at the marina

3.2.6. Maintenance of Vehicle Parking Area, Jetty and Pontoons

The Marina Management shall be required to carry out periodic repairs and maintenance on the car parking area, of the portable buildings on site, of the jetty, pontoons and wave attenuator structure.

We recommend that this works only be carried out in the day period, Monday to Friday.

3.2.7. Maintenance of Vessels at the Marina

Marina Tenants/users shall be permitted by Marina Management to carry out Maintenance of Vessels at their Marina berth using hand tools only. We recommend that this works only be carried out in the day period, Monday to Friday and noise levels comply with the PSN:L requirements for the site.

3.3. CATTLE BAY ROAD VEHICLE MOVEMENT NOISE

The Black Architectural plans for the site show parking for ~98 vehicles and the temporary buildings 1 and 2. The site parking is documented to be interrupted by 9 short access roads. Because the roads are broken up into short lengths, vehicles using the area cannot travel at any speed or be disruptive so typical 10 k/h low speed road noise can be emitted.

Typical low speed road vehicle noise inside the parking area at the Cattle Bay Marina Car park Site will be sufficiently attenuated by distance to the closest sensitive receivers to fully comply with the Day, Evening and Night period PSNL criteria so no additional Car park noise attenuation is recommended to be need on this project

3.4. CATTLE BAY MECHANICAL SERVICES NOISE

The Black Architectural plans do not detail any mechanical services but we envisage localised toilet exhaust fan and stand alone domestic standard air cooled split air conditioning will be installed in each of the two temporary buildings.

Typical low volume toilet exhaust fans inside the toilet areas and say 7 kW air cooled split air conditioners installed to serve the Cattle Bay Marina temporary buildings will be sufficiently attenuated by distance to the closest sensitive receivers to fully comply with the Day, Evening and Night period PSNL criteria so no additional mechanical services noise attenuation is recommended to be need on this project.

3.5. SEWAGE PUMP OUT NOISE

The Black Architectural plans do not detail any sewage pump-out facilities but we have been advised by our Client that a mobile system will be incorporated.

Suitable equipment is a portable, hand pushed, stand alone, 5 HP petrol motor, sewage pump-out 500 Series KECO Pump-A-Head portable unit, made available for the use of marina patrons to pump out their on-board sewage tanks into the portable tank and then

discharged into the town sewer line on site. A brochure for this plant is to be found in Appendix 1.

The typical internal combustion engine to comply with the POEO Regulations 2008 is to have a Sound pressure level not exceeding 75 dB(A) measured at 1.5 Metres in a hemispherical field of 30 Metres diameter. The portable pump out station can only be located on the jetty pontoons so the minimum distance from any closest sensitive receiver is as shown in the following table:

With reference to Table 4 above, the calculated noise from the portable sewer pump-out unit complies with the day and evening criteria established for the project site. The night period criteria, determined as being the threshold value that needs to be considered by the INP and NG does not comply. The Operational Noise Management Plan recommends that day period usage only be allowed and evening and night time usage be disallowed.

Table 4 Single Figure $L_{A Eq}$ Sewer Pump-Out Noise Level at Closest Residences

Closest Sensitive Receiver Locations	Calculated $L_{A eq}$	Day/ Evening/ Night Criteria	Day/ Evening/ Night Compliance
Cattle Bay Rd.	39 dB(A)	50/ 45/ 35 dB(A)	Yes/Yes/No
Cocora St.	39 dB(A)	50/ / 45/ 35 dB(A)	Yes/Yes/No
Bay Rd.	37 dB(A)	50/ 45/ 35 dB(A)	Yes/Yes/No

4. OPERATIONAL NOISE MANAGEMENT PLAN

The Operational Noise Management Plan is to be found in Appendix 2 of this DA Acoustic Report

5. CONSTRUCTION NOISE MANAGEMENT PLAN

The Construction Noise Management Plan is to be found in Appendix 3 of this DA Acoustic Report

6. VERIFICATION OF ACOUSTIC COMPLIANCE

6.1. VERIFICATION OF BACKGROUND NOISE LEVEL

This report assumed threshold background noise for the night period, the period when sleeping occurs and typically the controversial period of the day.

The actual background noise level for the other typical area of Eden to verify if in fact the 30 dB(A) threshold is appropriate to be used.

6.2. VERIFICATION OF VESSEL NOISE COMPLIANCE

This report has assumed the noise levels for marine vehicle movement based on the Rose Bay Marina monitored results. Actual vessel movement noise could be monitored at the closest sensitive receiver being the water front residences at Cocora Street Eden over several days once the Cattle Bay Marina was say 60 to 80 % occupied. It would be prudent not to allow the portable sewer pump-out facility to be used during that monitoring period.

End of Report

APPENDIX 1



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