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# Environmental Noise Impact Assessment

Proposed Service Station and Restaurants  
27834 Hume Highway, Bowning, NSW

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**Prepared For:**  
Bowing Development Trust  
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Attention: Mr Travis Barker



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## **1.0 EXECUTIVE SUMMARY**

Bowning Development Trust proposes to construct a service centre on land zoned RU1 – Primary Production according to the Yass Valley Local Environmental Plan 2013. The site is located on the northern side of the Hume Highway between Bowning and Bookham.

The surrounding area consists of rural properties, with farm land bounding the site to the north, east and west.

The service station will consist of 12 car fuel pumps and 7 high flow heavy vehicle fuel pumps. The proposed service centre will include two restaurants with drive through, another two restaurants, common dining for 188 patrons and 33 for truck drivers

The site will have parking capacity for 171 cars spaces, 19 car and trailer spaces, 3 bus places and 33 truck spaces.

The main sources of noise from the site will be mechanical plant, car and truck movements and restaurant patron noise.

The service centre and restaurants are proposed to operate 24 hours per day, 7 days per week.

Acceptable noise limits are derived from the NSW Industrial Noise Policy 2000 at each residential receptor location and these are based on background noise measurements carried out at the nearest potentially affected residence. Consideration is also given to on road traffic noise and sleep disturbance.

Recommendations are made in Section 6 of this report to reduce the noise emission to within acceptable limits. These include assessing the mechanical plant prior to the issue of a construction certificate.



## 2.0 CONSULTING BRIEF

Day Design Pty Ltd was engaged by Bowning Development Trust to assess the potential environmental noise impact of a proposed service centre at 27834 Hume Highway, Bowning, NSW.

This commission involves the following:

### **Scope of Work:**

- Inspect the site and environs
- Prepare a site plan identifying the proposal and nearby noise sensitive locations
- Establish acceptable noise level criteria
- Quantify noise emission from the proposed development
- Calculate the level of noise emission, taking into account building envelope transmission, screen walls, distance attenuation, etc
- Provide recommendations for noise control if necessary
- Prepare an Environmental Noise Impact Assessment Report.



### 3.0 SITE AND DEVELOPMENT DESCRIPTION

#### 3.1 Site Description

The proposal will be located on land zoned RU1 – Primary Production according to the Yass Valley Local Environmental Plan 2013. The site is located on the northern side of the Hume Highway between Bowning and Bookham.

The surrounding area consists of rural properties as shown in Figure 1, with farm land bounding the site to the north, east and west. The area slopes up towards the subject site. Figure 1 shows the location of the proposed development and the surrounding area.

The closest receptors are as follows in Table 1:-

**Table 1 Table of Most Affected Receptors**

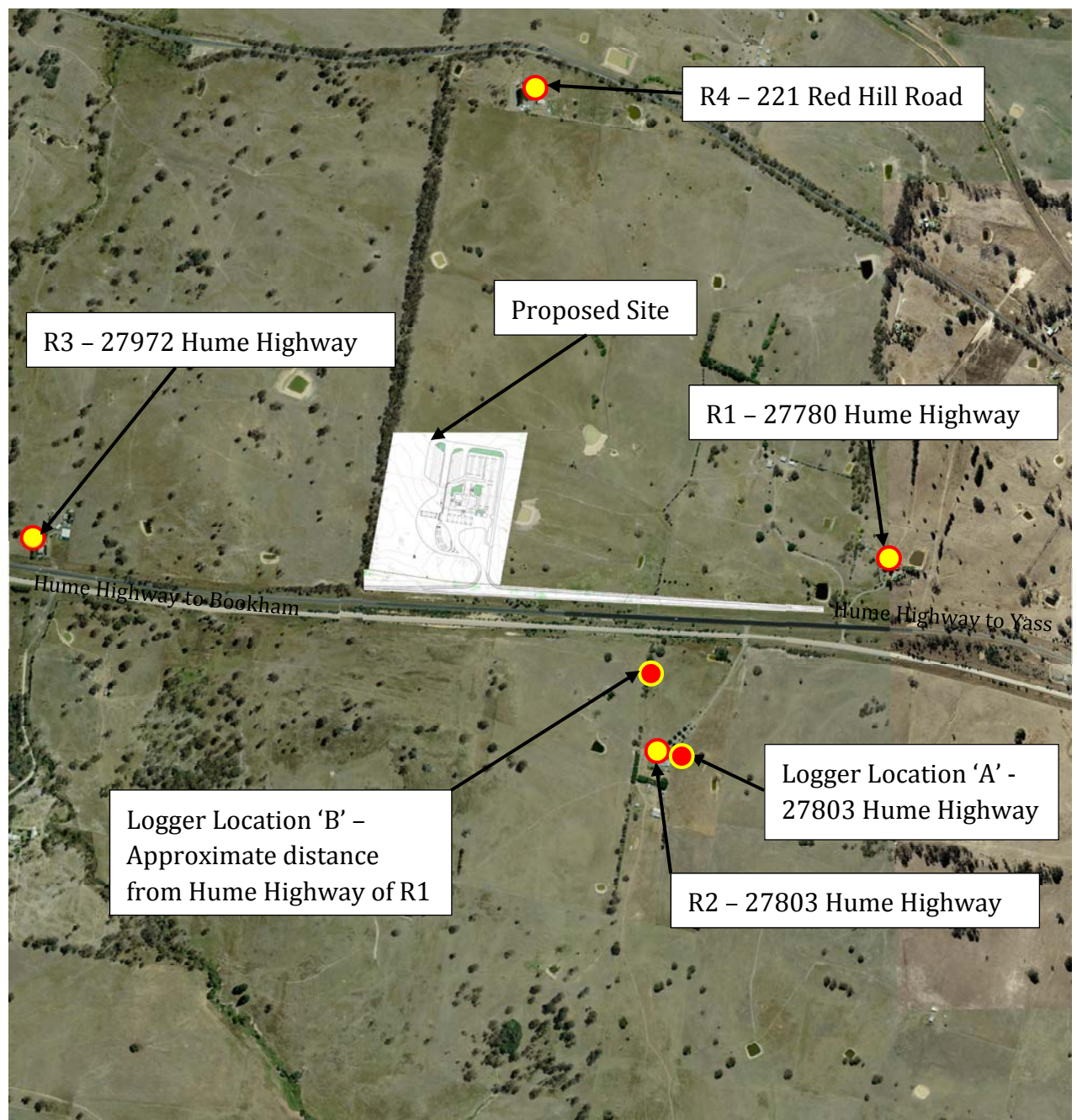
Receptor Address	Receptor Type	Direction from Site	Distance from Site
R1 – 27780 Hume Highway	Residential	East	850 m
R2 – 27803 Hume Highway	Residential	South	550 m
R3 – 27972 Hume Highway	Residential	West	790 m
R4 – 221 Red Hill Road	Residential	North	850 m

