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Environmental Noise Assessment

Proposed Kennel Extension
Richmond Race Club
312 Londonderry Road, Richmond, NSW

REPORT No
5791-2.1R

DATE ISSUED
17 September 2019

Prepared For:
Barbara Tarnawski Architects
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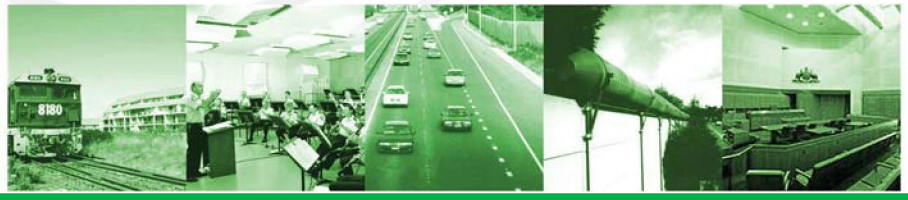
Attention: Ms Barbara Tarnawski



Revision History

Report	Date	Prepared	Checked	Comment
Draft	13/09/2018	William Wang	Stephen Gauld	By email, for client review
Final	17/09/2018	William Wang	Stephen Gauld	

Document R\5791-2.1R, 16 pages plus attachments

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1.0 CONSULTING BRIEF

Day Design Pty Ltd has been engaged by Barbara Tarnawski Architects to investigate the environmental noise impact of a proposed extension to the existing kennels at Richmond Race Club, 312 Londonderry Road, Richmond, NSW. This commission involves the following:

Scope of Work:

- Inspect the site and environs
- Measure the background noise levels from critical locations and times
- Establish acceptable noise level criteria
- Quantify noise emissions from the proposed extension
- Calculate the level of noise emission, taking into account building envelope transmission loss, screen walls and distance attenuation
- Prepare a site plan identifying the development and nearby noise sensitive locations
- Provide reasonable and feasible recommendations for noise control (if necessary)
- Prepare an Environmental Noise Assessment Report.

2.0 PROJECT DESCRIPTION & SUMMARY OF FINDINGS

Richmond Race Club is seeking to submit a Development Application for a proposed extension to the existing kennels on their existing site at 312 Londonderry Road, Richmond, NSW.

The proposed extension will include a maximum of 32 kennels, bringing the total capacity of the kennels to 128. Greyhounds are typically kept within the kennels until they are brought out to the racetrack. There are no greyhounds kept on site overnight.

The Richmond Race Club's property is situated on land zoned RU4 Primary Production Small Lots under Penrith City Council's Local Environment Plan (LEP) 2010.

We have been informed this does not impact on the generation of traffic noise as no additional trips are proposed. The additional dogs occupying the kennels will be brought onto the site from existing traffic generation.

Richmond Race Club operates greyhound racing each Friday night up to 10.30 pm as well as Wednesday twilight meetings. There may be dogs in the kennels up to 11 pm.

The nearest potentially affected residence to the proposed kennel extension is the residential dwelling to the north of the site, shown as 'R1' and 'R2' on Figure 1.

An air conditioning system is proposed to serve the new extension.

This report includes an assessment of the noise emissions from animals and mechanical plant associated with the kennel building.

Noise levels associated with the proposed kennel extension have been calculated at the nearest residential premises. Provided the recommendations in Section 6 of this report are implemented the level of noise from the kennel extension will be able to meet the guidelines in Penrith City Council's DCP and the EPA's NSW Noise Policy for Industry.

