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4th January 2007

To Rebecca Groth
Tweed Shire Council
Murwillumbah 2484 NSW

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EURON ROAD
DURANBAH.

LN: 42070

TWEED SHIRE COUNCIL	
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Dear Rebecca

Our amended plans are taking longer than anticipated because of the holiday season ie: our engineers and town planner's annual holiday break, consequently we are submitting the acoustic report separately.

Thank you,
Jeff & Merrin Gilliland

RECEIVED Building Services Unit Date: 5/1/07

Site Details

The site proposed for the facility is on an area of land adjoining a dense transportation route, the Pacific Highway, in northern NSW. The site topography consists of a flat plain on its western flank bounded by relatively steep hills on the northern and eastern sides of the property, these rising up to 50 metres above this plain on the northern end.

Substantial acoustic barrier shielding is possible to residents because of the terrain and the track layouts have been revised from the previous proposal to take maximum advantage of these natural features.

Figure 1, following, shows this topography and gives distances from a number of points to residence 2 (R2), which has the most direct view of the site of the closest residences (R1,R2,R3,R4). The alignment of the Pacific Highway is shown as a dotted blue line in the figure. The track layouts shown in the figure are not those currently proposed.

Figure 2, following, shows an aerial view of the zone of interest within the site, the Pacific Highway, the closest residential locations (R1 to R6), and noise level measurement locations in the Tweed Cemetery (A and B) and to the west of the highway (C).

Figure 2 Aerial View of Site Showing Closest Residential Receivers (R1-R6) and Cemetery Noise Monitoring Locations A & B



Existing Ambient Noise

The ambient noise information was derived from measurements undertaken for previous reports^{1,2} and attended 1/3 octave band spectrum measurements. Insect noise noted as currently present in the area meant that further dBA noise level logging could not be relied upon for information on ambient noise levels. The use of 1/3 octave band spectrum measurements allowed this insect noise to be excluded from the analysis.

Ambient noise in the surrounding area is primarily generated by dense traffic on the Pacific Highway. A previous study of noise from the Pacific Highway 4 kms to the south¹ found that background noise levels (LA90 levels) were highly correlated with the volume of traffic on the highway ($r^2=0.93$).

The study showed that daytime traffic flows are well established by 10am until 6pm on Sundays and from 9am until 6pm on other days of the week (See noise logging information in **Appendix B**). Weekend daytime traffic volumes on the Pacific Highway are not less than those for daytime weekday traffic and traffic noise levels are similar.

The dominant noise from the Pacific Highway traffic is generated by the rolling noise of vehicles, the interaction between vehicle tyres and the road surface. This noise has a consistent and well defined spectrum.

Appendix A provides the results of the ambient noise spectrum measurements. These show the broad road tyre noise peak centred around 1 kHz present at all measured locations. The peaks in the spectra around 4 kHz were due to insect noise.

The study also confirmed that the highway acts as a 'line source' of sound rather than a point source and that Rating Background Level (RBL) levels reduce by approximately 3 dBA per doubling of distance from the highway. Motorcycles act as a point source of sound and motorcycle noise reduces at twice the rate with distance as for the highway, 6 dBA per doubling of distance.

Additional ambient noise sources are insect noise, which varies with time of year, and noise generated by wind in vegetation.

Based on the measurement results the following Rating Background Levels (RBLs) have been adopted for assessment purposes. The R1-R4 and Cemetery levels are consistent with an AS1055 R4 category, an area with dense transportation.

Table 1 Noise Sensitive Receiver Location RBLs

Location	RBL	RBL+5
R1-R4, Cemetery	53	58
R5 & Westward Residences, R6	46	51

¹ James Heddle Acoustical Consultants Report LGD-R2, Pacific Highway Noise Impact Assessment, Tanglewood Property, Tweed, NSW

² Craig Hill Acoustics Revision 2 Noise Impact Assessment Proposed Motorcycle Track 6 Donalyn Court, Duranbah

Facility Operations Noise Criteria

The NSW DEC has confirmed that the Industrial Noise Policy specifically excludes motor sports facilities, such as the current proposal, from the scope of the policy (Section 1.3).