All distances are taken from the boundary of the proposal to the assessment location at each receptor.

Background noise levels were measured at R2 and are used to establish acceptable noise levels at all residential receptors in each direction from the site. Background noise levels at receptors R2 and R3 are likely to be higher given their proximity to the Hume Highway.







**Figure 1. Location Plan, Proposed Service Centre, Bowning, NSW.**



### **3.2 Development Description**

The proposed service centre will consist of two restaurants with drive through, another 2 restaurants

The service station will consist of 12 car fuel pumps and 7 high flow heavy vehicle fuel pumps, common dining for 188 patrons and 33 for truck drivers. Restaurant tenant 1 will be approximately 240 m<sup>2</sup>, restaurant tenants 2 & 3 will be approximately 79 m<sup>2</sup> each and restaurant tenant 4 will be approximately 229 m<sup>2</sup>.

The site will have parking capacity for 171 cars spaces, 19 car and trailer spaces, 3 bus places and 33 truck spaces.



## 4.0 ACOUSTICAL CRITERIA

This section presents the noise guidelines applicable to this proposal and establishes the project specific noise criteria.

### 4.1 Existing Ambient and Background Noise Levels

The  $L_{90}$  background noise level is a statistical measure of the sound pressure level that is exceeded for 90% of the measurement 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 a number of days during the proposed days and times of operation.

The background noise level should be measured at a location representative of the potentially affected receptors, in the absence of any noise sources that may be associated with the proposed development.

An environmental noise logger was placed in the front yard of 27803 Hume Highway, Bowring, designated Location A in Figure 1 above, between Tuesday 10 and Tuesday 17 January, 2017. A noise monitor was also placed at 27803 Hume Highway, Bowring at the approximate distance from the road as the residences at 27780 Hume Highway. Given that the ambient noise level in the area is dominated by traffic noise from the Hume Highway, this measurement location is considered representative of the ambient noise level at 27780 Hume Highway.

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

**Table 2 Rating Background Levels – 27803 Hume Highway, Bowring**

Noise Measurement Location	Time Period	$L_{90}$ Rating Background Level	Existing $L_{eq}$ Noise Level
Location 'A' – 27803 Hume Highway, Bowring	Day (7 am to 6 pm)	<b>42 dBA</b>	<b>55 dBA</b>
	Evening (6 pm to 10 pm)	<b>42 dBA</b>	<b>55 dBA</b>
	Night (12 am to 7 am)	<b>38 dBA</b>	<b>54 dBA</b>
Location 'B' – Representative of 27780 Hume Highway, Bowring	Day (7 am to 6 pm)	<b>51 dBA</b>	<b>65 dBA</b>
	Evening (6 pm to 10 pm)	<b>50 dBA</b>	<b>63 dBA</b>
	Night (12 am to 7 am)	<b>43 dBA</b>	<b>59 dBA</b>

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

The measured ambient noise level at Location 'A' is representative of the ambient noise level at R2 and R4.

The measured ambient noise level at Location 'B' is representative of the ambient noise level at R1 and R3.



## 4.2 NSW Industrial Noise Policy

The NSW Environment Protection Authority (EPA) 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. Local government may find the policy helpful in the carrying out of its land use planning responsibilities. (INP Section 1.3)

The objective of the policy is to establish noise criteria that will protect the community from excessive intrusive noise and to preserve amenity for particular land uses.

### 4.2.1 Controlling Intrusive Noise Impacts

The EPA in Section 2.1 of its NSW Industrial Noise Policy states that:- *“The intrusiveness of an industrial noise source may generally be considered acceptable if the equivalent continuous (energy-average) A-weighted level of noise from the source (represented by the  $L_{Aeq}$  descriptor) measured over a 15 minute period, does not exceed the background noise level measured in the absence of the source by more than 5 dB.”*

The Rating Background Level at R1 and R3 was 51 dBA in the day, 50 dBA in the evening and 43 dBA at night. Therefore the acceptable  $L_{eq}$  noise intrusiveness criteria in this area is:

#### R1 & R3

- (51 + 5 =) 56 dBA during the day;
- (50 + 5 =) 55 dBA in the evening; and
- (43 + 5 =) 48 dBA at night.

The Rating Background Level at R2 and R4 was 42 dBA in the day, 42 dBA in the evening and 38 dBA at night. Therefore the acceptable  $L_{eq}$  noise intrusiveness criteria in this area is:

#### R2 & R4

- (42 + 5 =) 47 dBA during the day;
- (42 + 5 =) 47 dBA in the evening; and
- (38 + 5 =) 43 dBA at night.

