

# SOUTHERN HIGHLANDS REGIONAL SHOOTING COMPLEX, HILL TOP

## Survey of Club Utilisation

ATTACHMENT B

**1. Date (approx) that your club commenced to shoot at the 800m rifle range at Hill Top**

Club	Members Shooting Since	Club Events Since
Southern Highlands Rifle Club	October 1988	October 1988 (moved from Welby)
Kiama – Albion Park Rifle Club	October 1988	November 1997
Illawarra Regional Shooting Association	October 1988	1989 (Previously shot at Welby)
Illawarra Service Rifle Club	October 1988	October 1988 (moved from Welby)
SSAA	October 1988	2000(Previously shot at Welby)

**2. Competitions shot by your club, indicating firing positions (distances) on the range from which the competitions are held**

Club	Distances	Competitions
Southern Highlands Rifle Club	<100m 300m – 800m	Rimfire Centrefire / Full Bore
Kiama – Albion Park Rifle Club	300m – 800m	Centrefire under NRAA rules
Illawarra Regional Shooting Association	<100m to 200m 100m – 500m  25m – 100m 100m – 200m	Rimfire Centrefire Field & Service Rifle Events + Sighting-in / practice Big Game Rifle Muzzle loading / Blackpowder
Illawarra Service Rifle Club	100m – 500m	Rimfire & Centrefire
SSAA	<100m to 200m 100m – 500m  <50m 100m – 200m	Rimfire Centrefire Field & Service Rifle Events + Sighting-in / practice Shotgun Muzzle loading / Blackpowder

**3. Firearms used by all club members, including the calibre of all firearms used (showing history of usage)**

Club	Calibres	Firearm Types
Southern Highlands Rifle Club	0.22 rimfire 0.223 – 0.308 0.223, 0.308 6mm, 0.243 (up to 0.315 permitted)	Sporting & Target Rifles Centrefire Field Rifle Full Bore Standard Target F class target rifles (usually custom built)
Kiama – Albion Park Rifle Club	0.308, 0.223, & 0.303 in accordance with NRAA rules	Target Rifles
Illawarra Regional Shooting Association	0.22 rimfire 0.17 – 0.45 centrefire 0.45 - 0.65 Breech & Muzzle-loading	Sporting & target rifles Sporting, target & service rifles Black powder events
Illawarra Service Rifle Club	0.22 rimfire 0.223 – 0.323	As issued service rifles
SSAA	0.22 rimfire, 0.22 air 0.17 – 0.45 centrefire 0.45 -0.65 Breech & Muzzle-loading rifles	Sporting & target rifles Sporting, target & service rifles Black powder events with historic firearms

**4. Which firearms of a lesser calibre and permitted in the Range Approval are not used by your members, indicating the reason?**

Club	Not Used	Reason
Southern Highlands Rifle Club	Larger calibres at short distances Small Calibres at long distance	Recoil Subject to wind drift
Kiama – Albion Park Rifle Club	Calibres and loads determined by NRAA rules	May change between calibres to suit conditions on the day
Illawarra Regional Shooting Association	Permitted larger calibres only occasionally used	Cost, recoil, checking sighting-in before hunting trip etc.
Illawarra Service Rifle Club	Calibres are determined by discipline rules	May change between calibres to suit conditions on the day
SSAA	Permitted larger calibres only occasionally used	Cost, recoil, checking sighting-in before hunting trip etc.

**5. Under what circumstances would your club members use firearms of a greater calibre to that being used now and within the approved limit?**

Club	Circumstances	Comments
Southern Highlands Rifle Club	0.223 not often used at long distance due to potential inaccuracy	Larger calibres used for longer distance events
Kiama – Albion Park Rifle Club	Calibres and loads determined by NRAA rules	May change between calibres to suit conditions on the day
Illawarra Regional Shooting Association	Personal choice, load development, sighting in, practice with hunting or target rifle, new discipline / event	IRSA members previously use a variety of firearm calibres on the range within terms of range approval
Illawarra Service Rifle Club	Calibres are determined by discipline rules	May change between calibres to suit conditions on the day
SSAA	Personal choice, load development, sighting in, practice with hunting or target rifle, new discipline/event	members have previously used a wide variety of firearm calibres within the terms of the range approval

**6. What is regarded by your club as the known noisiest firearm used by your club members on the 800m range? Why and how do you know?**

Club	Noisiest Firearm	Reason
Southern Highlands Rifle Club	0.308	Most powerful under discipline rules and most accurate over 800m at Hill Top, and 1000m at State events. Feedback from sound testing
Kiama – Albion Park Rifle Club	0.308	Feedback from sound testing
Illawarra Regional Shooting Association	0.308	Shooter perception, feedback from sound testing
Illawarra Service Rifle Club	0.308, 0.323 similar	Shooter perception, feedback from sound testing
SSAA	Centrefire rifles similar to 0.308 – smaller calibres quieter, larger calibres not noticeably noisier (hearing protection compulsory for centrefire events) Reliant on measurements by others. Noise perceived by shooter depends on many factors: calibre, loading, barrel length/muzzle style, firearm operating mechanism	Feedback from near field sound testing by several consultants confirmed shooters impression of locally generated noise. Feral animal control Hunters working close to urban areas frequently use larger calibre but lower noise generating rifles to limit disturbance to nearby residents and stock.
74 Pistol Club (sound testing)	0.357 magnum pistol	Consensus by shooters at the time of testing