Examples of noise sources that are NOT dealt with by the policy are:

- transportation corridors (roadways, railways and air corridors)
- motor sport facilities

However, in our opinion, the broad principle of submerging introduced noise into the existing background noise and applying penalties to account for the characteristics of the introduced noise is still valid. If an introduced noise is inaudible at a receiver then it has no impact. An introduced source whose equivalent continuous level is below the existing ambient for more than 90% of the time at any time during its operation is also likely to have low impact, that is, if the equivalent continuous noise level is below the Rating Background Level (RBL). Exceedences of less than 5 dB above the RBL for continuous noise sources are generally considered to be satisfactory.

Trail bike noise levels measured during this assessment are presented in **Appendix C**. These measurements indicate that the large four stroke trail bike was the loudest and that a penalty for impulsiveness was warranted, the NSW Industrial Noise Policy procedure specifying a 5 dBA penalty for impulsiveness.

Based on the foregoing, the Vipac report recommendation that the maximum levels be constrained to background plus 5 dBA is a significantly stricter criterion since the measurements indicate that the difference between the equivalent continuous noise level and the maximum level for the loudest bike was in the order of 10 dBA. However, constraining the maximum levels in this way is likely to provide good conditions for receivers and we have adopted the RBL+5 limits given in **Table 1** for the maximum levels generated by the operation of the facility.

Additionally, we have adopted the same RBL + 5 limits for the equivalent continuous noise due to the net contribution from all trail bikes, applying a 5 dBA penalty for impulsiveness.

In terms of other published noise criteria for trail bikes, we note that a "Trail Bike Site Assessment Tool" has recently been developed by the Redland Shire, Brisbane City, Beaudesert Shire and Logan City Councils in Queensland. The assessment tool stipulates that a trail bike site should be located a minimum of 300 metres from existing or proposed urban areas, residential areas or noise or dust sensitive areas and/or natural or built features should be present that would mitigate the noise impacts of a trail bike facility on sensitive surrounding land uses.

The POEO (Noise Control) Regulation 2000 requires a reasonable person to assess that the noise from trail bikes is offensive, as given below.

Clause 14 of the Regulation	Noise abatement direction (ss. 275–279 of the POEO Act)
What is the offence? The regulation makes it an offence for a motor vehicle to make offensive noise in off-road locations. A penalty notice can then be issued immediately if the authorised officer considers noise to be offensive.	A noise abatement direction is an official warning to stop making offensive noise. It is an offence to breach a noise abatement direction, which lasts for 28 days. An offence only occurs if the direction is breached. Before taking enforcement action it is advisable for the authorised officer to visit the site again, to verify that the warning was not being heeded. Once this has been verified a penalty notice can be issued.

Audibility Testing

OXGV14L

JAMES HEDDLE ACOUSTICAL CONSULTANTS

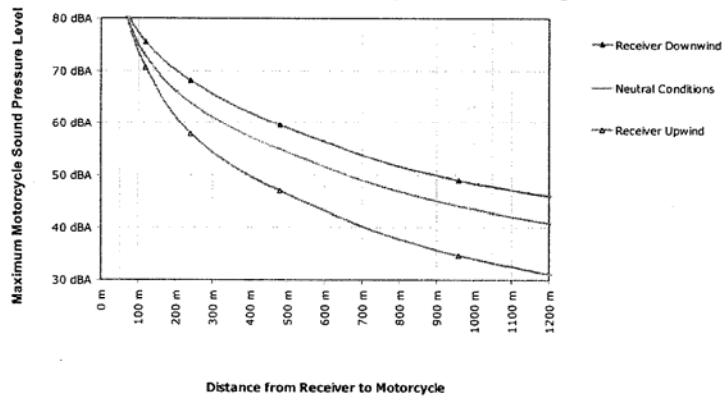
Facility Operations Noise Modelling

Three trail bikes selected as examples of loud models were measured at the worst case angle to the axis of the bikes and the results are presented in Appendix C. From these measurements representative worst case octave band sound power levels were determined from the maximum spectrum generated by the loudest bike at its loudest angle for modelling using the CONCAWE noise propagation algorithms⁴.

Modelling was undertaken to various distances and for various degrees of acoustic barrier shielding for comparison with the maximum noise level criterion.

Figure 5 below shows the worst case maximum sound pressure level at a given distance for a range of meteorological conditions with the trail bike unshielded, i.e. fully in view. It can be seen that the variation is significant with downwind conditions generating levels about 5 dBA higher than calm and neutral conditions.