### 4.2.2 Protecting Noise Amenity

Depending on the type of area in which the noise is being made, there is a certain reasonable expectancy for noise amenity. Table 2.1 of the NSW Industrial Noise Policy 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.



Compliance with the Noise Amenity levels in Table 2.1 will limit ambient noise creep. Table 2.1 of the INP is replicated in Table 3 below.

**Table 3      Amenity Criteria (INP - Table 2.1)**

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
Residence	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
Residence	Urban	Day	60	65
		Evening	50	55
		Night	45	50

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 R1 and R3 was 65 dBA during the day, 63 dBA in the evening and 59 dBA at night. Therefore the acceptable  $L_{eq}$  amenity criteria for in this area is:

#### **R1 & R3**

- (65 - 10 =) 55 dBA during the day;
- (63 - 10 =) 53 dBA in the evening; and
- (59 - 10 =) 49 dBA at night.

The existing  $L_{eq}$  noise level at R2 and R4 was 55 dBA during the day, 55 dBA in the evening and 54 dBA at night. Therefore the acceptable  $L_{eq}$  amenity criteria for in this area is:

#### **R2 & R4**

- 60 dBA during the day;
- (55 - 10 =) 45 dBA in the evening; and
- (54 - 10 =) 44 dBA at night.



#### 4.3 Sleep Disturbance Criteria

There is no specific noise criterion for sleep disturbance in the INP, however in an application note to the INP, the EPA states:-

*“Peak noise level events, such as reversing beepers, noise from heavy items being dropped or other high noise level events, have the potential to cause sleep disturbance. The potential for high noise level events at night and effects on sleep should be addressed in noise assessments for both the construction and operational phases of a development. The INP does not specifically address sleep disturbance from high noise level events.”*

Nevertheless, the EPA's Noise Guide for Local Government states in Section 2.2.4 that where sleep disturbance is being assessed, the  $L_{A1, 1 \text{ minute}}$  or  $L_{Amax}$  noise level is most appropriate, and the measurement position should be outside the bedroom window. Sleep may be disturbed if the source noise level exceeds the background noise by more than 15 dB. In this instance this is:

##### R1 & R3

- $(43 + 15 =) \text{ 58 dBA}$  during the night.

##### R2 & R4

- $(38 + 15 =) \text{ 53 dBA}$  during the night.

The Road Noise Policy, in Section 5.4, contains a wide variety of information on research carried out on the effects of noise on peoples sleep. From the research on sleep disturbance to date (in 2011), it can be concluded that:

- Maximum internal noise levels below 50-55 dBA are unlikely to awaken people from sleep; and
- One or two noise events per night, with maximum internal noise levels of 65-70 dBA are not likely to affect health and wellbeing significantly.

It is noted that internal noise levels are increased by 10 dB when assessed as external noise levels outside a residential window.



#### 4.4 Road Traffic Noise Criteria

The NSW Road Noise Policy, in Section 2.3.1, sets out road traffic noise assessment criteria for residential land uses in Table 3. The information in that table is extracted below in Table 4.

**Table 4 Road Traffic Noise Assessment Criteria - Residential**

Road Category	Type of project/land use	Assessment Criteria - dB(A)	
		Day (7am - 10pm)	Night (10pm - 7am)
Freeway/arterial/sub-arterial roads	1. Existing residences affected by noise from <b>new</b> freeway/arterial/sub-arterial roads	L <sub>Aeq</sub> , (15 hour) 55 (external)	L <sub>Aeq</sub> , (9 hour) 50 (external)
	2. Existing residences affected by noise from <b>redevelopment</b> of existing new Freeway/arterial/sub-arterial roads	L <sub>Aeq</sub> , (15 hour) 60 (external)	L <sub>Aeq</sub> , (9 hour) 55 (external)
	3. Existing residences affected by <b>additional traffic</b> on existing freeways/arterial/sub-arterial roads generated by land use developments		

The entry and exit ramps on the Hume Highway from the proposal are considered to be a redevelopment of an existing new Freeway/arterial/sub-arterial roads, therefore the daytime L<sub>Aeq</sub>, (1 hour) 60 dBA and nighttime L<sub>Aeq</sub>, (1 hour) 55 dBA noise criteria are the appropriate assessment criteria at the adjacent residences.



#### 4.5 Project Specific Noise Criteria

The measured background noise levels have been used to establish the most stringent noise criteria at each receptor location as follows:-

##### **R1 & R3 – 27780 & 27972 Hume Highway**

- 47 dBA  $L_{eq, 15 \text{ minute}}$  during the day;
- 47 dBA  $L_{eq, 15 \text{ minute}}$  in the evening; and
- 43 dBA  $L_{eq, 15 \text{ minute}}$  at night.

##### **R2 & R4 – 27803 Hume Highway & 221 Red Hill Road**

- 56 dBA  $L_{eq, 15 \text{ minute}}$  during the day;
- 55 dBA  $L_{eq, 15 \text{ minute}}$  in the evening; and
- 48 dBA  $L_{eq, 15 \text{ minute}}$  at night.

The residential 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:

##### **R1 & R3 – 27780 & 27972 Hume Highway**

- $L_{1,1 \text{ minute}} (43 + 15=)$  **58 dBA** during the night, or
- $L_{max}$  60-65 dBA outside a bedroom window.

##### **R2 & R4 – 27803 Hume Highway & 221 Red Hill Road**

- $L_{1,1 \text{ minute}} (38 + 15=)$  **53 dBA** during the night, or
- $L_{max}$  60-65 dBA outside a bedroom window.

#### 4.6 Modifying Factor Adjustments

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.