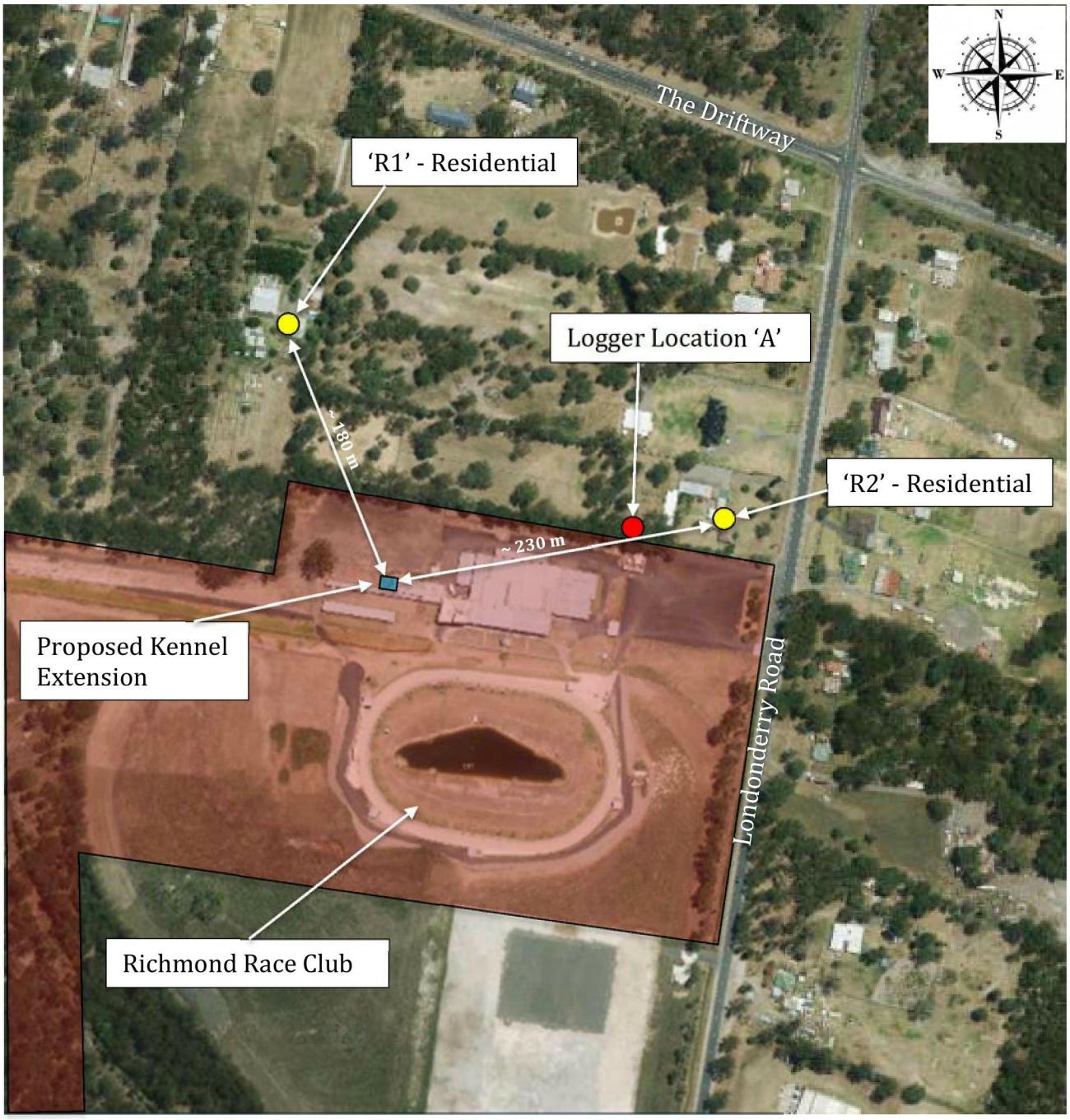


Figure 1. Location Plan – 312 Londonderry Road, Richmond, NSW

3.0 NOISE SURVEY INSTRUMENTATION

Noise level measurements and analysis were made with instrumentation as follows below in Table 1.

Table 1 Noise Survey Instrumentation

Description	Model No.	Serial No.
Infobyte Noise Logger	iM4	105
Condenser Microphone 0.5" diameter	MK 250	7112

An environmental noise logger is used to continuously monitor ambient noise levels and provide information on the statistical distribution of noise during an extended period of time. The Infobyte Noise Monitor iM4 #105 is a Type 1 precision environmental noise monitor meeting all the applicable requirements of AS1259 for an integrating-averaging sound level meter.

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 1 dB during unattended measurements. No adjustments for instrument drift during the measurement period were warranted.

4.0 ACOUSTIC CRITERIA

4.1 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 Environment Protection Authority (NSW) as the median value of the (lower) tenth percentile of L_{90} ambient background noise levels for day, evening or night periods, measured over a number of days during the proposed days and times of operation.

The place of worst possible annoyance is the residential dwelling located to the north of the proposed Veterinary Clinic at 302 Londonderry Road. This location is shown as 'R1' in the Location Plan on Figure 1. The times of worst possible annoyance will be during the day when the Veterinary Clinic is operational.

Ambient noise levels were previously measured in the rear yard of the adjacent property at 302 Londonderry Road, Richmond, Location 'A', as shown on Figure 1, over seven days from Friday 4 September 2015 to Friday 11 September 2015. We are of the opinion that with minimal development in the area, the background noise levels are unlikely to have changed in the last 4 years.

The measured noise levels are presented in the attached Appendix A and also below in Table 2.

Table 2 Ambient Noise Levels

Noise Measurement Location	Time Period	L_{90} Rating Background Level	Existing L_{eq} Noise Level
Logger Location 'A' – 302 Londonderry Road, Richmond	Day (7 am to 6 pm)	**42 dBA**	**58 dBA**
	Evening (6 pm to 10 pm)	**35 dBA**	**59 dBA**
	Early Night (10 pm to 12 am)	**30 dBA^**	**N/A**
	Night (10 pm to 7 am)	**30 dBA***	**58 dBA**

^The actual rating background noise level was 27 dBA and is therefore set to 30 dBA in accordance with the NPI
**The actual rating background noise level was 23 dBA and is therefore set to 30 dBA in accordance with the NPI.*

Meteorological conditions during the testing typically consisted of clear skies and temperatures of 4 to 24°C. Rain periods and wind speed of greater than 5 m/s were experienced on Sunday 6 September and have been excluded from the assessment period. Atmospheric conditions were otherwise ideal for noise monitoring. Noise measurements were therefore considered reliable and typical for the receptor areas.

4.2 Penrith City Council DCP

Penrith City Council in its Development Control Plan (DCP), 2014, Part C12 'Noise and Vibration', states:

12.5. Rural Development

C. Controls

Noise Impact Statements - specific requirements

a) All development applications for dog boarding, training and breeding establishments are required to provide a Noise Impact Statement prepared by a qualified acoustic consultant in accordance with the requirements set out in this DCP.

The Noise Impact Statement should demonstrate acoustic protection measures necessary to achieve an indoor environment meeting residential standards, in accordance with relevant noise criteria, as well as relevant Australian Standards.

***NOTE**: The above noise controls should be read in conjunction with the specific development controls for dog boarding, training and breeding establishments in the Rural Land Uses Section of this Plan.*

D1 Rural Land Uses

1.4.4. Animal Boarding or Training Establishments

C. Controls

3) Design for Dog Boarding, Training or Breeding Establishments

a) All kennels are to be screened to ensure that dogs cannot see the street.

b) Concrete floors are to be provided to all kennels and runs to facilitate cleaning.

c) Sound-proofed holding sheds are to be provided for distressed animals.

d) Applications for consent to establish kennels shall be accompanied by an acoustic study which demonstrates that the proposal can operate with acceptable impact on adjoining and nearby properties.

e) Structures and enclosures should be designed to minimise visual impact on the streetscape and views enjoyed by adjoining properties. Large areas of light coloured or reflective materials will not be permitted.

f) Development applications should include details of proposed advertising and sign posting.

4.3 NSW Noise Policy for Industry

The NSW Environment Protection Authority (EPA) published the *Noise Policy for Industry* (NPI) in October 2017, superseding the NSW Industrial Noise Policy. The *NPI* is specifically aimed at assessing noise from industrial noise sources listed in Schedule 1 of the Protection of the Environment Operations Act 1997 (POEO, 1997).