Figure 5 Worst Angle Maximum Sound Pressure Levels vs Receiver Distance for Loudest Trail Bike, Expected Range due to Meteorological Conditions



The following figures show the expected maximum trail bike level relative to the criterion level for various receivers and degrees of acoustic shielding for neutral and downwind/temperature inversion conditions. Figure 6, following, depicts the maximum levels with the range in distances from the tracks to residence R2, shown shaded. Figure 7 shows the same for the Cemetery and Figure 8 for the closest residences to the west of the highway.

⁴ CONCAWE The Propagation of Noise from Petrochemical Complexes to Neighbouring Communities Report 4/81 Den Haag, 1981.

Figure 7 Worst Angle Maximum Sound Pressure Levels at Stated Receiver Distance, for Loudest Trail Bike showing the Range due to Meteorological Conditions and Various Amounts of Acoustic Shielding. Track Distances to Cemetery shown Shaded.

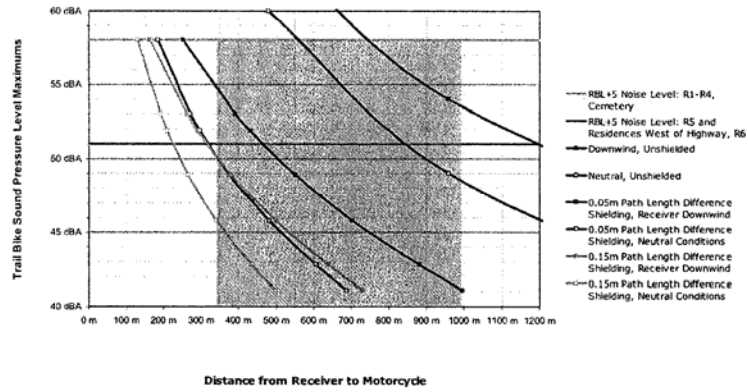
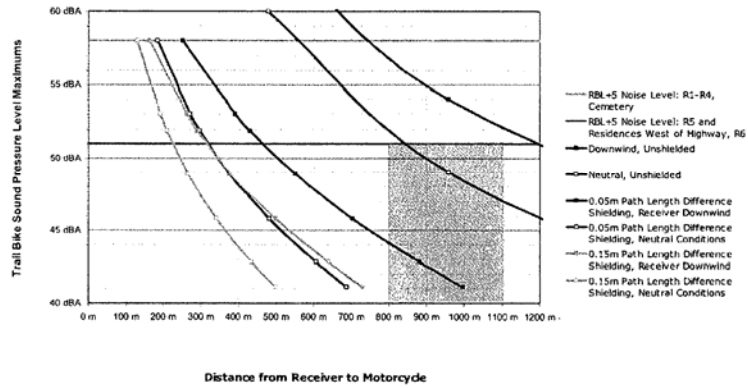


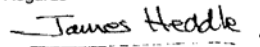
Figure 8 Worst Angle Maximum Sound Pressure Levels at Stated Receiver Distance, for Loudest Trail Bike showing the Range due to Meteorological Conditions and Various Amounts of Acoustic Shielding. Track Distances to Residences West of the Pacific Highway shown Shaded.



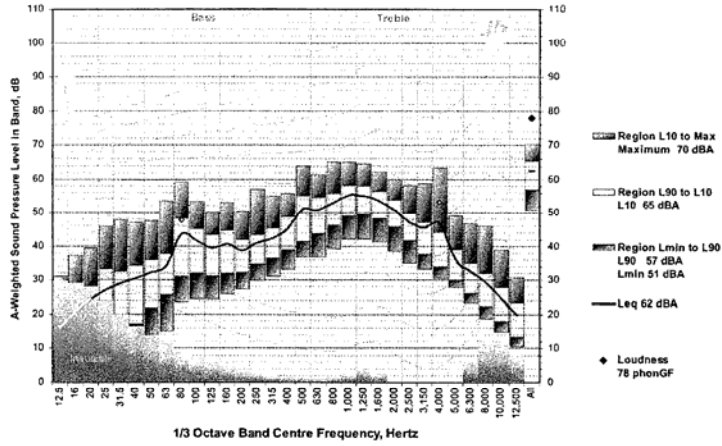
Recommendations

1. Adopt the revised Track zones to maximise available acoustic shielding provided by the terrain.
2. Screen trail bikes at all locations on the site viewable from receivers. This means to residential locations to the northwest and west where they have direct line of sight to the facility.
3. Screening to consist of soft barriers on the residential receiver side of the track (northwest or west of the track) where the trail bike exhaust may otherwise be visible to the receiver. Barriers to consist of hay bales a minimum of 1.25 metres in height. The precise location details for these are dependent on the preferred track layout within the designated zones.
4. Trail bike numbers to be limited to 12 per track unless maximum noise levels are lowered to be below 130 dBA at 500mm (trail bike used in modelling).
5. Vehicle access to the site not to exceed 80 vehicle movements per hour.
6. Bikes to be tested in accordance with the procedure given in Section 5.7.2.1 of the Manual of Motorcycle Sport 2006, Motorcycling Australia (see Appendix D) except that bikes to be throttled to maximum throttle position instantaneously at least three times. Bikes exceeding a maximum level of 130 dBA to be excluded.

