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Environmental Noise Assessment

Proposed Paintball Facility
312 Londonderry Road, Londonderry, NSW

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Prepared For:
Delta Force Paintball
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Attention: Mr Tony Wilson



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1.0 CONSULTING BRIEF

Day Design Pty Ltd was engaged by Delta Force Paintball to investigate the environmental noise impact of a proposed Paintball Game Site in an area adjacent to the Richmond Racecourse on Londonderry Rd, Londonderry. This commission involves the following:

Scope of Work:

- Inspect the site and environs.
- Measure the background noise levels at critical locations and times.
- Establish acceptable noise level criterion.
- Quantify noise emissions from the Proposed Paintball operation.
- Calculate noise emission, considering ground absorption, foliage, screen walls and distance attenuation.
- Prepare a site plan identifying the development and nearby noise sensitive locations.
- Provide recommendations for noise control if necessary.
- Prepare an Environmental Noise Impact Report.

2.0 PROJECT DESCRIPTION & SUMMARY OF FINDINGS

The proposed Paintball Game Site is located in an area located between an existing watercourse and Richmond Racecourse as shown on Figure 1 below. The nearest residences are located to the north on The Driftway. The houses on the residential properties are approximately 220 m from the proposed Paintball Facility. To the west is an existing Greyhound Training facility, while to the east is the main Richmond Race Track. A Car Park accessed via Londonderry Rd will be located behind the Race Course.

The nearest noise sensitive receptors to the property, in various directions, are shown in Figure 1 and as follows in Table 1 below.

Table 1 Noise Sensitive Receptors

Receptor and Type	Address	Direction from site	Distance
R1 – Residence	366 The Driftway	North	270 m
R2 – Residence	448A The Driftway	West	290 m
R3 – Residence	2 Wilshire Road	South-West	470 m
R4 – Residence	81 Wilshire Road	South-East	470 m