The *NPI* provides a useful framework to assess noise emission from non-scheduled premises, whether that premises produces intrusive or non-intrusive noise.

4.3.1 Intrusiveness Criteria

The EPA states in Section 2.3 of its NSW *NPI* (October 2017) that the intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the L_{Aeq} descriptor), measured over a 15-minute period, does not exceed the rating background noise level by more than 5 dB when beyond a minimum threshold (EPA *NPI*, 2017, Section 2.3).

The Rating Background Level at Londonderry was 42 dBA in the day, 35 dBA in the evening, 30 dBA in the early night and 30 dBA at night. Therefore the acceptable L_{eq} noise intrusiveness criteria in this area is:

- (42 + 5 =) 47 dBA during the day;
- (35 + 5 =) 40 dBA in the evening;
- (30 + 5 =) 35 dBA in the early night; and
- (30 + 5 =) 35 dBA at night.

4.3.2 Amenity Criteria

Depending on the type of area in which the noise is being made, there is a certain reasonable expectancy for noise amenity. The NSW NPI 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 below in Table 3 are taken from Section 2.4, Table 2.2 of the NPI.

Table 3 Amenity Criteria

Receiver	Noise Amenity Area	Time of Day	L_{Aeq} Noise Level, dBA
			Recommended amenity noise level
Residential	Rural	Day	50
		Evening	45
		Night	40

The L_{Aeq} is determined over a 15-minute period for the project intrusiveness noise level and over an assessment period (day, evening and night) for the project amenity noise level. This leads to the situation where, because of the different averaging periods, the same numerical value does not necessarily represent the same amount of noise heard by a person for different time periods. To standardise the time periods for the intrusiveness and amenity noise levels, the *NPI* assumes that the **$L_{Aeq,15min}$** will be taken to be equal to the **$L_{Aeq, period}$ + 3 decibels (dB)**.

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 Londonderry was 58 dBA during the day, 59 dBA in the evening and 58 dBA at night. Therefore the acceptable L_{eq} amenity criteria for in this area is:

- (50 – 5 + 3 =) 48 dBA during the day;
- (45 – 5 + 3 =) 43 dBA in the evening; and
- (40 – 5 + 3 =) 38 dBA at night.

4.3.3 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. On the other hand, some sources may cause less annoyance where only a single event occurs for a limited duration. Correction factors are to be applied to the noise from the source measured or predicted at the receiver before comparison with the criteria. AC500-10 in the Appendices is extracted from Table C.1 of the *NPI*.

In this case the noise is of a broadband nature, therefore modifying factors are not applicable.

4.3.4 Sleep Disturbance Criteria

The EPA's *NPI* states in Section 2.5 that the potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.

Sleep may be disturbed if the subject development night-time noise levels at a residential location exceed the following:

- $L_{Aeq,\ 15min}$ 40 dBA or the prevailing RBL plus 5 dB, whichever is greater; and/or
- L_{AFmax} 52 dBA or the prevailing RBL plus 15 dB, whichever is greater.

Where either of the above criteria are triggered, a detailed maximum noise level event assessment should be undertaken.

In this instance, consideration is given to the potential for sleep disturbance from the noise associated with the dog kennels between 10 pm and 11 pm.

Location 'A'

- 52 dBA L_{AFmax} in the early night.

The assessment location should be outside the bedroom window of the most affected nearby residential receivers, 'R1' and 'R2'.

4.4 Project Specific Noise Criteria

When all the above factors are considered, we find that the most stringent noise criterion is:

- **47 dBA** $L_{eq,\ 15\ minute}$ during the day;
- **40 dBA** $L_{eq,\ 15\ minute}$ in the evening; and
- **35 dBA** $L_{eq,\ 15\ minute}$ during the early night.

These criteria apply at the most-affected point on or within the residential property boundary – or, if that is more than 30 metres from the residence, at the most-affected point within 30 metres of the residence. For upper floors, the noise is assessed outside the nearest window.

The following criteria will be applied for sleep disturbance:

- **52 dBA** L_{Max} between 10 pm and 11 pm

5.0 KENNEL NOISE EMISSION

The main sources of noise associated with the proposed kennel that have the potential to create a noise impact on nearby residences are:

- Dogs kept inside the kennels; and
- Air conditioning equipment serving the kennel building.

The noise impact from each noise source has been calculated at the most affected nearby residence.

All calculations in the following sections are based on the drawings provided by Barbara Tarnawski Architects, attached as Appendix B.

5.1 Noise From Dogs Barking

The main source of noise from this site will be dogs barking while in the kenneling area during operational hours.

Over the years Day Design has measured the level and spectrum of dog noise at many different kennel locations including the RSPCA Kennels in Sydney and a similar site to this proposal in Fiddletown. We have built up a database of barking dog noise and derived the average maximum noise levels that may be expected from a boarding kennel. A schedule of the sound power levels for a kennel with 10 dogs is given below in Tables 4. Noise levels assume 100 % of all dogs (10 dogs) are barking simultaneously for 15 minutes at any given time of day.

Table 4 Dog Barking - $L_{eq,\ 15min}$ and L_{Max} Sound Power Levels

Description	dBA	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
L_{eq} Noise Level 1 dog barking (10 seconds)	**86**	63	63	67	87	80	75	71	66
L_{eq} Noise Level 10 dogs (100 % barking)	**96**	73	73	77	97	90	85	81	76
L_{eq} Noise Level 128 dogs (100 % barking)	**107**	84	84	88	108	101	96	92	87
L_{Max} Noise Level 1 dog barking	**98**	70	73	87	100	93	81	73	70

Knowing the sound power level of a noise source (see Table 4 above), 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, barriers, etc.

The predicted sound pressure levels ($L_{Aeq,\ 15\ minute}$) at each of the relevant receiver locations are shown in Table 6 for dogs barking within the kennelling area during the day.

For our assessment, we have assumed that all 128 dogs may bark continuously for 15 minutes. In practice, this is not likely to be the case, but is assessed as a worst case scenario. The L_{eq} noise level from dogs barking sporadically will be less than the noise levels predicted in Table 5.