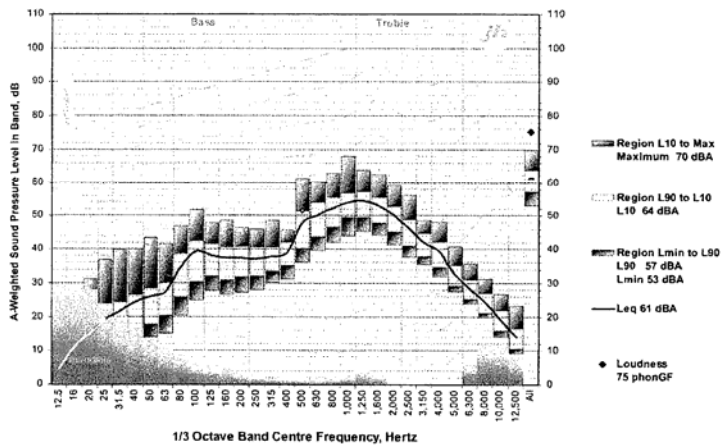
Trust this of assistance
Regards



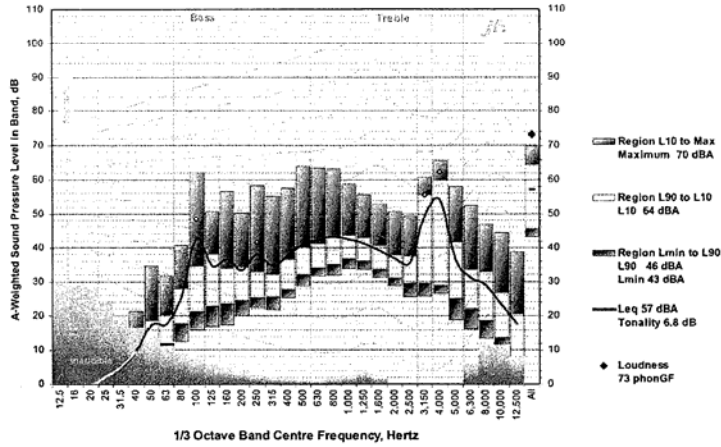
Residence R2, 15min Ambient. 13:29 Friday, 13 October 2006



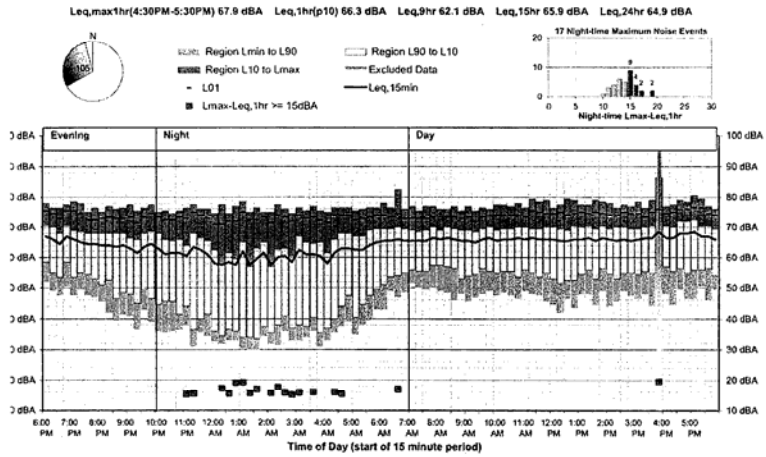
Location A, Cemetery, 15 min Ambient. 13:52 Friday, 13 October 2006