**7. Which firearms (calibre) have been used in noise testing (commencing with the February 2007 testing undertaken by GHD)?**

<b>Club</b>	<b>Calibres</b>
Southern Highlands Rifle Club	0.22 rimfire rifle 0.223 rifle 0.303 rifle 0.308 rifle
Kiama – Albion Park Rifle Club	0.310 rifle 0.303 rifle 20 gauge shotgun
Illawarra Regional Shooting Association	0.303 rifle 0.308 rifle 7.92 x 57mm (0.312) rifle 0.358 rifle 450/400 (0.41) rifle 0.54 Black powder rifle 12 gauge shotgun
Illawarra Service Rifle Club	6.5mm (0.256) rifle 0.303 rifle 0.308 rifle
SSAA	0.22 rimfire rifle 0.218 rifle 0.270 rifle 0.303 rifle 0.308 rifle 16 gauge shotgun 12 gauge shotgun
74 Pistol Club (sound testing)	0.357 magnum revolver 0.44 black powder revolver
ADF	0.223 Rifle – 14 inch barrel; 0.308 Rifles – 20 & 26 inch barrels

# SOUTHERN HIGHLANDS REGIONAL SHOOTING COMPLEX, HILL TOP

## Survey of Club Utilisation

### Attachment C

The purpose of this commentary is to provide information on the history of developing noise measurement standards.

It may be the case that current officers in the E&H are unaware of the basis of the SPCC guidelines that have been used in the subject assessment and may very well not have access to documentation issued by the SPCC in relation to rifle ranges.

In relation to the preparation of noise guidelines two primary documents were nominated by the SPCC as forming the basis of an assessment, those being reports issued by the National Acoustics Laboratory (NAL - being part of the Commonwealth Department of Health):

- Community reaction to noise from Hornsby Rifle Range NAL Report No 84, February 1981
- Community response to impulse the noise, a survey around Holsworthy Army Range NAL Commissioned Report No. 3, April 1984.

The SPCC Shooting Association Liaison Committee was charged with the responsibility of preparing noise targets for shooting ranges.

The initial concept was based on the National Acoustic Laboratory study for Hornsby Rifle Range (NAL Report No 84 – May 1981). The report concluded the use of A-weighted sound exposure level (ASEL) and Unweighted peak sound pressure level (LPEAK) were the appropriate acoustic metrics to use.

In the 1980s instrumentation to accurately measure LPEAK was available but there were limits in appropriate instrumentation (and familiarity) for the ASEL parameter. The recommended LPEAK limit was 85 dB as an energy mean (logarithmic) value. The entire NAL assessment used logarithmic averaging of shots recorded at each site.

The second NAL report in 1984 considered noise around Holsworthy army range that includes weapons of a significantly higher calibre than rifles. The report recommended using the Unweighted Peak level determined as an energy mean (logarithmic) level. The report provided an index that included the number of shots being the Accumulated Peak Level (APL) = the energy mean over all impulses + 10 Log (mean number of shots per day).

Section 5.4 of the NAL 1984 report "Accounting for Inaudible Events" stated:

The fact that large numbers of noise events were inaudible presents great difficulties in the analysis of the noise data. Although these events actually contribute almost nothing to the final noise exposure measures, their presence can have a marked effect on the intermediate regression analysis, and thus on the predicted values of these measures. Three ways of treating inaudible events are possible:

Assign inaudible events a nominal noise level which approximates the limit of audibility and thereafter carry out a standard regression analysis.

Perform an analysis to predict the levels of audible events only, and another to predict the proportion of events which are audible. The final noise exposure measures can be calculated from these two variables.

Perform a series of analyses predicting, for example, the proportion of events with SEL values greater than 70 dB, greater than 80 dB and greater than 90 dB. Interpolation then gives a probability distribution of levels, from which exposure measures can be calculated.

The regression analysis eventually used by NAL was to use method 1 as it appeared to give the most accurate estimate of overall noise exposure and in the case of Holsworthy range had a cut-off limit of 75 dB Lin Peak Hold.

At the outset of the preparation of what later became the Chapter 164 guidelines the SPCC were considering logarithmic averaging.

The NAL reports that formed the basis of the guideline nominated noise levels for assessment purposes and as correctly pointed out by the E&H, the Chapter 164 guideline did not identify the basis of determining the noise level nominated in the tables.

Reference to minutes of the SPCC Shooting Association Liaison Committee meetings reveal a number of assessment reports in relation to rifle ranges came before the committee and consistently provided assessments in terms of a logarithmic average level and also identified the need for consideration of a different limit for different classes of firearms. For example the provision of rimfire shooting gives rise to a significantly lower noise level than from centrefire rifles and as such resulted in different operating constraints for different classifications of firearms.

The SPCC Shooting Association Liaison Committee was working on amendments to the guideline to represent what had been occurring and clarify the issue of averaging and different disciplines, including the use of dB(A) levels when assessed at residential boundaries for indoor shooting ranges. However before that matters could be determined as a revised guideline, the proposal to remove shooting ranges from Schedule Premises was taken, The continuation of the committee was no longer required.