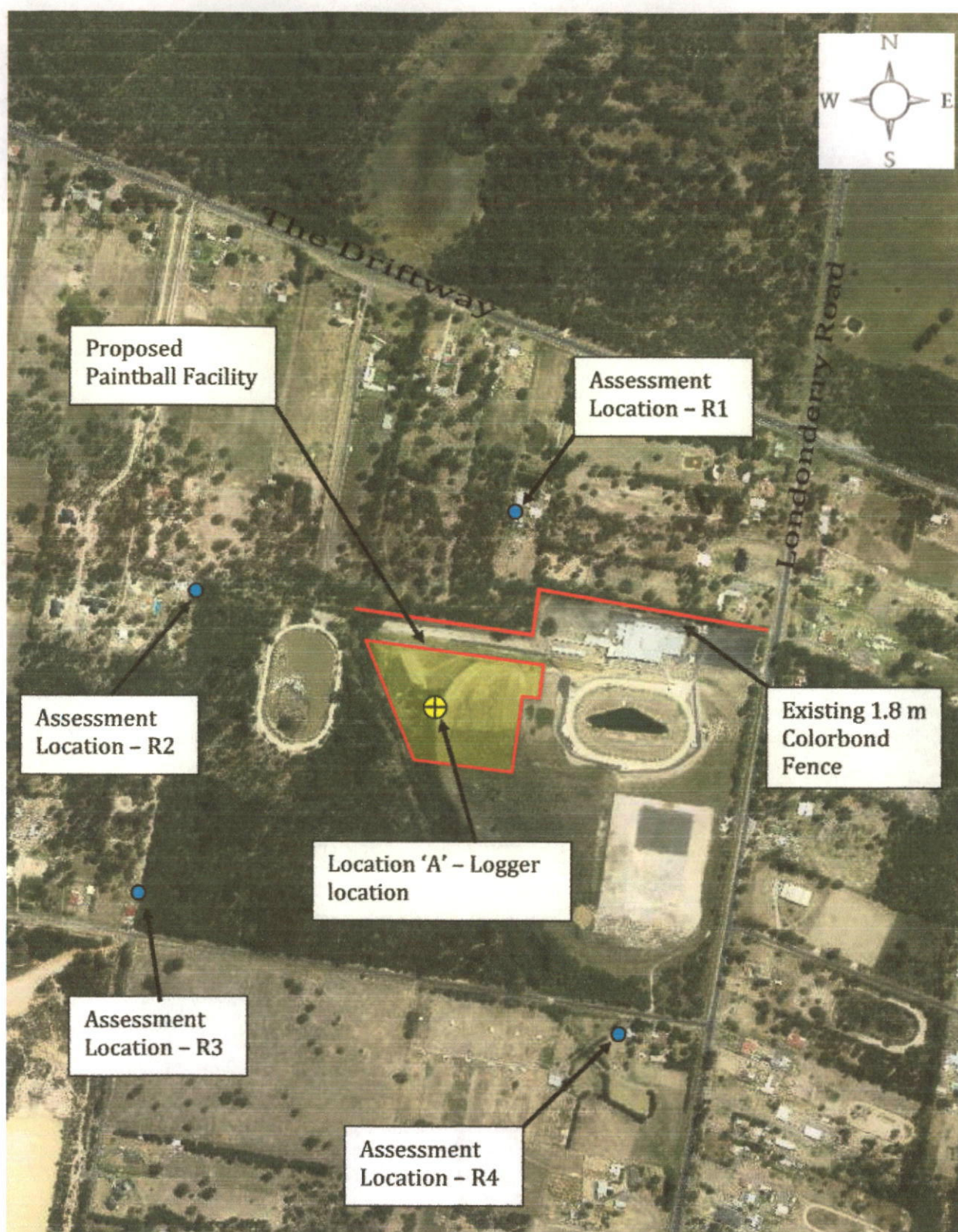


Figure 1 - Location Plan



Upon arrival patrons will be directed to the Base Camp, where they will be provided with protective equipment, paintball gun and paintballs. Once equipped, the players will be escorted to the Practice Firing Range where they are instructed on the correct use of the Paintball Gun, and then directed to one of five playing fields located to the west of the Racecourse as shown in Appendix B. There is an existing 1.8 metre high Colorbond fence on the rear boundary of the residential premises to the north as shown in Figure 1, which will provide useful visual and acoustic screening of the Paintball Game activities.

Approximately 500 players are estimated to visit the site each week, with a maximum capacity of 150 players on site. Typically only four of the five playing fields will be used at one time, with a maximum of 40 people in each field. Opening times will be restricted to the daytime hours of 9 am until 4:30 pm seven days a week.

The noise emission from the proposed Paintball Range has been modelled on computer and it has been found to meet the noise requirements of Council and the Environment Protection Authority without further noise control.



3.0 NOISE SURVEY INSTRUMENTATION

Noise level measurements and analysis were made with instrumentation as follows in Table 2:

Table 2 Noise Instrumentation

Description	Model No	Serial No
Infobyte Noise Logger	iM3	32
Condenser Microphone 0.5" diameter	MK 250	2622
Real Time Sound level Analyser	CEL 593	035 426
Condenser Microphone 0.5" diameter	MK 250	3300
Microphone Calibrator	CAL 200	3646

The **CEL 593 Sound Analyser** is a real-time precision integrating sound level meter with octave and third octave filters, that samples noise at a rate of 10 samples per second. The CEL 593 provides L_{eq} , L_1 , L_{10} , L_{50} and L_{90} statistical data at 15-minute intervals (longer or shorter intervals optional) over the desired monitoring period. Results are normally downloaded to computer for rapid processing.

All instrument systems had been laboratory calibrated using instrumentation traceable to Australian National Standards and certified within the last two years thus conforming to Australian Standards. The measurement system was also field calibrated prior to and after noise surveys. Calibration drift was found to be less than 0.3 dB during attended measurements and within 1 dB for long-term measurements. No adjustments for instrument drift during the measurement period were warranted.



4.0 MEASURED AMBIENT NOISE LEVELS

In order to assess the severity of a possible environmental noise problem in a residential area it is necessary to measure the ambient background noise level at the times and locations of worst possible annoyance. The lower the background noise level, the more perceptible the intrusive noise becomes and the more potentially annoying.

The ambient L_{90} background noise level is a statistical measure of the sound pressure level that is exceeded for 90% of the measuring period (typically 15 minutes).

The Rating Background Level (RBL) is defined by the NSW EPA as the median value of the (lower) tenth percentile of L_{90} ambient background noise levels for day, evening or night periods, measured over 7 days during the proposed days and times of operation.