Table 5 Predicted L_{eq} Sound Pressure Levels – Dogs in Kennelling Area

Receptor Location	Predicted L_{eq} Noise Level, dBA	Acceptable L_{eq} Noise Level, dBA	Compliance
'R1' – Residential 366 The Driftway, Londonderry (~ 205 metres from Kennel)	33	35	Yes
'R2' – Residential 302 Londonderry Road, Londonderry (~ 225 metres from Kennel)	31	35	Yes

The level of noise at the adjacent residential premises is within the acceptable noise criterion of 35 dBA in Section 4.4 of this report and is therefore acceptable.

For the sleep disturbance assessment, we have assessed a dog barking inside the kennel at the nearby residential locations. The L_{Max} noise level from a dog barking is shown in Table 6.

Table 6 Predicted L_{Max} Sound Pressure Levels – Dogs in Kennelling Area

Receptor Location	Predicted L_{eq} Noise Level, dBA	Acceptable L_{eq} Noise Level, dBA	Compliance
'R1' – Residential 366 The Driftway, Londonderry (~ 205 metres from Kennel)	26	52	Yes
'R2' – Residential 302 Londonderry Road, Londonderry (~ 225 metres from Kennel)	24	52	Yes

The level of noise at the adjacent residential premises is within the acceptable noise criterion of 35 dBA in Section 4.4 of this report and is therefore acceptable.

5.2 Air Conditioning Noise Emission

The kennel building is proposed to be air conditioned using up to 3 residential split systems. The particular make and model is typically not selected until construction and not available at DA stage.

We have therefore estimated a typical sound power level for each of the 3 split system air conditioning units for our assessment. The condenser units are likely to be located on the northern side of the kennel building.

A schedule of the sound power levels for typical air conditioning units is given in Table 6 below.

Table 7 Air Conditioner L_{eq} Sound Power Levels

Description	dBA	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
Air conditioner unit (Typical, 10 kW, 3 off)	**74**	84	79	76	71	67	61	60	56

Table 7 below shows the predicted $L_{eq,\ 15minute}$ noise level of air conditioning noise serving the kennel building at the most affected receptor locations.

Table 8 Predicted Air Conditioning Noise Levels at Receptor Location

Receptor Location	Predicted L_{eq} Noise Level, dBA	Acceptable L_{eq} Noise Level, dBA	Compliance
'R1' – Residential 366 The Driftway, Londonderry (~ 205 metres from Kennel)	26	35	Yes
'R2' – Residential 302 Londonderry Road, Londonderry (~ 225 metres from Kennel)	24	35	Yes

The predicted levels of noise from the air conditioning systems serving the kennel building at the adjacent residential premises complies with the criteria in Section 4.4 of this report and is therefore acceptable.

6.0 NOISE IMPACT STATEMENT

Day Design has been engaged by Barbara Tarnawski Architects to investigate the environmental noise impact of a proposed extension to the existing kennel building at Richmond Race Club, 312 Londonderry Road, Richmond, NSW.

Calculations show that the level of noise emitted by the proposed kennel extension will meet the Penrith City Council DCP and the Environment Protection Authority's acceptable noise level requirements as detailed in Section 4 of this report.