On 15 May 1989 the SPCC issued to members of the NSW Shooting Association Liaison Committee a preliminary discussion paper prepared by the Commission's Noise Investigation Section for examination and comment arising from a 1989 meeting of the Environmental Noise Control Committee to consider the accumulation method (APL) and a maximum level criteria for shooting ranges. That document confirms the use of logarithmic averaging and classification of different firearms as per the evolution of the guidelines examined by the committee.

The E&H has identified that in 1993 the EPA issued an internal memo that identified the use of arithmetic average for rifle noise.

The basis of changing from logarithmic to arithmetic is unknown. One suggestion could be that as shooting ranges were no longer to be Scheduled Premises (and therefore moving from being controlled by the EPA to the Council) the concept of logarithmic averaging whilst understood by the EPA is not understood by Councils, hence arithmetic averaging.

The 1993 memo contained in the E&H confirms the noise limit in the SPCC/EPA Noise Control Guideline is to be an averaged level and therefore classifies the nominal limit in the Consent is not an absolute limit.

41.4883.R7:ZSC

12<sup>th</sup> September, 2011

Office of Communities  
Sport & Recreation  
Locked Bag 1422  
SILVERWATER NSW 2128

Attention: Mr J. Shipway

**PEER REVIEW – ACOUSTIC REPORT OF RENZO TONIN**  
**SOUTHERN HIGHLANDS REGIONAL SHOOTING COMPLEX**  
**WATTLE RIDGE ROAD, HILL TOP**

An application to modify the Minister's approval for the Southern Highlands Regional Shooting Complex at Hill Top has been the subject of submissions to the Department of Planning of which the only technical submission in relation to noise has been provided by Renzo Tonin & Associates ("Tonin").

The Tonin report "Southern Highlands Regional Shooting Complex, Application for Modification, Conditions. A9, A6 & D4 – Acoustic Report of Renzo Tonin" dated 15 July 2011 is referenced as TF403-01F05 (Rev) Acoustic Report.

The report purports to have been prepared by an independent expert and not as an advocate for Pikes Lawyers who are acting on behalf to the Hilltop Resident Action Group. The report claims to address the proposed modifications but on viewing the contents of the report one finds significant errors in the analysis so provided, the absence of an assessment in terms of the nominated arithmetic average procedure, and findings as a result of that analysis that would appear to provide an answer not desired by the Hill Top Resident Action Group.

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**20-22 FRED STREET, LILYFIELD, 2040, NSW, AUSTRALIA**

ph: (612) 9555 4444    fx: (612) 9555 4442    tag1@acoustics.com.au  
A.B.N. 73 082 704 701



**THE ACOUSTIC GROUP**

In reviewing the Tonin report it is necessary to examine the material in various components to ascertain what has been provided, and more importantly what has not been provided in the Tonin analysis.

## Introduction

In terms of the qualifications of Dr Tonin there is no issue in terms of his capability to undertake a true and proper acoustic assessment and he should have the appropriate knowledge in relation to the mathematical analysis of such measurements, the appropriate knowledge of instrumentation and the knowledge of the significant difference in an audible sense between a measurements conducted in dB(A) versus a Peak Hold Level recorded as an unweighted (Linear) dB level.

Dr Tonin identifies in the introduction that he has been involved in the measurement of noise levels associated with a proposed firing range in 2002 and as a result of that experience is familiar with the issue of wind affecting the measurement results. He does not indicate the outcome of that investigation, the criteria used in that investigation or the method of assessment that was used in that investigation.

Dr Tonin identifies that he has not visited the site and therefore the assessment report is one of a desktop audit referring to documentation that has been provided in relation to the subject application.

## Consolidation of Gun Fire Noise Measurements

Section 2 of the report purports to identify a set of figures to provide a better understanding of the range of gunfire noise levels measured at each residential location for each firing position. The data referred to in the figures is related to the environmental assessment report prepared by GHD, the 2010 GHD compliance test report and reports prepared by The Acoustic Group in November 2010 and February 2011.

The four figures that have been provided are identified as representing location A1, A2 & B2, A3 and A4 that are then purported to have been analysed to obtain the data set out in the corresponding Tables 1 – 4.



In examining the figures and the tables with the reference material, that is identified as being related to the figures and tables that have been presented, there are a number of omissions that are relevant in terms of the subject application as outlined below.

### Figure 1

This figure is identified as related to residential location A1 which by reference to the various reports refers to the northern side of the cul-de-sac at the south western end of Rocky Water Holes Road, Hill Top.

Examination of Figure 1 reveals that the GHD environmental assessment results for this location are noticeably different to all the other measurement results shown for that location. The significance of this difference is identified in the third paragraph of page 12 of the Tonin report. However, this difference is not discussed later in the report in the section as to whether the original environmental assessment was flawed.

If one looks at the general result of the graphs it would appear that the 200 m Cooper measurements are higher than the 100 m and the 800 m measurements. It also appears that the 800 m GHD measurements (their compliance test) is noticeably different and reference to the GHD report indicates there was a significant degree of wind.

However if one looks at gunfire noise levels identified in Figure 1 there is a problem in that Dr Tonin suggests a lower limit of noise levels when in fact the tables of results from which the material has been extracted indicates a significant number of shots have a value of less than what amounts to an ambient background level. This is not reflected in the graphical results. Furthermore there is an absence of any identification of the significant number of shots that occurred on the range but were inaudible at location A1.



## Figure 2

The Cooper reports identify that there are anomalies in relation to the GHD location in Starlight Place as the written description versus the diagrammatic presentation of the location in the GHD reports do not consistently show the Starlight Place monitoring location as A2.