The places of worst possible annoyance are houses located along The Driftway. These residences are shown on Figure 1 above. The times of worst possible annoyance will be from 9 am to 4:30 pm when paintball activity is proposed to occur.

Ambient L_{90} background noise levels were previously measured at a location near the area identified on Figure 1 as Location 'A' over seven (7) days from 18 to 25 October 2005. These levels are presented in the attached Appendix A and also in Table 3 below.

Table 3 Rating Background Level

Location	Time Period	L_{90} Rating Background Level	Existing L_{eq} Noise Level
Near the rear residential boundary behind Richmond Race Course, Londonderry	Day (7 am to 6 pm)	37 dBA	49dBA
	Evening (6 pm to 10 pm)	38 dBA	53 dBA
	Night (10 pm to 7 am)	30 dBA	49 dBA

Atmospheric conditions were ideal for noise monitoring. Noise measurements were therefore considered reliable and typical for the receptor area.

It is unlikely that the ambient noise levels have decreased since the previous measurements in 2005. We consider the measured noise levels typical of the area and have therefore used them in our noise assessment.

The Rating Background Level during the daytime when the Paintball Games will be played is therefore **37 dBA**.



5.0 ACCEPTABLE NOISE LEVELS

5.1 NSW Industrial Noise Policy

The NSW Environment Protection Authority published the NSW Industrial Noise Policy (INP) in January 2000. The policy is specifically aimed at assessing noise from industrial noise sources scheduled under the Protection of the Environment Operations Act 1997.

Delta Force Paintball at Richmond Racecourse is not a 'scheduled premises' under the Protection of the Environment Operations Act 1997 as it is not required to hold a licence under that Act for operations at the site.

The appropriate regulatory authority (EPA or Council) may, by notice in writing given to such a person, prohibit the person from causing, permitting or allowing:

- (a) any specified activity to be carried on at the premises, or
- (b) any specified article to be used or operated at the premises,

or both, in such a manner as to cause the emission from the premises, at all times or on specified days, or between specified times on all days or on specified days, of noise that, when measured at any specified point (whether within or outside the premises,) is in excess of a specified level.

It is an offence to contravene a noise control notice. Prior to being issued with a noise control notice, no offence has been committed.

While the Industrial Noise Policy is not strictly applicable to this site, as the site is not scheduled, in the absence of other relevant standards the limits set out in the NSW Industrial Noise Policy will be used as a guide in determining whether the level of noise is considered intrusive or not.

5.2 Residential Receptor Intrusiveness Criteria

The EPA states in Section 2.1 of its NSW Industrial Noise Policy (January 2000) that the L_{eq} level of noise intrusion from broad-band industrial noise sources may be up to 5 dB above the L_{90} background noise level at the receptor without being considered offensive.

The Rating Background Level at Richmond was 37 dBA during the daytime. Therefore the acceptable L_{eq} noise intrusiveness criteria for **broadband noise** in this area is $(37 + 5 =) 42$ dBA during the day.



5.3 Amenity Criteria

Depending on the type of area where the noise is being made, there is a certain reasonable expectancy for noise amenity. The INP provides a schedule of recommended L_{eq} industrial noise levels that under normal circumstances should not be exceeded. If successive developments occur near a residential area, each one allowing a criterion of background noise level plus 5 dB, the ambient noise level will gradually creep higher.

The recommended L_{eq} noise levels in Table 4 below are taken from Section 2.2 of the INP.

Table 4 Amenity Criteria

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{eq} Noise Level, dBA	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
Commercial premises	All	When in use	65	70

Compliance with the amenity criteria will limit ambient noise creep. Wherever the existing L_{eq} noise level from industrial noise sources approaches or exceeds the amenity criteria at a critical receptor location, the intrusive L_{eq} noise from the noise source in question must be reduced to a level that may be as much as 10 dB below the existing L_{eq} industrial noise level.

The existing L_{eq} noise level at Richmond was 49 dBA during the day, 53 dBA in the evening and 49 dBA at night. Therefore the acceptable L_{eq} amenity criteria for in this area is:

- $(50 - 6 =) 44$ dBA during the day;
- $(53 - 10 =) 43$ dBA in the evening; and
- $(49 - 10 =) 39$ dBA at night.