William Wang, BE (Mechatronics), MIEAust, MAAS

Senior Acoustical Engineer

for and on behalf of Day Design Pty Ltd

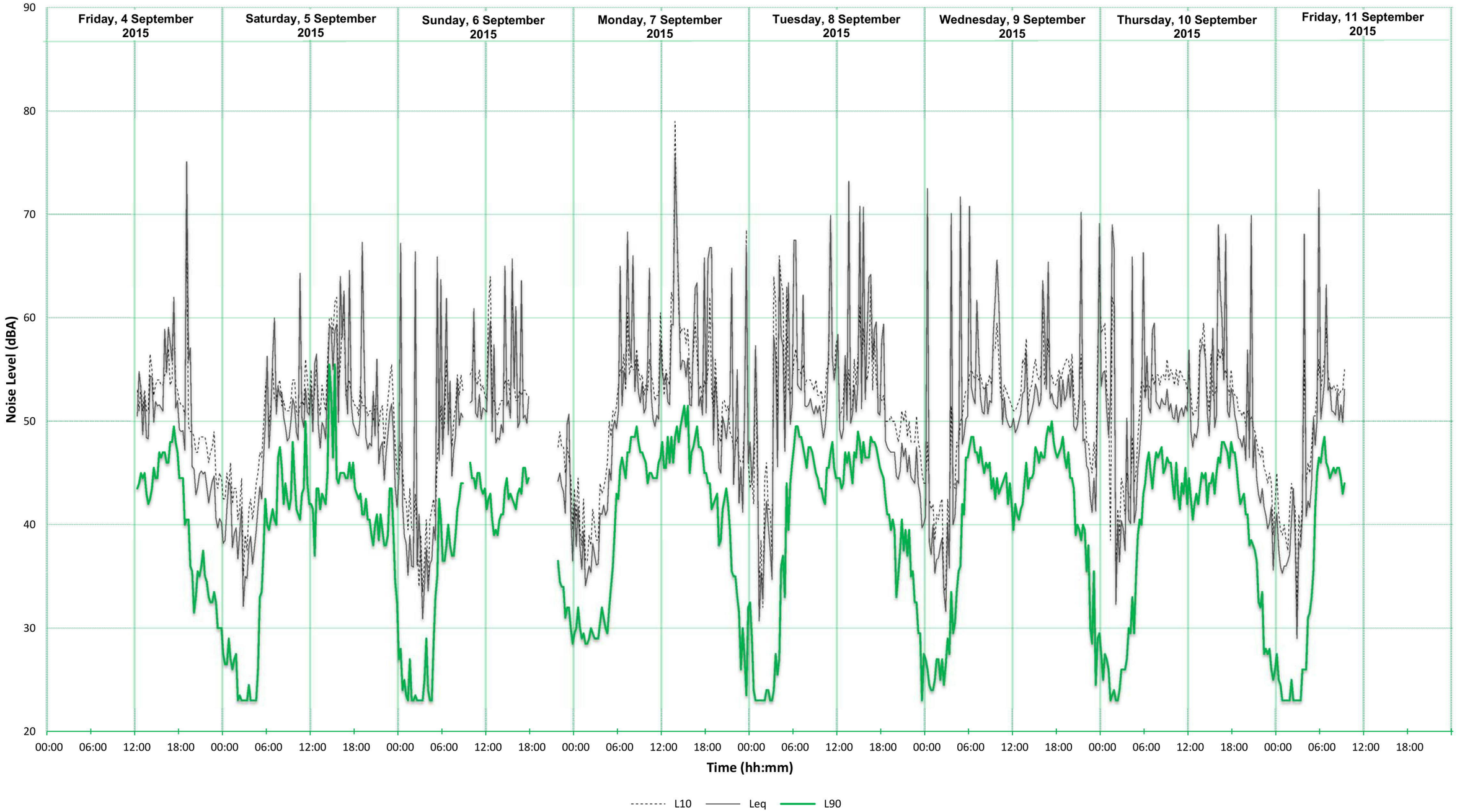
AAAC MEMBERSHIP

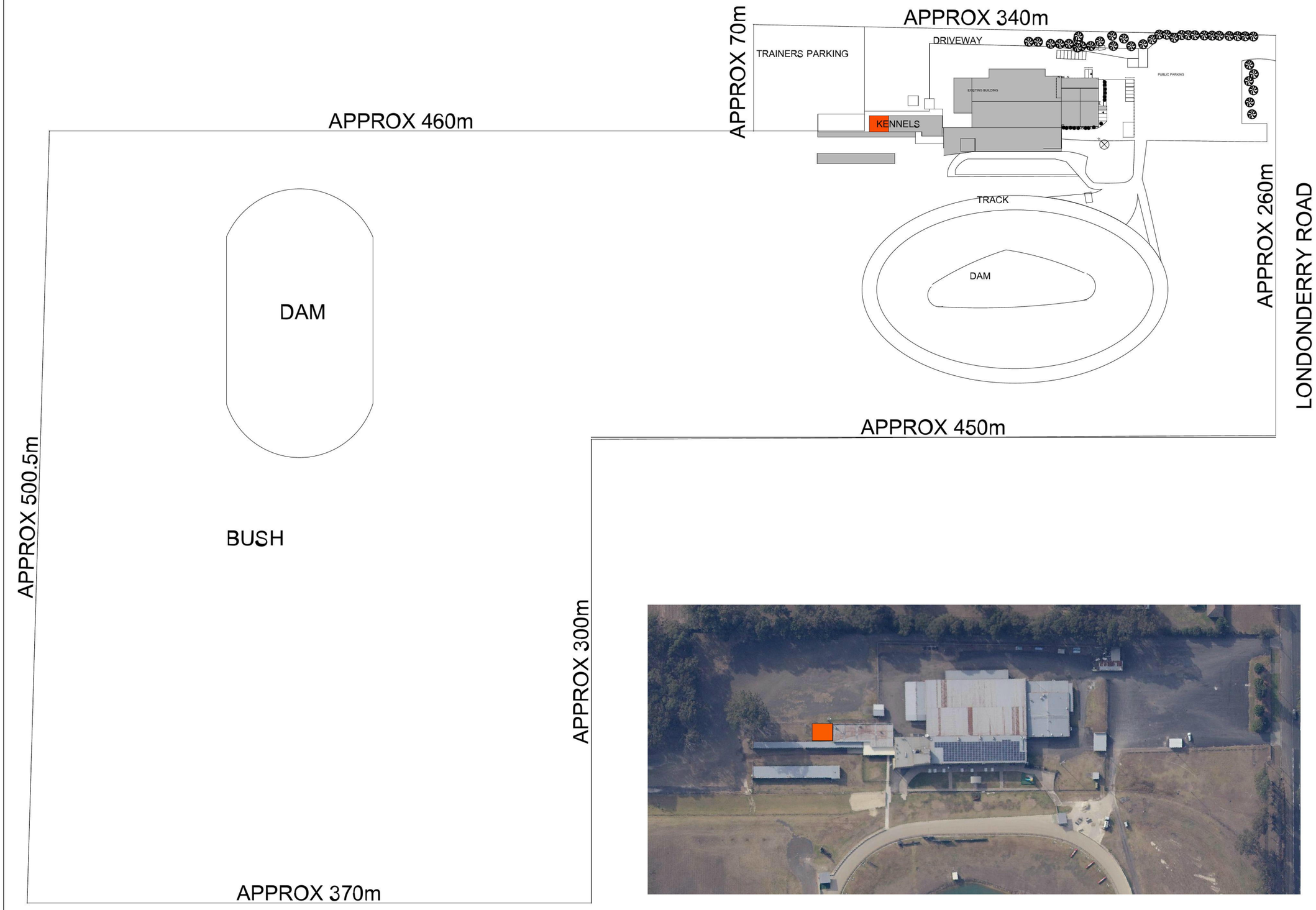
Day Design Pty Ltd is a member company of the Association of Australasian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.