Section 4 of the NSW Industrial Noise Policy provides modifying factor corrections to account for the additional annoyance where applicable. The modifying factor corrections are to be applied to the measured or predicted source noise level, at the receiver location, prior to comparison with the project specific noise criterion detailed above.

Table 4.1 of the INP is replicated in the attached Appendix E.

Noise emission is not considered to display characteristics requiring modifying factor adjustments at the nearest receptor locations.





## **5.0 DEVELOPMENT NOISE EMISSION**

The proposed service station will consist of 12 car fuel pumps and 7 high flow heavy vehicle fuel pumps, common dining for 188 patrons and 33 for truck drivers. Restaurant Tenant 1 will be approximately 240 m<sup>2</sup>, Tenants 2 & 3 will be approximately 79 m<sup>2</sup> each and Tenant 4 will be approximately 229 m<sup>2</sup>.

The main sources of noise from the service centre will be the cars and trucks on the entry and exit ramps, vehicle movements within the site, patrons inside and outside the restaurants and mechanical plant. The service centre will operate 24 hours a day, 7 days a week.

### **5.1 Service Station Car Noise Emission**

GTA Consultants prepared a Transport Impact Assessment reference N109490 dated 23 December 2016.

The GTA report predicted the anticipated peak hour traffic generation of the site based on the service station and restaurant floor area in accordance with the RTA 's "Guide to Traffic Generating Developments".

The GTA report concludes that the site may generate up to 240 vehicle trips in any peak hour, with up to 70 of these being heavy vehicles. The report also states that 100 vehicles entering the site during any peak hour is more likely.

As a worst case scenario of the peak hour traffic flow, we have adopted the GTA higher prediction that up to 170 cars and 70 heavy vehicles may visit the service station during daytime peak hour (equivalent to 43 car trips and 18 heavy vehicle trips every 15 minutes).

During the night time (10 pm – 7 am), we have assumed that the traffic flow will be 20 % of the peak hour traffic (equivalent to 9 car trips and 4 heavy vehicle trips every 15 minutes).

The  $L_{eq}$  sound power level and spectrum of cars and trucks has been measured by Day Design at various locations and is given in Table 5 below.



**Table 5** **L<sub>eq</sub> Sound Power Levels of Vehicle Movements**

Description	dBA	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
Car door slam, ignition and drive away	<b>76</b>	89	81	74	72	71	68	66	60
Truck door slam, ignition and drive away	<b>94</b>	91	88	85	88	91	87	82	79
9 car and 4 heavy vehicle trip (Night time)	<b>100</b>	101	96	92	94	97	93	88	85
43 car and 18 heavy vehicle trip (peak hour traffic)	<b>107</b>	108	102	98	101	104	100	95	92

The L<sub>1, 1minute</sub> sound power level and spectrum of a truck door slam and ignition or air brakes has been measured by Day Design and is given in Table 6 below.

**Table 6** **L<sub>1,1 minute</sub> Sound Power Levels of Truck Door Slam & Air Brakes**

Description	dBA	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
L <sub>1, 1 minute</sub> of truck door slam and ignition	<b>102</b>	113	102	98	95	97	94	92	86
L <sub>1, 1 minute</sub> of truck air brakes	<b>119</b>	94	100	93	95	100	108	117	110



## 5.2 Mechanical Plant Noise Emission

The mechanical plant for the proposal hasn't been selected yet and therefore we can only assume typical noise levels used on similar developments. A schedule of the sound power levels for mechanical plant is given in Table 7 below.

**Table 7 Mechanical Plant  $L_{eq}$  Sound Power Levels**

Description	dBA	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
Commercial Air Conditioning (1 of 6)	<b>75</b>	80	87	75	71	67	60	55	45
Cool room Condenser (1 of 4)	<b>81</b>	74	74	77	66	79	72	69	61
Freezer Condenser (1 of 4)	<b>75</b>	68	68	71	60	73	66	63	55
Toilet Exhaust Fan (1 of 4)	<b>68</b>	81	77	69	66	58	58	56	50

We recommend a detailed analysis be carried out once the mechanical plant selection is finalised.

## 5.3 Patrons Talking

The service station eating area provides seating for 188 patrons and 33 for truck drivers. Of the possible 221 patrons we have assumed up to 25 % will sit outdoors.

From our observations of other sites, we have modelled the noise emission from people as patrons talking normally (50 %) and the rest are not talking or listening (50 %).

Based on information in Harris<sup>1</sup> and in our noise level database gathered over many years, we calculate the sound power levels shown in Table 8 below.

<sup>1</sup> Handbook of Acoustical Measurements and Noise Control, Third Edition, Cyril M. Harris, McGraw-Hill Inc, New York, (Page 16.2)



**Table 8       $L_{eq}$  Sound Power Levels – Patrons**

Description	dBA	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
One man talking with <b>normal</b> voice	<b>66</b>	57	57	63	66	59	55	51	46
55 people dining outdoors (50% speaking normally, the rest listening)	<b>80</b>	71	71	77	80	73	69	65	60

#### 5.4      Predicted Noise Levels

Knowing the sound power level of a noise source (see Tables 5 - 8 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 building envelope transmission, distance losses, sound barriers, etc.

The cumulative noise level at each residential receptor is shown below in Table 9.