5.4 Modifying Factors

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency or dominant low-frequency content, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level. Correction factors are to be applied to the noise from the source measured or predicted at the receiver before comparison with the criteria. AC500-9, in the Appendices is extracted from Table 4.1 of the INP.

In our opinion, the character of noise from paintball guns is slightly impulsive, but should not incur a 5 dBA penalty for impulsiveness. At a distance, the noise from paintball guns is characterised by gentle compressed-air "pops" rather than loud explosive bullet "bangs". At another Paintball Game Site in Helensburgh, noise from multiple bursts was more frequent than single shot activity. This was typically conducted by one or more persons during each game. The effects of multiple bursts was not observed to be subjectively impulsive in character. As shown in Table 5 measured noise levels during multiple bursts was louder by approximately 6 dBA. In our opinion a 2 dBA penalty is considered more appropriate to account for the occasional impulsive noise of single gun shots.

5.5 Project Specific Noise Criteria

When all the above factors are considered the project specific criteria is as follows:

- **42 dBA** for broadband noise sources such as that from the Car Park and
- **40 dBA** for Paintball Gun noise sources during the day.

These criteria are to be assessed at the most affected point on or within the residential property boundary – or, if that is more than 30 m from the residence, at the most-affected point within 30 m of the residence.



6.0 PAINTBALL FACILITY NOISE EMISSION

The main sources of noise from these premises is the paintball game noise and car park activity which may occur 7 days a week.

The proposed Paintball Facility is located adjacent to an existing greyhound racetrack. The schedules for race meetings and the Paintball Facility do not overlap, with the exception of possibly one hour on a Wednesday afternoon (between 3.30pm and 4.30pm). The noise impacts from this overlap is not considered significant based on the following:

- The paintball facility experiences relatively low use and numbers during weekdays (peaks on the weekends);
- The time of the overlap relates to the period when patrons of the paintball facility are leaving the premises;
- As confirmed in the Traffic and Parking Report prepared by ML Traffic Engineers (Refer Appendix C of that report), attendance numbers on Wednesday afternoon race days are extremely low.
- The overlap time (between 3:30 -4:30 pm) is in usual business hours, when occupancy of dwellings can be considered low.

The schedules of trailing (for greyhounds) and the paintball facility experience a greater overlap, however, again the noise generation as a result of use of both facilities concurrently is minimal. Trialling occurs Monday and Tuesday between 8:00am and 12 noon and Sunday between 8:00am and 10:15am. Again, in relation to the weekday overlap, the paintball facility experiences relatively low use on these days, with the exception of Sunday.

The total overlap where both facilities may be operating concurrently is limited to 8hrs 15min in any 7 day week, the majority of which (7 hours) occurs during the week when Delta Force experience low occupancy.

This report assesses the noise impact from the proposed Paintball Facility only. However, due to the limited periods of overlap, the contribution of noise from the greyhound race meetings and trialling is expected to be minimal.



6.1 Paintball Game Noise Emission

A noise survey was previously carried out at the Ultimate Paintball game site at Helensburgh to determine the character and level of noise generated by paintball activities. Sound pressure level readings were taken around a VM68 paintball gun at 45 degrees, 90 degrees and 135 degrees to the line of fire and at a distance of 3m. A schedule of average sound power levels for the equipment is given in Table 5 below. The Sound Exposure Level (SEL) represents the sound energy of a gunshot averaged over one second. It provides a very useful tool for calculating the L_{eq} (15 min) noise level at nearby residences.

Table 5 Paintball Gun SEL Sound Power Levels

Paintball Gun Model and Firing Mode	dBA	SEL Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
VM68 Single Shot	96	84	86	89	90	90	89	90	88
VM68 Multiple Burst	103	90	91	94	94	95	95	98	99

In addition to gunshot noise, a paintball game is characterised by noise from whistles being blown to commence a contest and shouting by participants. Typical sound power levels for each of these activities is summarised below in Table 6. For a typical day, there may be two or three Game Zones in operation at any one time with up to 30 contestants playing at any one time with up to 25 % of the participants (or 8 persons) shouting.