Attachments:

- Appendix A – Ambient Noise Survey
- Appendix B – Site Drawings
- AC500-10 – Modifying Factor Corrections

Located at 302 Londonderry Road, Londonderry, NSW





3. SITE PLAN 1:2500

CHECK ALL DIMENSIONS ON SITE.
REFER ANY DISCREPANCIES TO THE ARCHITECT
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A3

Issue		
	29/08/19	Sketch design

Amendments

Proposed Extension to Kennels

Address
LOT 1 DP 1084891
312 Londonderry Rd Londonderry

Client
RICHMOND RACE CLUB

Stage
Development Application

Drawing Title
SITE PLAN

Drawing No.
190829-1

Date	Drawn by	Scale	Project No.	Issue
11/09/19	BT/TT	AS shown	190829	A

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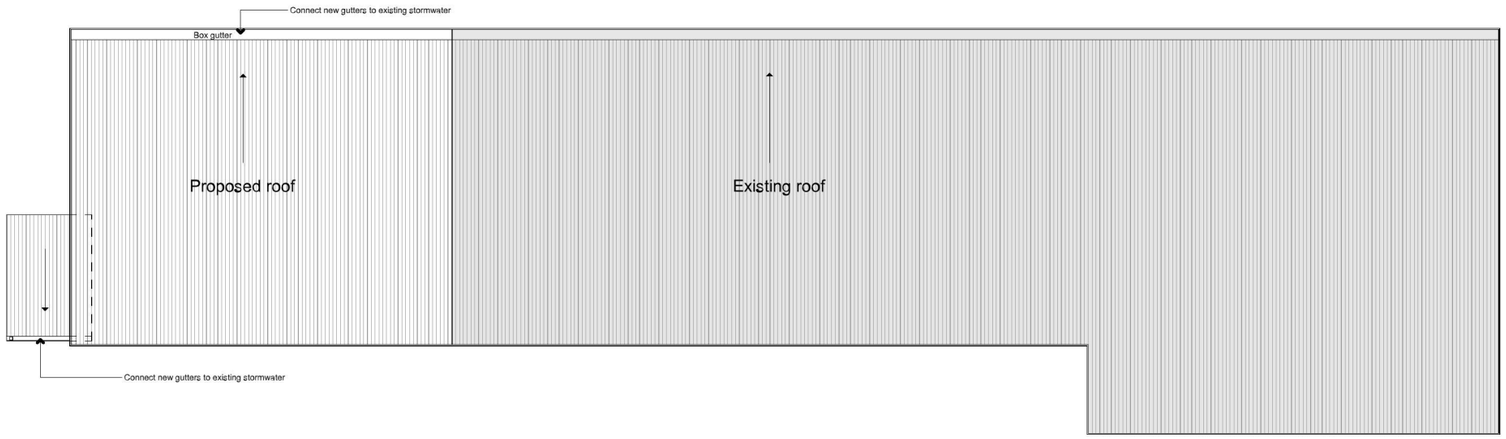

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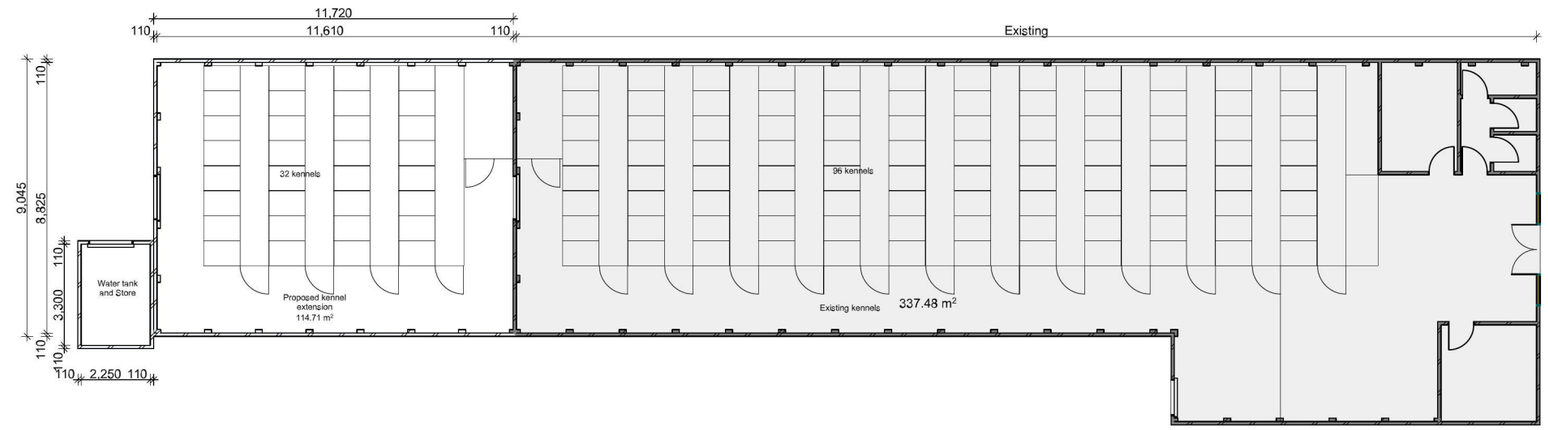