**Table 9 Calculated Level at the Nearest Receptors**

Description	Predicted Noise level		Complies
<b>R1 – 27780 Hume Highway</b>	<b>Day</b>	<b>Night</b>	
-Car movements	18 dBA	11 dBA	
-Truck movements	28 dBA	21 dBA	
-People eating indoors and outdoors	8 dBA	8 dBA	
Cumulative	<b>28 dBA</b>	<b>22 dBA</b>	
<b>Noise Criteria</b>	55 dBA	49 dBA	<b>Yes</b>
<b>R2 – 27803 Hume Highway</b>			
-Car movements	19 dBA	13 dBA	
-Truck movements	30 dBA	23 dBA	
-People eating indoors and outdoors	7 dBA	7 dBA	
Cumulative	<b>30 dBA</b>	<b>24 dBA</b>	
<b>Noise Criteria</b>	60 dBA	49 dBA	<b>Yes</b>
<b>R3 – 27972 Hume Highway</b>			
-Car movements	15 dBA	8 dBA	
-Truck movements	27 dBA	22 dBA	
-People eating indoors and outdoors	3 dBA	3 dBA	
Cumulative	<b>27 dBA</b>	<b>22 dBA</b>	
<b>Noise Criteria</b>	55 dBA	49 dBA	<b>Yes</b>
<b>R4 – 221 Red Hill Road</b>			
-Car movements	17 dBA	10 dBA	
-Truck movements	28 dBA	20 dBA	
-People eating indoors and outdoors	3 dBA	3 dBA	
Cumulative	<b>28 dBA</b>	<b>20 dBA</b>	
<b>Noise Criteria</b>	60 dBA	44 dBA	<b>Yes</b>

It should be noted that this is considered a worst-case scenario as it assumes peak restaurant patronage at night. This is unlikely to be the case in practice.

The noise level of cars, trucks and restaurant patrons at the adjacent residential premises is within the acceptable noise criteria in Section 4.0 and is therefore considered acceptable.



The predicted  $L_{1, 1 \text{ minute}}$  of a truck door slam and ignition at night is as follows:

- 43 dBA at 27780 Hume Highway (R1),
- 49 dBA at 27803 Hume Highway (R2),
- 47 dBA at 27972 Hume Highway (R3),
- 46 dBA at 221 Red Hill Road (R4),

This level of noise is within the sleep disturbance criteria in Section 4.3 and is therefore considered acceptable.

## 5.5 On Road Traffic Noise

This section presents the predictions of noise levels from motor vehicles travelling along the exit and entry ramps of the proposed Service Centre. The entry and exit ramps on the Hume Highway from the proposed site may be considered to be a redevelopment of an existing Freeway/arterial/sub-arterial roads, therefore are assessed against the NSW Road Noise Policy.

The GTA report concludes that the site may generate up to 240 vehicle trips in any peak hour, with up to 70 of these being heavy vehicles.

Table 10 below shows the predicted level of motor vehicle noise at the nearest residential receptors for peak hour traffic.

**Table 10 Predicted On-Road Traffic Noise Levels ( $L_{eq, 1 \text{ hour}}$ )**

Description	Predicted $L_{eq, 1 \text{ hour}}$ Noise level	Assessment Criteria Day/Night	Compliance
<b>R1</b> – 27780 Hume Highway	40 dBA	60/55 dBA	<b>Yes</b>
<b>R2</b> – 27803 Hume Highway	38 dBA	60/55 dBA	<b>Yes</b>
<b>R3</b> – 27972 Hume Highway	27 dBA	60/55 dBA	<b>Yes</b>
<b>R4</b> – 221 Red Hill Road	27 dBA	60/55 dBA	<b>Yes</b>

The noise level of cars and trucks on the entry and exit ramps at the adjacent residential premises is within the acceptable on road noise criteria in Section 4.4 and is therefore considered acceptable.



## **6.0 NOISE CONTROL RECOMMENDATIONS**

To ensure the noise emission from the proposed service station and restaurants is within the acceptable noise criteria detailed in Section 4.0 is achieved, we recommend the following noise controls:

### **6.1 Mechanical Plant**

The selection of mechanical plant has not been finalised at this stage.

Once mechanical plant has been selected, a final assessment should be made, prior to the issue of a Construction Certificate.





## 7.0 NOISE IMPACT STATEMENT

Day Design was engaged to assess the level of noise emission from the proposed Bowning Service Centre at 27834 Hume Highway, Bowning, NSW.

Measurements and calculations show that, provided the recommendations in Section 6 of this report are implemented, the level of noise emitted by the proposed Service Centre at 27834 Hume Highway, Bowning will meet the acceptable noise level requirements of The NSW Environment Protection Authority's Industrial Noise Policy and the NSW Road Noise Policy as detailed in Section 4 of this report.



**Thomas Roseby**, MEngSc (Mech), MDesSc (Audio and Acoustics), AMIEAust, 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.