Table 6 Associated Paintball Activities SEL Sound Power Levels

Noise Source	dBA	SEL Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
Sports Whistle	107	-	-	-	-	77	106	97	89
8 persons shouting	99	71	82	91	97	95	92	82	65

Knowing the sound power level of a noise source (see above Tables 5 and 6), the sound pressure level (as measured with a sound level meter) can be calculated at a remote location using suitable formulae to account for distance losses, ground absorption, sound barriers, atmospheric effects, etc.



We predict that the L_{eq} (15 min) level of noise for paintball activity will not exceed 40 dBA within 30 metres of any nearby residence, as shown in Table 7.

Table 7 Predicted L_{eq} , 15-minute noise levels Paintball Game Activity

Description	Predicted L_{eq} Noise Level (dBA) at Receptor Locations			
	R1	R2	R3	R4
Paintball Gun Games	39	38	34	32
Acceptable Noise Limit	40	40	40	40
Compliance	Yes	Yes	Yes	Yes

6.2 Car Park Noise Emission

For the purpose of assessing the maximum possible level of noise emission from the car parks, we have assumed a flow of cars filling the designated car park over 1 hour, equivalent to 12 cars in 15 minutes either entering or leaving through Londonderry Rd exit. The L_{eq} sound power level and spectrum of such car park noise was measured by Day Design at a previous location is given in Table 8 below:

Table 8 L_{eq} Noise Levels in a Car Park

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	63	125	250	500	1k	2k	4k	8k
L_{eq} level of 1 car leaving the car park (door slam, engine start, drive away)	77	90	82	75	73	72	69	67	61
L_{eq} level of 1 car travelling 10km/h in the car park	77	92	78	76	74	73	68	65	60
L_{eq} level of 12 cars leaving car park at any one time	88	93	89	87	85	84	79	76	71

The predicted L_{eq} (15 min) level of noise from the Car Park, when measured at any nearby residential premises, taking into consideration the existing Colorbond fence, is 40 dBA. This is less than the broadband noise criterion of 42 dBA and is therefore acceptable.



7.0 NOISE CONTROL RECOMMENDATIONS

While the predicted level of noise emission from the proposed development is predicted to comply with the acceptable noise criterion established in Section 5 of this report. We recommend that a number of best practice treatments be considered to minimise the impact of the operation.

7.1 Game Zone Materials

To reduce the noise of paintballs hitting surfaces used in the game zone areas, we recommend that resilient materials such as shade-cloth fabric, wood, or rubber be used in the construction of any Game Zone structures. If the use of galvanised steel or Colorbond is required, we recommend that shade cloth be suspended in front of these surfaces to absorb the impact of any paintballs that may be inadvertently directed at them.

7.2 Practice Firing Range

As shown in Site Plan in Appendix B, the Practice Firing Range will be located at the north-east end of the Game Zones, to the west of the Base Camp. We recommend that firing on the Practice Range be directed towards the South, away from the residential premises and into the bushland where it will be absorbed. The targets and surfaces inside Practice Firing Range should be made of absorbent materials. The 1.8 metre high Colorbond fence on the residential boundary will provide very useful screening of noise for the residences to the North.

7.3 Noise Management

As well as the engineering noise controls recommended above, we also recommend administrative noise controls to reduce undue noise be adopted by management and be encouraged by the use of clear signs and warnings to employees and patrons.

7.4 Construction Disclaimer

Recommendations made in this report are intended to resolve acoustical problems only. We make no claim of expertise in other areas and draw your attention to the possibility that our recommendations may not meet the structural, fire, thermal or other aspects of building construction.

We encourage clients to check with us before using materials or equipment that are alternative to those specified in our Acoustical Report.



8.0 NOISE IMPACT STATEMENT

Day Design has been engaged to assess the environmental noise impact of a proposed Paintball Facility to be located next to the existing Richmond Racecourse at 312 Londonderry Road, Londonderry. Due to the limited periods of overlap in the schedules for race meetings and the Paintball Facility, the contribution of noise from the greyhound race meetings and trialling is expected to be minimal and not considered significant.

Measurements and calculations show that, provided the recommendations in Section 7 of this report are implemented, the level of noise emitted by Richmond Racecourse Paintball Game Site will meet the Environment Protection Authority's acceptable noise level requirements as detailed in Section 5 of this report.