The Cooper reports nominate the Starlight Place location as B2.

Therefore the material contained in Figure 2 (with respect to the GHD measurements) is incorrect, as the GHD results should be removed.

If one removes the GHD results from Figure 2 then it would appear by way of the graphical results that the 300 m position gives rise to higher noise levels than the hundred metre position and the 500 m position may be slightly lower than the 300 m position, particularly if one excludes what is acknowledged as obvious wind effects for that location.

The Figure 1 presented in the Tonin report as to the lower levels recorded is incorrect and again the significant number of inaudible events is omitted from the graph.

## Figure 3

The measurements set out in Figure 3 relate to location A3 and have omitted the significant number of measurements identified in the reports that relate to inaudibility at this location. For example the GHD compliance report found inaudibility for shooting from 300m and 800 m. The Cooper 300 m test found only a few shots were audible in that the majority the shots were inaudible, yet that situation is not reflected in Figure 3.

Furthermore the above criticism as to the Tonin report misrepresenting the measurement data by providing a circle, square or diamond at a position when the text reveals less than an ambient level is clearly evident in Figure 3 if one compares the data upon which the figure relies.



#### Figure 4

The GHD measurements with respect to location A4 do not represent a position in proximity to the residence and Figure 4 has omitted the various tests where noise was inaudible at that location. Furthermore there is data that relates to location A4 that should have been included.

In moving to the tables that purport to represent an analysis of the noise levels set out in the figures there are a number of issues of concern in relation to the presentation of that material.

If as identified later on in the report that there is an endorsement of an arithmetic average for the purpose of acoustic assessment then the obvious question becomes: Why was that material not provided in Tables 1 to 4? The provision of arithmetic average would have assisted the resolution of the matters in that only a few of the logarithmic results (i.e. only 3 of them) are above 75 dB.

If as identified in the GHD compliance report there was a strong wind blowing at the time and ambient levels associated with the wind were greater than that measured from shots then from Tables 1 to 4 the only logarithmic average above 75dB is that from the Cooper 200 m tests at location B2 - if the Tonin report had correctly calculated the logarithmic average, Table 2 mixes locations B2 and A2.

On my examination of Tables 1-4 there appears to be a number of anomalies with respect to the method of logarithmic averaging that has been used in the report.

The second last paragraph on page 17 of the Tonin report claims that in Tables 1-4 the last column shows the percentage of noise measurements which lie above the logarithmic average value proposed in the Cooper reports. Not all of the averages in Tables 1 – 4 can be attributed to me in that I did not present the averaging methodology for evaluation of the GHD reports.



If I am to assume the logarithmic average contained in Tables 1 – 4 follows the format that I have used in my reports, that where the level is below the ambient background level I have used that level for the purpose of calculations, then if one understands the mathematics associated with logarithmic averaging in a technical sense one would get a higher value than if one nominated a contribution for that shot at or around the threshold of hearing, in that acoustic environment which for typical environmental noise is taken as 10 dB below the background level.

The table provided in the Tonin report for location A1 is shown below.

**Table 1 Description of Firearms and Noise Analysis at Location A1**

Consultant	Firing Position	Gun Type	Log Av	% Above
GHD EA	100m	Shotguns – 2 x 12 gauge shotgun, 1 x 20 gauge shotgun Rifles – 4 x .308 rifles, 1 x .310 mm rifles Pistols – 1 x 44 revolver, 1 x 357 Magnum	58.5	13%
GHD	100m	1 x 0.22 G shotgun, 4 x 0.303 rifles, 1 x 7.62 rifle, 1 x 6.5 rifle, 1 x 0.22 Rimfire rifle	70.6	32%
Cooper	100m	Centrefire	72.0	35%
Cooper	200m	Full Bore (.303, .308 and .223), .22,.250	73.9	45%
GHD	800m	0.308 rifle 0.223 rifle	77.4	37%
Cooper	800m	Shotgun, Centrefire, Service Rifle	70.8	10%

If as identified later in the report the OEH now consider the use of arithmetic averaging then going back to the data that has been provided one can insert the arithmetic average for the measurement values that are provided (ignoring the inaudible results). On that basis Table 1 becomes:



Corrected Table 1 results for Location A1

Consultant	Firing Position		Tonin	Cooper		
			Log Ave	Log Ave	Arith Ave	Shots heard
GHD EA	100m		58.5			
GHD	100m		70.5	71	70	24
Cooper	100m	rimfire		Not audible		
Cooper	100m	centrefire		72	70	25
Cooper	200m		73.9	74	73	28
GHD	300m			Not audible		
Cooper	500m			69	66	171
GHD	800m		77.4	77	75	6+
Cooper	800m			71	66	43

Considering the arithmetic average for the corrected Table 1 results shown above one concludes that the 75 dB limit is satisfied when identifying that the GHD 800 m results were wind affected.

The concept of percentage shots above the logarithmic average as presented in Table 1 of the Tonin report is misleading on a number of grounds.

The GHD material does not identify by way of measurements on site the number of shots that were fired versus the number of shots that were detected. There is no acknowledgement in the Tonin report that a significant number of shots fired on the range are inaudible at the residential monitoring location.