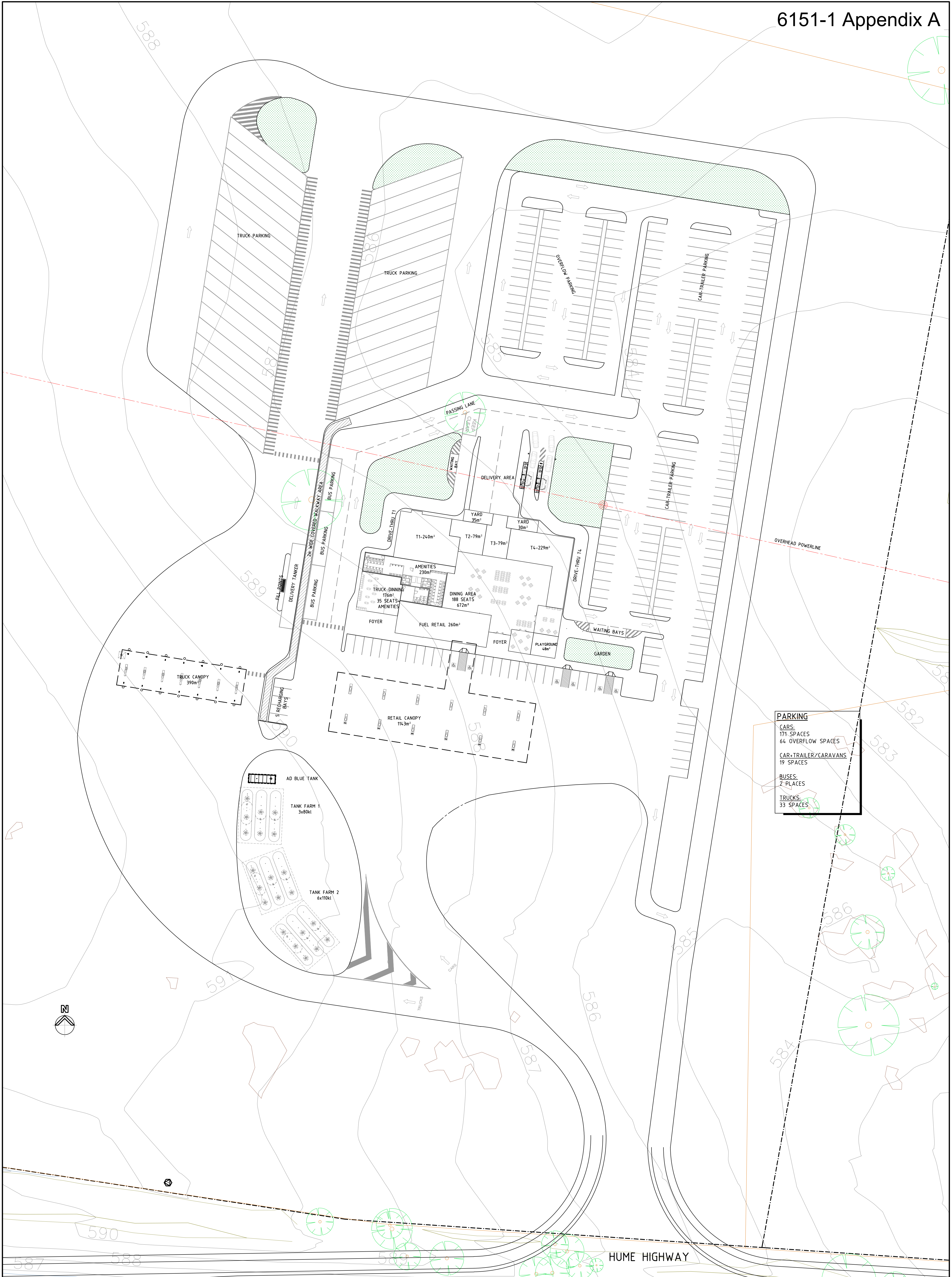
### Attachments:

Appendix A – Proposed Floor Plan

Appendix B – Ambient Noise Survey

Appendix C – Noise Survey Instrumentation





PARKING	
CARS:	171 SPACES
	64 OVERFLOW SPACES
CAR-TRAILER/CARAVANS:	19 SPACES
BUSES:	2 PLACES
TRUCKS:	33 SPACES

REV. No.	COMMENTS	DATE	INIT.
A	CIRCULATION ISSUE	13.05.16	DM
B	REVISED CIRCULATION ISSUE	16.05.16	DM
C	LAYOUT AND PARKING REVISED	02.06.16	JD
D	ENTRY LAYOUT REVISED	09.06.16	JD
E	AERIAL PHOTO ADDED	18.08.16	DM
F	SURVEY ADDED, BUILDING RELOCATED CLEAR FROM POWER LINES	16.09.16	DM