William Wang, BE (Mechatronics), MIEAust, MAAS
Senior Acoustical Engineer
for and on behalf of Day Design Pty Ltd.

AAAC MEMBERSHIP

Day Design Pty Ltd is a member company of the Association of Australian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.

Attachments:

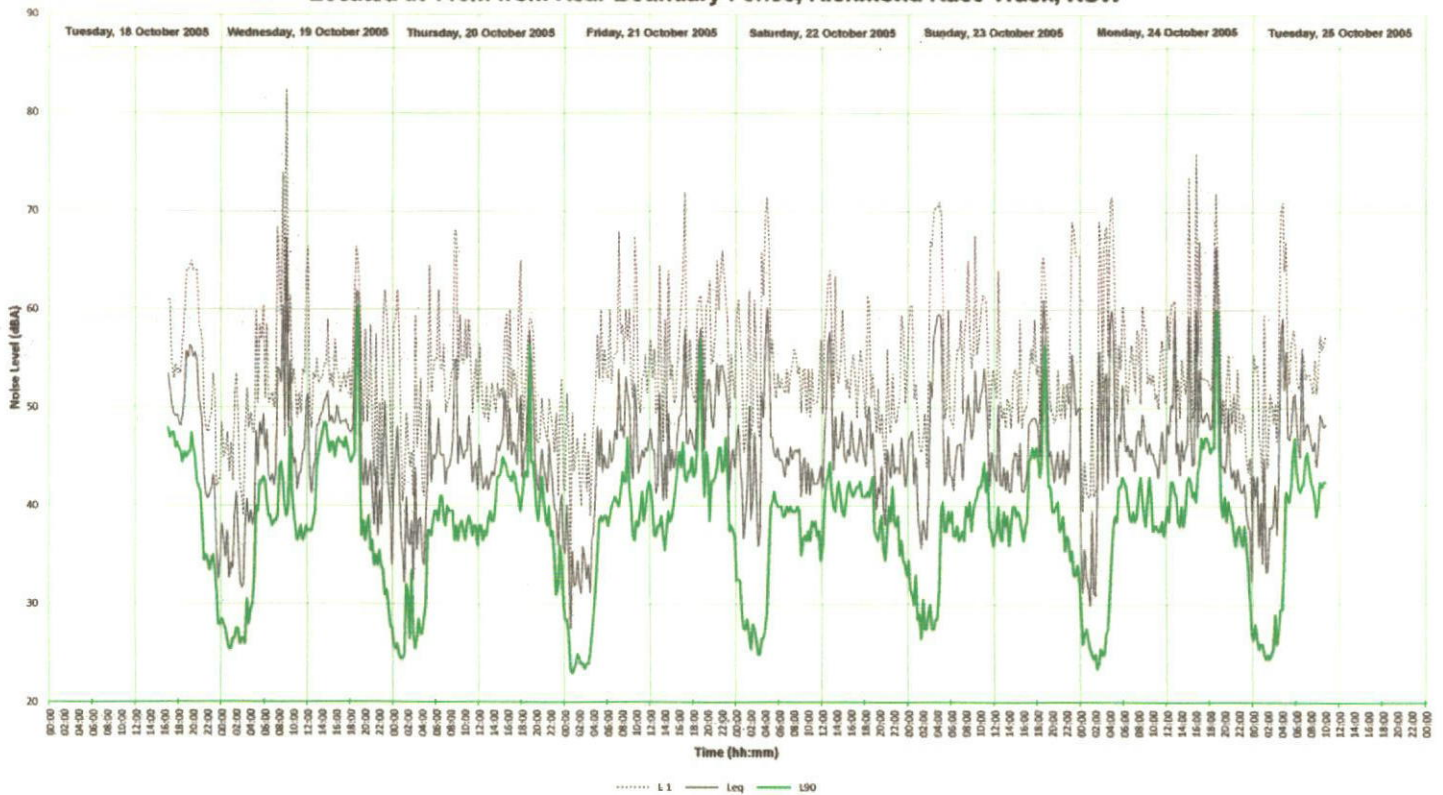
- Appendix A – Ambient Noise Survey Graph
- Appendix B – Proposed Site Plan



AMBIENT NOISE SURVEY

5633-1
Appendix A

Located at 115m from Rear Boundary Fence, Richmond Race Track, NSW



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