The above table identifies that monitoring of rimfire operations from 100 m was found to be inaudible at location A1 and it was only a specific test of utilising centrefire rifles from the hundred metre position that gave rise to the measured noise levels for Cooper 100 m in the corrected Table 1 results. That was a special test to examine the difference in centrefire rifle operations for the 100m metre position with respect to the larger firing distances. The results for that test are not in fact representative of normal operations and should be excluded from all the tables in the Tonin report.



If one examines the Cooper reports the 800 m firing position over the same 50 min period recorded 127 shots, yet only 43 shots were heard at monitoring location A1. Whereas the Tonin report claims 10% of the shots were above the logarithmic average in actual fact only 3.2% of the total number of shots was above the logarithmic average. If one considers the number of audible shots above the arithmetic average then by reason of the arithmetic average being lower, the percentage of the total shots fired at that position on that day is 9.5%.

If one examines the Cooper report for the 500 metre firing position the report identified 388 shots over a three-hour period. The attended monitoring at location A1 recorded only 171 shots were audible over that same period of which 13 of the shots that were audible gave rise to a level less than the background at that time.

It is interesting that the Tonin report has omitted the results for the 500 m firing position for location A1, but includes the 500 m firing results under some form of accumulated method in Table 2 for location A2 and B2.

Considering the number of shots detected at location A1 for the 500 m range was 44% of the total number of shots, then for a logarithmic average of 69 dB only 30 of shots were above the logarithmic average and represents 7.7% of the total number of shots for that monitoring period of three hours. If one conducts the same analysis with respect to the arithmetic average only 12.4% of the total shots in that three-hour period exceeded the arithmetic average.

**Table 2 Description of Firearms and Noise Analysis at Location A2 and B2**

Consultant	Firing Position	Gun Type	Log Av	% Above
GHD EA	100m	Shotguns – 2 x 12 gauge shotgun, 1 x 20 gauge shotgun Rifles – 4 x .308 rifles, 1 x .310 mm rifles Pistols – 1 x 44 revolver, 1 x 357 Magnum	66.4	31%
GHD	100m	4 x 0.303 rifles	70.4	34%
Cooper	100m	Rimfire	67.5	26%
Cooper	200m	Full Bore (.303, .308 and .223), .22,.250	76.0	34%
GHD	300m	16 G shotgun 7.62 Nato rifle 0.22 Rimfire rifle	69.3	49%
Cooper	300m	Full Bore (.303, .308 and .223)	72.1	22%
Cooper	500m	Full Bore (.303, .308 and .223)	67.4	23%

*Note: Cooper 500m value ignores wind affected levels*



Table 2 in the Tonin report cannot be accepted in that it has not comprehended the conflict in relation to the GHD measurement locations, or the fact that the Cooper reports nominate location A2 at the northern end of the bitumen to Rocky Water Holes Road and location B2 at the western end of Starlight Place.

The Cooper results for 200m short test (15 minutes) were wind affected and are of no assistance in this matter.

To consider the impact of the rifle range in the correct context I provide two Corrected Table 2, with Table 2A showing the results for location A2 - noting there are no reliable GHD measurements that can actual be attributed to location A2 as they never conducted any measurements at that location.

Again it interesting that the Tonin report failed to include the Cooper results for the 800 m position but provided those results for location A1.

Table 2A: Results for Location A2

Consultant	Firing Position		Tonin	Cooper		
			Log Ave	Log Ave	Arith Ave	Shots heard
Cooper	100m	rimfire	67.5	69	67	32
Cooper	100m	rimfire		Not audible		
Cooper	100m	centrefire		63	62	25
Cooper	300m	Big bore	72.1	74	72	59
Cooper	300m	mixed		68	68	4
Cooper	500m		67.4	68	65	388
Cooper	800m			66	64	53

The results in Corrected Table 2a reveal the logarithmic and arithmetic average levels to be less than 75 dB.



Again one can conduct the exercise in relation to the percentage of shots that gave rise to measurable increase above the average that is selected for assessment purposes that will result in lower percentages that nominated in the Tonin report.

Corrected Table 2B provides the results for location B2. On removing the results where there was excessive wind (Cooper 200m short sample and GHD 800m) the arithmetic average is less than 75 dB. It is also noted that the results show the 500 m position is a firing position the generates the highest average noise level - not the hundred metre position suggested by GHD in the environmental assessment report.

Corrected Table 2B: Results for Location B2

Consultant	Firing Position		Tonin		Cooper		
			Log Ave		Log Ave	Arith Ave	Shots heard
GHD EA (B2)	100 - 400m		66				?
GHD (A2)	100m		70.4		70	69	24
Cooper	100m	rimfire	67.5		63	61	19
Cooper	100m	rimfire			Not audible		
Cooper	100m	centrefire			70	67	25
Cooper	200m		76.0		76	74	7
GHD	300m		69.3		69	69	2
Cooper	300m	Big bore	72.1		69	67	68
Cooper	500m		67.4		76	70	307
GHD	800m				78	77	22
Cooper	800m				69	66	44

The Tonin report Table 3 and the Corrected Table 3 for location A3 when viewed in the context of Figure 3 require further comments as to the misrepresentation of the acoustic impact at that location.