CIRCULATION  
ISSUE

PROJECT:  
SIDE ROAD SERVICE CENTRE

CLIENT:  
-

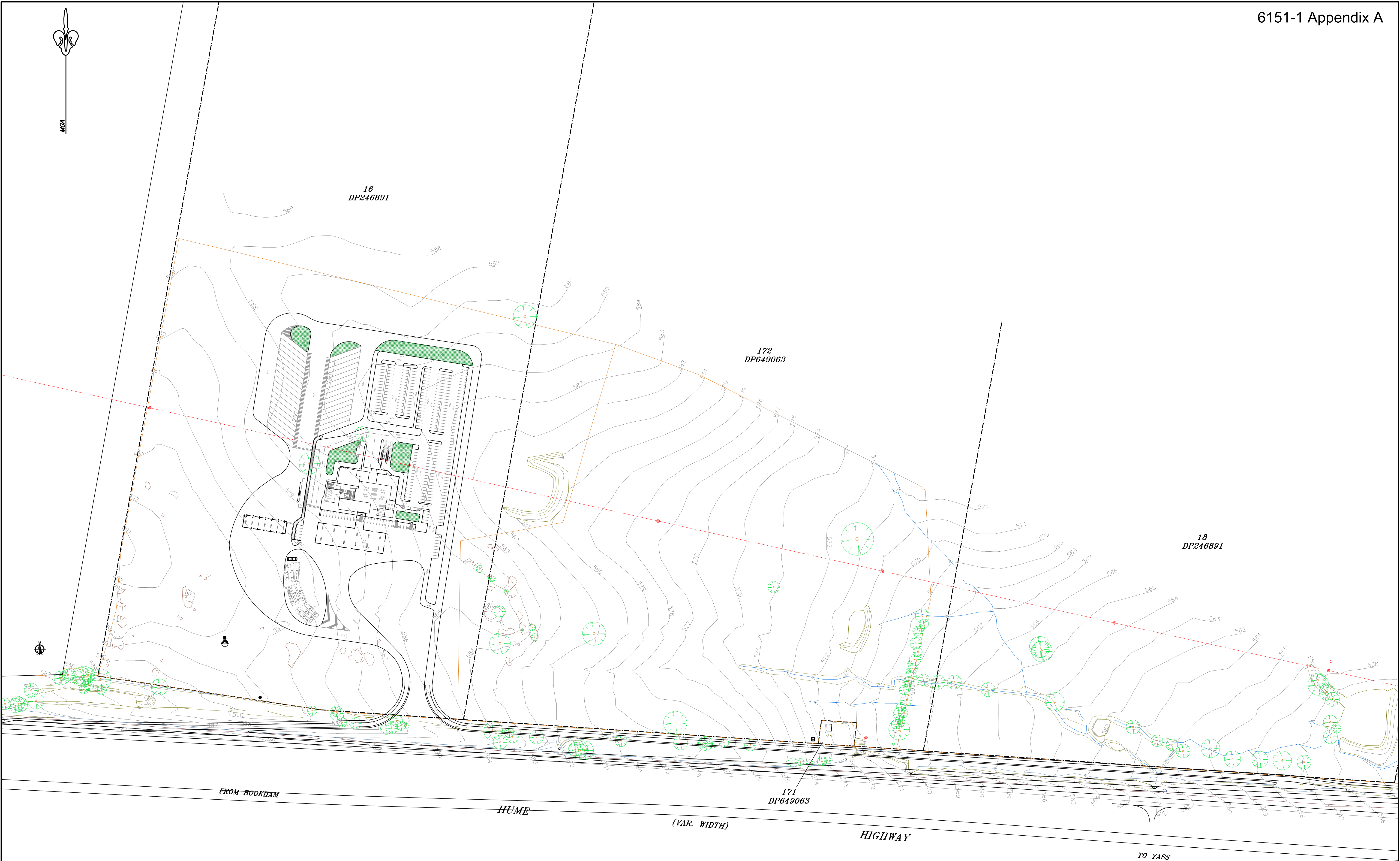
**Richmond+Ross** PTY LIMITED  
ABN 34 001 485 436

CONSULTING ENGINEERS  
38 WILLOUGHBY ROAD,  
CROWS NEST, NSW 2065  
TEL : (02) 9490 9600  
FAX : (02) 9438 1224

PROPOSED SITE PLAN

DATE:	MAY 2016	DRG.No.
SCALE:	1:500 AT A1	<b>A100</b>
JOB No.	160173	REV. F





REV No.	COMMENTS	DATE	INIT.
A	CIRCULATION ISSUE	16.09.16	DM

CIRCULATION  
ISSUE

PROJECT:  
SIDE ROAD SERVICE CENTRE

CLIENT:  
-

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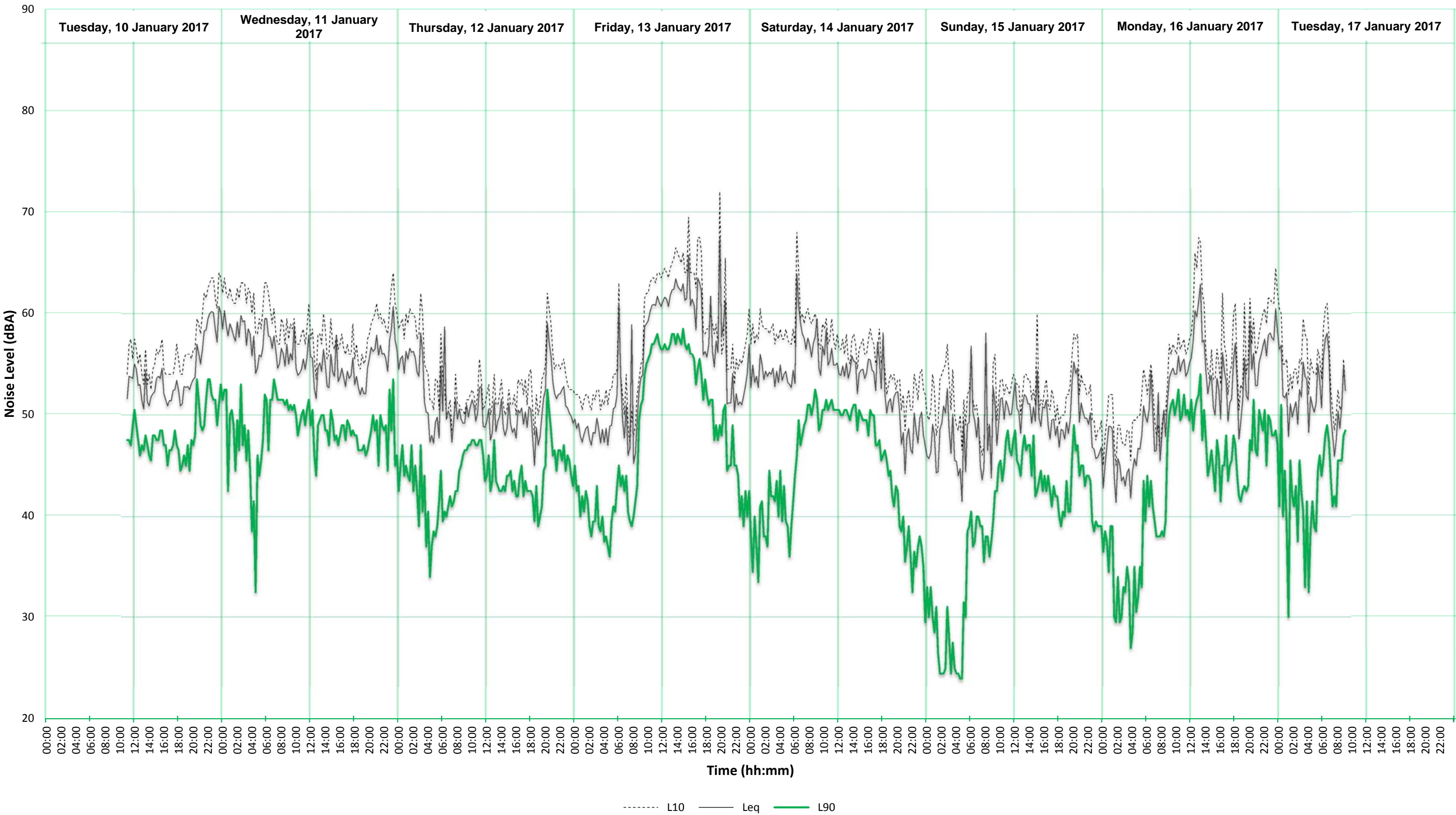
OVERALL SITE PLAN