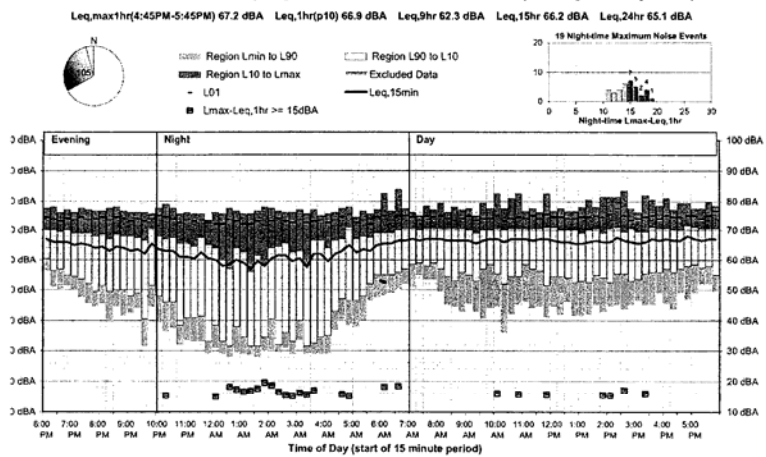
Location C, West of Highway, 15 min Ambient. 14:59 Friday, 13
October 2006



Statistical Noise Levels, Offset to Highway 77m, 4.3km South of R2, Commencing Evening of Sunday, 11 May 2003



Statistical Noise Levels, Offset to Highway 77m, 4.3km South of R2, Commencing Evening of Sunday, 25 May 2003



Appendix C – Motorcycle Sound Level Tests

Testing was undertaken on a flat grassed area of land at the site, pictured below. The motorcycles were selected as examples of loud motorcycles, one a four stroke engine the other two 2 stroke engines.

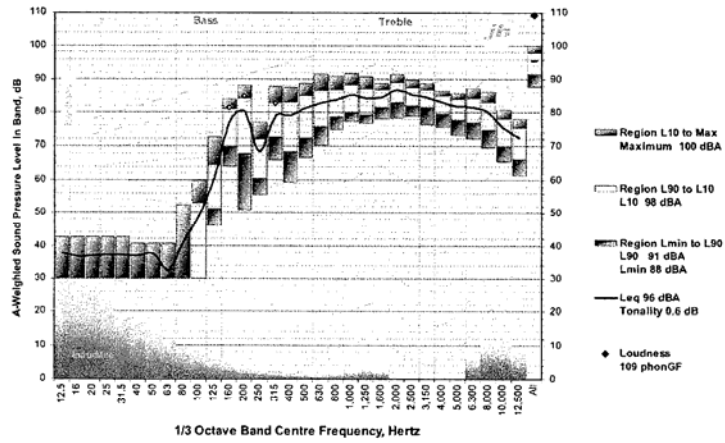
A RION NA27 1/3 octave band spectrum analyser was positioned at 1.2 metres above ground level, 7.5 metres from the exhaust of the motorcycles at 30 degrees counter clockwise around from the front back axis of the motorcycle, the angle around the motorcycles found to give the highest sound pressure levels. Measurements were taken over a 60 second period with the riders aggressively revving the engines. The Yamaha 2 stroke motorcycle engine seized during revving for these measurements and a second two stroke was brought to the site for testing.

The purpose of the testing was to enable the determination of representative worst case octave band sound power levels for sound propagation modelling (loudest motorcycles, loudest angle, maximum engine throttling).





Yamaha YZ250 2 Stroke, 7.5m, 30° from front back axis on exhaust side. 10:26 Thursday, 2 November 2006



Appendix D – Motorcycling Australia, 2006 Manual of Motorcycle Sport

5.7 NOISE EMISSIONS

5.7.1 Specifications

5.7.1.1 Noise emissions must not exceed 102dB(A) unless otherwise provided for in SR. This sub-Rule does not apply to Record Attempts.

5.7.1.2 The noise emission level for speedway is 98dB(A).

5.7.2 Measurement

5.7.2.1 Noise emissions must be measured with a microphone placed at 500mm from the exhaust pipe at an angle of 45 degrees measured from the centre line of the exhaust end, and at the height of the exhaust pipe, but at least 200mm above the ground. The reading must be taken with the engine running at a crankshaft speed equivalent to a calculation based on a mean piston speed of 13m per second for two-stroke and 11m per second for four-stroke engines using the following table (*not shown here*)

5.7.2.2 Where government regulations or planning orders exist in relation to noise testing, those regulations or orders will prevail over rules 5.7.1.

5.7.2.3 No person may compete in any event on a machine whose noise emissions exceed the prescribed levels.