**Table 3 Description of Firearms and Noise Analysis at Location A3**

Consultant	Firing Position	Gun Type	Log Av	% Above
GHD EA	100m	Shotguns – 2 x 12 gauge shotgun, 1 x 20 gauge shotgun Rifles – 4 x .308 rifles, 1 x .310 mm rifles Pistols – 1 x 44 revolver, 1 x 357 Magnum	66.8	12%
GHD	100m	3 x 0.303 rifles, 1 x 6.5 rifle	76.7	59%
Cooper	300m	Full Bore (.303, .308 and .223)	67.4	73%

Corrected Table 3: Results for Location A3

Consultant	Firing Position		Tonin	Cooper		
			Log Ave	Log Ave	Arith Ave	Shots heard
GHD EA	100m		66.8	68	68	5
GHD	100m		76.7	77	76	24
Cooper	100m	rimfire		Not audible		
GHD	300m			Not audible		
Cooper	300m	Big bore		68	67	4
Cooper	300m	Mixed		Not audible		
GHD	800m		Barely audible			

On going to the GHD EA report the test firings indicate there were 50 individual shots tested of which only five results gave rise to what is described as audible firing, 20 shots were described as barely audible firing and the remainder being audible all masked by other noises. As 27 of the shots indicate the noise level was less than about 66 dB (as discussed above in relation to Figure 3) the logarithmic average has been provided is somewhat misleading for that testing. It would appear that only three of the shots were above the nominated logarithmic average which therefore would represent 6% of the total shots.



For the GHD 100 m compliance test it is obvious from examination of the data that the level so claimed cannot be rifle shooting but must be assumed to be the measurement of wind. 24 shots are identified as being audible but the background peak level noted for the wind is significantly higher than that attributed to the shots. The notation for the test results for location A4 indicate wind gusts at that position were between 70 and 85 dB but there is no notification as to the level obtained from wind gusts for location A3. There is also the question of accurate results from the meter used for that testing which will be discussed later in this review.

The Tonin report Table 4 and the corrected Table 4 are shown below.

**Table 4 Description of Firearms and Noise Analysis at Location A4**

Consultant	Firing Position	Gun Type	Log Av	% Above
GHD EA	80 100m	Shotguns – 2 x 12 gauge shotgun, 1 x 20 gauge shotgun Rifles – 4 x .308 rifles, 1 x .310 mm rifles Pistols – 1 x 44 revolver, 1 x 357 Magnum	62.6	31%
GHD	100m	4 x 0.303 rifles	69.0	0%
Cooper	300m	Full Bore (.303, .308 and .223)	62.1	44%

**Corrected Table 4: Results for Location A4/A4A**

Consultant	Firing Position	Tonin	Cooper		
			Log Ave	Arith Ave	Shots heard
GHD EA	A4 100m	62.6	63	60	21
GHD	A4 100m	69.0	69	69	11
Cooper	A4 100m rimfire		Not audible		
Cooper	A4A 100m rimfire		Not audible		
Cooper	A4A 100m centrefire		Not audible		
GHD	A4 300m		Not audible		
Cooper	A4 300m Big bore		62	62	2
Cooper	A4 500m		Not audible		
Cooper	A4A 500m		Not audible		
GHD	A4 800m		Not audible		
Cooper	A4A 800m		Not audible		



The monitoring location A4 selected by GHD is significantly removed from the residential dwelling to the north-west of the range to such an extent that the results of that location are somewhat meaningless. The additional distance and screening by topography to the residential property would significantly alter the measured levels to that obtained at location A4A.

The claim that the percentage exceedances of 44% at location A4 for the Cooper 300 m test becomes absurd when one looks that only two shots were detected over 15 minutes. If one shot is measured at 63dB and the other shot is measured at 61dB then the mathematics of having 44% of the detected shots being above the average is clearly wrong (only 2 shots audible). There is no corresponding information provided in the Cooper report to indicate the actual number of shots that occurred during the monitoring period at location A4A. However, examination of the number of shots at locations L1, L2 & L3 would suggest 36 shots per 15 minutes that therefore would realise 5.6% of the assumed total shots were heard at that location and that less than 3% of the total shots exceeded the average level for the shots that were measured.

By examination of the corrected tables above one can only conclude that the figures and the tables contained in Section 2 of the Tonin report have clearly misrepresented the situation. As discussed above the absence of providing arithmetic average results seriously questions the independence or purpose of the report.

### **Condition of Approval A9 – Firearm Noise Limits**

Under this heading the Tonin report seeks to raise matters in the application that are described as “contentions” for the purpose of itemising various issues.

#### **Contention 1: GHD Environmental Noise Assessment was Flawed**

The Tonin report agrees that by reference to Figures 1- 3 that the GHD environmental assessment report underestimated the noise from firearms at various firing points on the existing 800 m multi-purpose range.



The discussion then move into a matter of considering conditions and an interpretation of what would appear to be irrelevant matters concerning the contention so stated.

In the introduction to the report Dr Tonin identifies his familiarity with the issue of wind affecting the measurement results.

Dr Tonin is capable and qualified to address the issue of instrumentation used by GHD in the environmental assessment that cannot measure the peak hold linear level by that meter. However, whereas the use of incorrect instrumentation that cannot read the appropriate noise limit would be a matter that would have serious implications in terms of the accuracy of report he has chosen not to address that matter. The GHD EA report states in section 3.2.1 the monitoring was undertaken with two Type 1 sound Level meters.

The Svan 943 sound level meter is a Type 2 meter that does not have Peak Hold time constants. The SVAN 912 meter is a Type 1 meter. The near field measurements in Table 3-6 produce the same levels for 4 different firearms that exceed the capabilities of the 943 and the 912 meters.