DATE:	SEPT 2016
SCALE:	1:1500 AT A1
JOB No.	160173

DRG.No.	A101
REV. A	

AMBIENT NOISE SURVEY

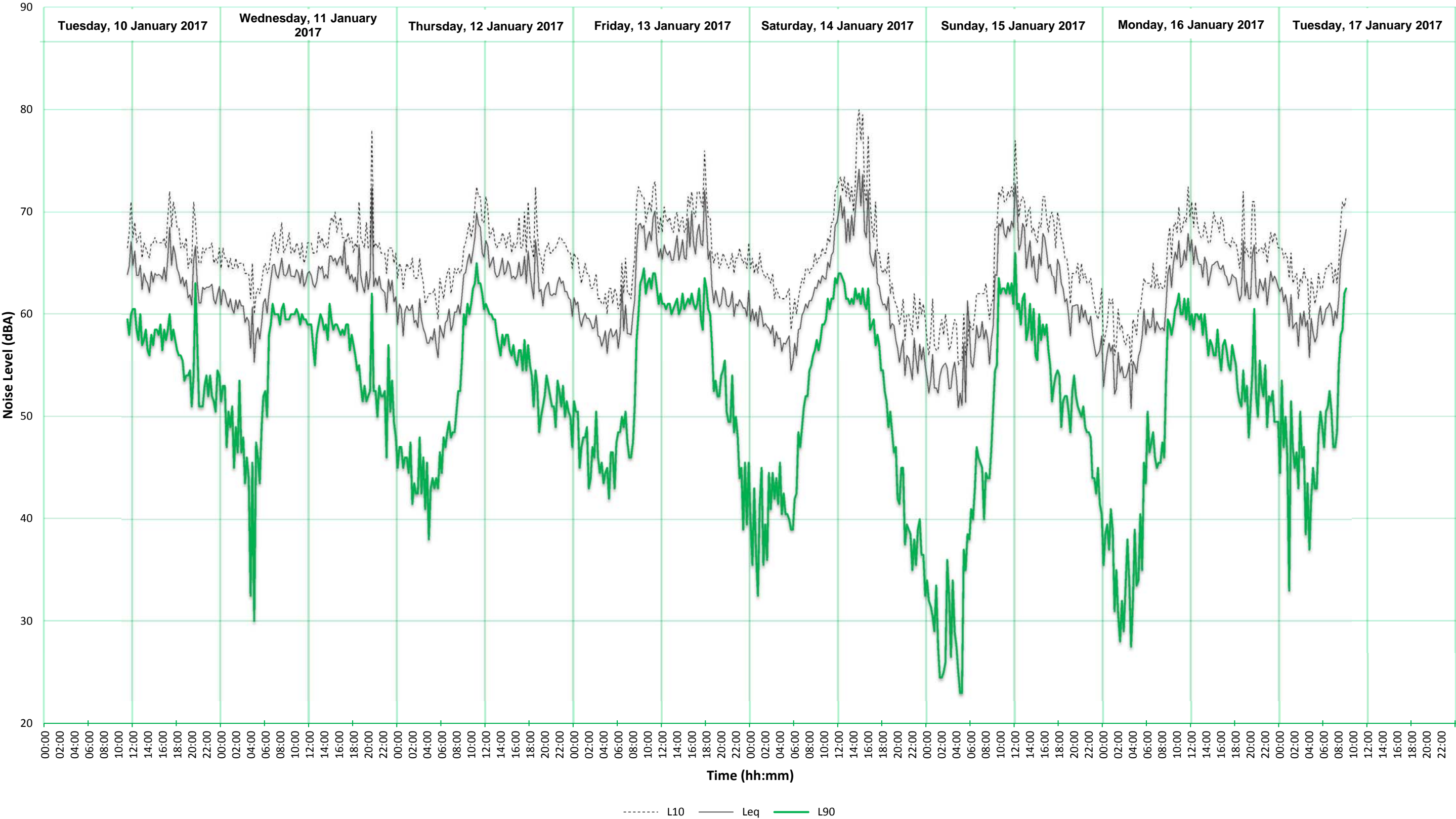
Located at (R2) 27803 Hume Highway, Bowning, NSW





AMBIENT NOISE SURVEY

Located at (R1) 27803 Hume Highway, Bowning, NSW



## NOISE SURVEY INSTRUMENTATION

Noise level measurements and analysis in this report were made with instrumentation as follows:

**Table A1 Noise Survey Instrumentation**

Description	Model No	Serial No
Infobyte Noise Logger(Type 2)	iM4	113
Condenser Microphone 0.5" diameter	MK 250	113
Infobyte Noise Logger (Type 2)	iM4	117
Condenser Microphone 0.5" diameter	MK 250	117

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 is a Type 2 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 attended and unattended measurements. No adjustments for instrument drift during the measurement period were warranted.