2. **Floor Plan**
Scale 1:200

Issue		
	29/08/19	Sketch design

Amendments

Proposed Extension to Kennels

Address
LOT 1 DP 1084891
312 Londonderry Rd Londonderry

Client
RICHMOND RACE CLUB

Stage
Development Application

Drawing Title
FLOOR PLAN

Drawing No.
190829-2

Date	Drawn by	Scale	Project No.	Issue
11/09/19	BT/TT	AS shown	190829	A

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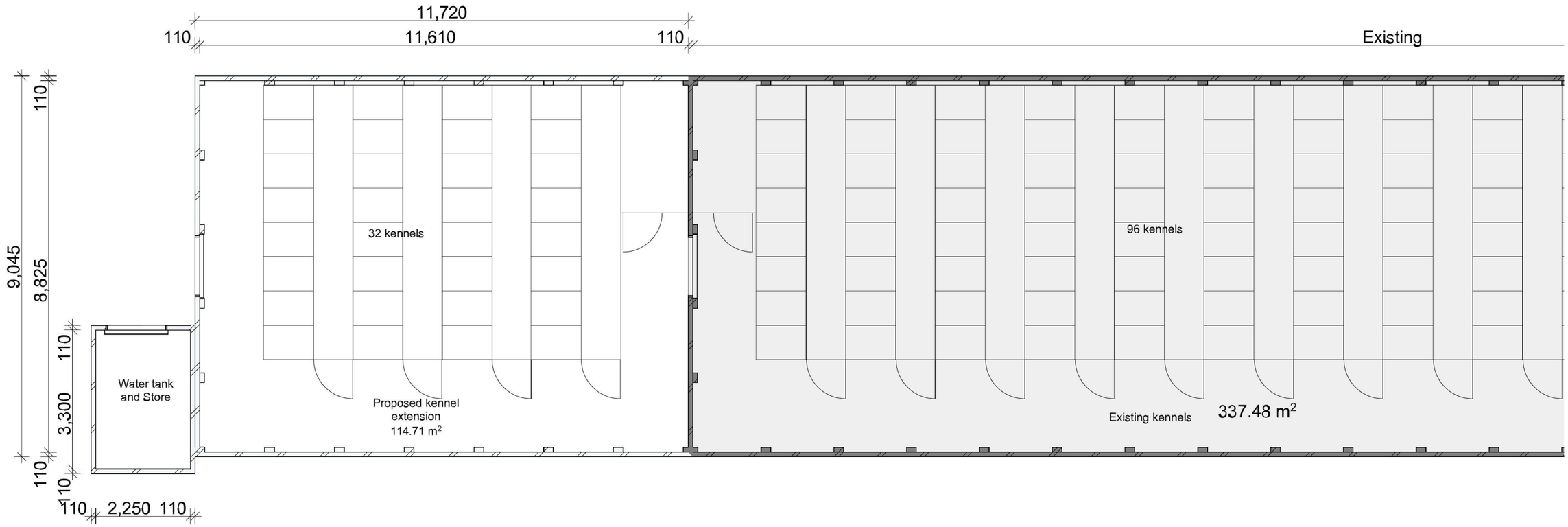

2. **Part Floor Plan**
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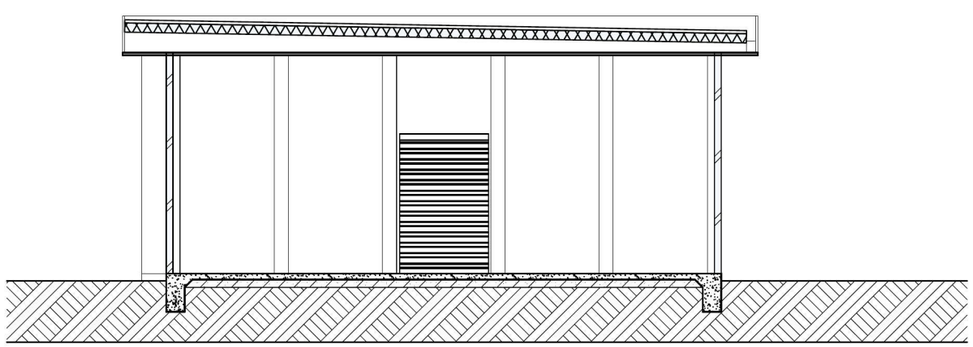

3 **Section A-A**
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Issue		
	29/08/19	Sketch design

Amendments

Proposed Extension to Kennels

Address
LOT 1 DP 1084891
312 Londonderry Rd Londonderry

Client
RICHMOND RACE CLUB

Stage
Development Application

Drawing Title
FLOOR PLAN AND SECTION

Drawing No.
190829-3

Date	Drawn by	Scale	Project No.	Issue
11/09/19	BT/TT	As shown	190829	A

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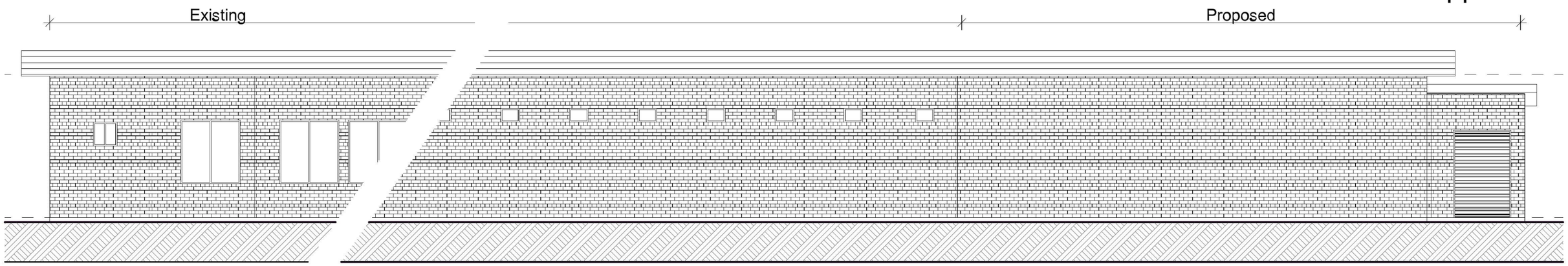

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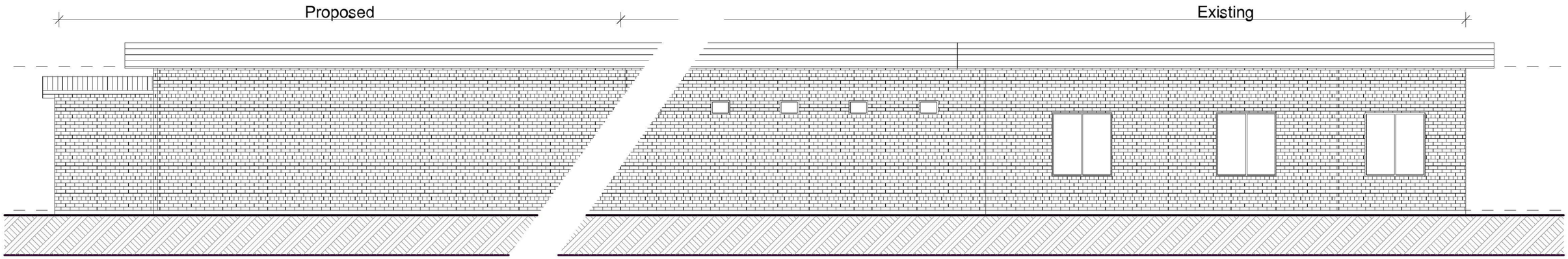