Dr Tonin has failed to confirm the directional characteristics of noise propagation associated with firearms, despite the Cooper reports including a noise contour plot from the NAL report in relation to Hornsby rifle range.

Whilst agreeing in Section 2 of the report that various firing positions give rise to higher noise levels than that obtained at 100 m Dr Tonin has failed to address the stated position on page 15 of the GHD environmental assessment report that:

*It is in GHD's opinion that the testing simulated a worst-case configuration for the following reasons:*

- *Firing was undertaken at the end of the firing range nearest to the rear target earth embankment. Firing would normally occur at a further setback distant from the target than that tested, providing further distant loss attenuation of sound at the nearest receivers: and*



- *The firing site during testing was considered more elevated exposed than the rest of the range, with less trees intervening between source and receiver locations.*

Dr Tonin agrees on page 15 of his report that the GHD assumption as to worst case scenario was incorrect.

The GHD report did not identify the use any averaging mechanism in the analysis of rifle ranges.

All of the above matters identify the GHD EA assessment used incorrect instrumentation and inexperienced personnel who did not have the necessary technical experience to undertake such an assessment.

The subsequent measurements by GHD and Cooper show the original measurements, assessment and conclusions provide by GHD were incorrect.

The GHD compliance report utilised a different sound level meter (a Larson Davis 831). However Dr Tonin has failed to identify that the readout of that Larson Davis meter does not actually show the peak hold value that can be related to a shot.

For the Blue Mountains Gun Club compliance testing I placed a B & K 2218 meter, a B & K 2209 meter, a Svan 912 meter and a B & K 2260 meter side by side to verify the results obtained from those meters and found consistent results.

For my first set of tests along the power line to the east of the range I set up at up one point a Larson Davis 831 meter alongside a SVAN 957 meter and could not get meaningful results from the digital display of either meter for the shooting that was occurring at the range. Hence I relied upon the stored time splice file from the two meters. I also conducted a comparison test of the Larson Davis 831 meter with a B & K 2260 meter in the residential area of Hill Top and could not obtain reliable information from the Larson Davis meter when viewing the digital display, whereas the B & K meter has a specific peak hold setting and obtain results for audible shots was relatively easy.



I specifically undertook that exercise to ascertain the potential errors in the GHD compliance report and why I consistently used B & K 2260 meters for the attended residential reference locations in Hill Top.

Accordingly if Dr Tonin had confined his comments to the contention that he raised then the only conclusion he can provide is that the GHD EA assessment was flawed.

His comments as to changes in noise limits are inappropriate and do not relate to the contention.

However, it is necessary to correct Dr Tonin's misleading comments as to the Third Runway matter. Yes there was an impact in relation to the introduction of the third runway that gave rise to a significant increase in noise and affected a large population that had not previously been affected by aircraft noise. However, it would have been appropriate for Dr Tonin to confirm the aircraft noise impacts were significantly above the recommended noise levels for residential receivers (ANEF 20) and that apart from schools and churches that were affected by the third runway the majority of the schools and churches insulated under the Sydney Aircraft Noise Insulation Project (SANIP) were under the main north south and east west runways. The insulation upgrading to dwellings applied to the main north south runway (not the Third Runway) and to exposure levels well above the unacceptable limit.

If Dr Tonin had placed the Third Runway issue in the context of the 10% of the population being seriously affected as the trigger point (ANEF 20) and then referred to the Hornsby Rifle Range report he would have had to confirm that the 85 dB L Peak Hold logarithmic average level is at the same 10% of the population assessment point.

**Contention 2: Imposition of Condition A9 Reduces 800m Range to 400m**

Dr Tonin has not answered his own contention.



It would have been appropriate to provide a qualification as to the basis of condition A9. If taken as an absolute level then from Figures 1-3 the entire range would be reduced.

If Condition A9 is taken as a logarithmic average (basis of the Applicant's submission) then from Dr Tonin's incorrect Tables 1 – 3 the GHD compliance test shows issues at 800 metres. The Cooper 200m results were identified as subject to wind and measured only for a limited period.

If Condition A9 is taken as a logarithmic average then from the Corrected Tables 1 -3 the 500 metre firing position is of concern, noting the 400 metre and 600 metre firing positions were not tested.

Therefore contention 2 is valid on the basis of the application.

If however one considers the application in terms of an arithmetic average (which Dr Tonin has not considered) and one views the corrected Tables 1 – 4 and excludes the GHD wind affected compliance results, the Contention falls away if one accepts Condition A9 should be assessed as an arithmetic average.

### **Contention 3: Use of Logarithmic Averaging Not Absolute Maximum Level.**

It is obvious that Dr Tonin has no knowledge of the methodology used by the SPCC when the shooting guidelines were prepared, or the source material that the SPCC used in the original consideration of noise from rifle ranges. If Dr Tonin was aware of the Australian material that led to the development of the guidelines, or had even bothered to check the reference to the Hornsby rifle range that was referred to in TAG report of 27<sup>th</sup> October 2010 (4<sup>th</sup> paragraph on page 7) then he would have been aware that the use of logarithmic averaging has been used for a considerable period of time.

Furthermore if Dr Tonin had looked at that reference and go to page 68 of that reference then he would have found in Section 8.2:



### ***Implications for land-use planning***

*While it would be desirable to have noise levels restricted so that no residences are seriously affected, this is not always possible. In order to derive a criteria level for land-use planning one must make a reason but nevertheless arbitrary decision.*

*A criterion based on an A-weighted sound exposure level of 50 dB would appear too low given that only 5.4% of respondents were found to be seriously affected (See Table 8.1). On the other hand, an SEL of 65 dB is clearly too high as a criterion level with some 43.8% seriously affected. It is proposed that a reasonable criterion would be 55 dB (ASEL). The corresponding criterion in the case of unrelated peak sound pressure level would be 85 dB (LPEAK). Note that both levels are to be calculated by averaging on an energy basis over a representative number of shots.*

*If noise levels were restricted to the proposed criterion levels (ASEL 55 and LPEAK 85) it could be expected that fewer than 10% of the residents would be seriously affected by the noise (cf. Figures 5.4 and 5.5). This is in accordance with the informal conventions adopted by overseas authorities who aim to restrict noise levels that seriously disturb not more than 10% of the exposed population in residential communities.*

Figure 8.2 “Noise contours around Hornsby Rifle Range (Unweighted peak sound pressure level – LPEAK)” in the NAL report is the contour noise provide in the Cooper Reports. The above extract highlights the use of an 85 dB LPEAK level (similar to that expressed in the SPCC guideline) is a logarithmic average.



Dr Tonin would be well aware that the methodology used by the National Acoustic Laboratories in assessing community impacts has been in the form of a dose-response curve – that normally by definition uses a logarithmic averaging method of the energy.

If Dr Tonin has undertaken the necessary investigations then he would have been able to confirm that logarithmic averaging had been used in the past by the SPCC. He could have then continued in his discussion to Contention 3 that now the OEH have provided the memo that is attached to the Tonin report then Contention 3 when amended to use an arithmetic average would be upheld.

The provision of a conclusion that considers the contention should fail when there is material attached to the report that confirms the requirement to define the level in Condition A9 as an arithmetic average must give cause to question the independent position of the Tonin report.

It would also have been appropriate for Dr Tonin to confirm (as shown in the corrected Tables 1 – 4) that the use of an arithmetic average results in a lower noise compliance limit than the logarithmic average previously used by the SPCC and the logarithmic averaging method provided in the Cooper reports.

#### **Condition A6(D) – Attended Noise Monitoring 800m Range**

Dr Tonin agrees with the modification.

#### **Condition of Approval D4 – Acoustic Shelters**

It would have been appropriate if Dr Tonin had placed his opinion in the context of the original application, and then in the context of what must occur as a result of the OEH memo.

If the approval is modified to utilise arithmetic average and one excludes the GHD wind affected results then the acoustic shelter is not required. Furthermore when the other firing positions are placed in the same context then it would appear that no other shelters or acoustic moundings are required for the 800 metre range.



### **Condition of Approval A6(C) - Frequency of Noise Monitoring**

Dr Tonin forms his opinion to reject the request on the basis of exceedances of Condition 9 that is incorrectly demonstrated in section 2 of his report.

Utilising the corrected Tables 1-4 and excluding the obvious wind affected GHD and Cooper results, together with an arithmetic average one must form a different position.

### **Conclusion**

For some unexplained reason the Tonin report was accepting the OEH requirement for arithmetic average has chosen not to present any information in that format.

The presentation of the measurement results in the form of an arithmetic average would automatically provide lower noise levels than shown in Tables 1 – 4 of the Tonin report.

The consideration of the “Contentions” in terms of an arithmetic average would automatically change the opinions. If the arithmetic average had been acknowledged then the report would have been of assistance to the Department as the majority of the issues are resolved by specifying the noise limit in terms of an arithmetic average.

The Tonin report whilst acknowledging the GHD EA results are lower than other testing, has ignored the issue of instrumentation and obvious lack of experience evident in the GHD report. The Tonin report has ignored the error in the GHD reports as to location A2/B2 and has incorrectly merged the results together in Table 2.

To overcome the significant omissions and errors in the Tonin report it has been necessary to correct the Tables, and separate Table 2 into Table 2A and Table 2B to permit a correct analysis.

The Tonin report has ignored the limited capabilities of the LD 831 meter used in the GHD compliance testing.



Despite agreeing there are issues in accepting the GHD report an opinion is provide that the GHD EA report was not flawed!

The Tonin analysis in the form of a logarithmic average confirms the 500 m firing position on the 800 metre range is an issue that would restrict the operation of that range and ignores the requirement to exclude wind affected data for the 100m range (GHD testing) and 200m range (Cooper testing) that may well be to suit his client's position.

The Tonin report confirms that Dr Tonin is totally unaware of previous compliance testing of rifle ranges, or even considered the fact that that may have been the position in the past the use of logarithmic averaging, but is now to be arithmetic averaging.

His "experience" of testing for one rifle range does not disclose the methodology that he used for that assessment.

There is at least agreement that there is a need to extend the time period for the provision of a report.

As to why the Tonin report has not sought to provide the appropriate analysis and ignored the material provided in the Cooper reports could only lead a reasonable person to form the view that the Tonin report is not an independent report but one specifically prepared to present an advocate's position.

Yours faithfully,

**THE ACOUSTIC GROUP PTY LTD**

  
**STEVEN E. COOPER**