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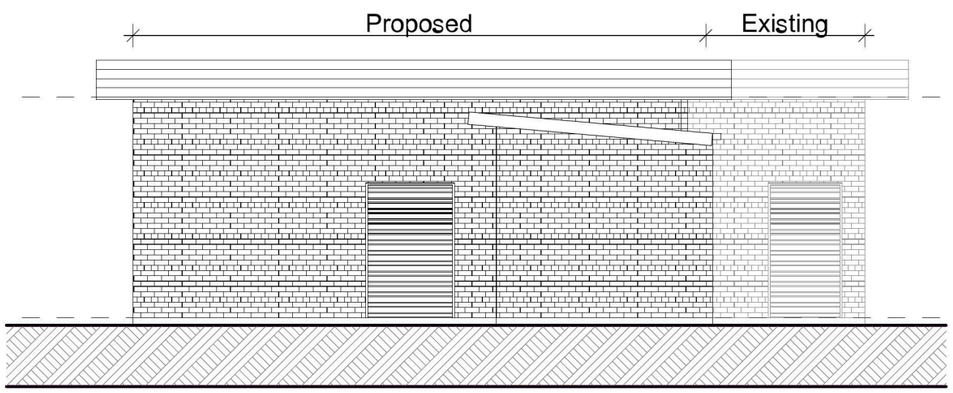

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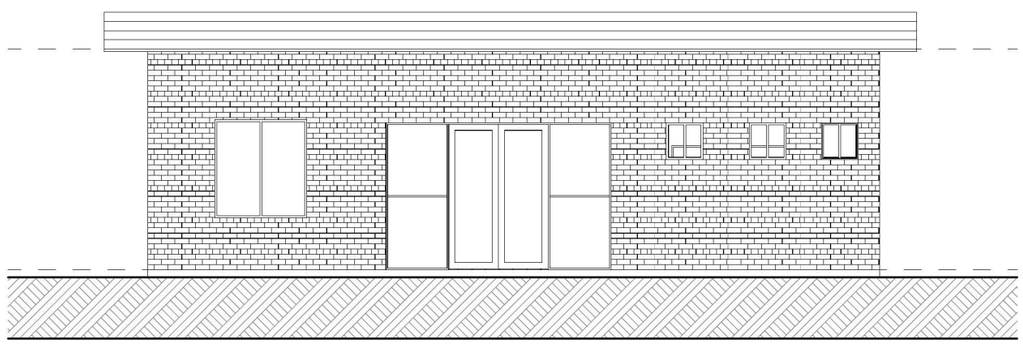

3 **East Elevation Existing**
Scale 1:100

CHECK ALL DIMENSIONS ON SITE.
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Issue		
	29/08/19	Sketch design

Amendments

Proposed Extension to Kennels

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Stage
Development Application

Drawing Title
ELEVATIONS

Drawing No.
190829-4

Date	Drawn by	Scale	Project No.	Issue
11/09/19	BT/TT	As shown	190829	A

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Table C.1 Modifying factor corrections
(See definitions in Section C2)

Factor	Assessment/ Measurement	When to apply	Correction[1]	Comments
Tonal noise	One-third octave band analysis using the objective method for assessing the audibility of tones in noise – simplified method (*ISO1996.2-2007 – Annex D*).	Level of one-third octave band exceeds the level of the adjacent bands on both sides by: • 5 dB or more if the centre frequency of the band containing the tone is in the range 500–10,000 Hz • 8 dB or more if the centre frequency of the band containing the tone is in the range 160–400 Hz • 15 dB or more if the centre frequency of the band containing the tone is in the range 25–125 Hz.	5 dB [2, 3]	Third octave measurements should be undertaken using unweighted or Z-weighted measurements. **Note:** Narrow-band analysis using the reference method in *ISO1996-2:2007, Annex C* may be required by the consent/regulatory authority where it appears that a tone is not being adequately identified, e.g. where it appears that the tonal energy is at or close to the third octave band limits of contiguous bands.
Low frequency noise	Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements in the range 10–160 Hz	Measure/assess source contribution C- and A-weighted Leq,T levels over same time period. Correction to be applied where the C minus A level is 15 dB or more and: • where any of the one-third octave noise levels in Table C2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2 dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period • where any of the one-third octave noise levels in Table C2 are exceeded by more than 5 dB and cannot be mitigated, a 5-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2dB(A) positive adjustment applies for the daytime period.	2 or 5 dB[2]	A difference of 15 dB or more between C- and A-weighted measurements identifies the potential for an unbalance spectrum and potential increased annoyance. The values in Table C2 are derived from Moorhouse (2011) for DEFRA fluctuating low-frequency noise criteria with corrections to reflect external assessment locations.

Table C.1 Modifying factor corrections – continued

Factor	Assessment/ Measurement	When to apply	Correction[1]	Comments
Intermittent noise	Subjectively assessed but should be assisted with measurement to gauge the extent of change in noise level.	The source noise heard at the receiver varies by more than 5 dB(A) and the intermittent nature of the noise is clearly audible.	5 dB	Adjustment to be applied for **night-time only**
Duration	Single-event noise duration may range from 1.5 min to 2.5 h.	One event in any assessment period.	0 to 20 dB(A)	The project noise trigger level may be increased by an adjustment depending on duration of noise (see Table C3).
Maximum Adjustment	Refer to individual modifying factors.	Where two or more modifying factors are indicated.	Maximum correction of 10 dB(A)[2] (excluding duration correction).	

Notes:

1. *Corrections to be added to the measured or predicted levels, except in the case of duration where the adjustment is to be made to the criterion.*
2. *Where a source emits tonal and low-frequency noise, only one 5-dB correction should be applied if the tone is in the low-frequency range, that is, at or below 160 Hz.*
3. *Where narrow-band analysis using the reference method is required, as outlined in column 5, the correction will be determined by the ISO1996-2:2007 standard.*