External Noise Intrusion Assessment

The Arbour – Stage 6
10 Victoria Street, Berry

Client:
Berry Village Retirement Pty Ltd
C/o Altre Partners

3 April 2019

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CONTENTS

GLOSSARY

NOISE

Noise is produced through rapid variations in air pressure at audible frequencies (20 Hz – 20 kHz). Most noise sources vary with time. The measurement of a variable noise source requires the ability to describe the sound over a particular duration of time. A series of industry standard statistical descriptors have been developed to describe variable noise, as outlined in Section 2 below.

NOISE DESCRIPTORS

L_{eq} – The sound pressure level averaged over the measurement period. It can be considered as the equivalent continuous steady-state sound pressure level, which would have the same total acoustic energy as the real fluctuating noise over the same time period.

dB – Decibels. The fundamental unit of sound, a Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell. Probably the most common usage of the Decibel in reference to sound loudness is dB sound pressure level (SPL), referenced to the nominal threshold of human hearing. For sound in air and other gases, dB(SPL) is relative to 20 micropascals (μPa) = 2×10^{-5} Pa, the quietest sound a human can hear.

R_w – Weighted Sound Reduction Index. A measure of sound insulation performance of a building element. The higher the number, the better the insulation performance.

A-WEIGHTING

"A-weighting" refers to a prescribed amplitude versus frequency curve used to "weight" noise measurements in order to represent the frequency response of the human ear. Simply, the human ear is less sensitive to noise at some frequencies and more sensitive to noise at other frequencies. The A-weighting is a method to present a measurement or calculation result with a number representing how humans subjectively hear different frequencies at different levels.

1 INTRODUCTION

1.1 SUMMARY

Acoustic Dynamics has been engaged by **Berry Village Retirement Pty Ltd** to assess road traffic noise intrusion for the proposed Stage 6 development at "The Arbour", 10 Victoria Street, Berry. This document provides a technical assessment, as well as recommendations for construction materials and methods to achieve compliance with the relevant acoustic design criteria and requirements. It has been prepared in accordance with the requirements of Shoalhaven City Council, the NSW Department of Planning and Infrastructure (DP&I) and relevant Australian Standards.

1.2 LOCATION OF PROPOSED DEVELOPMENT

The site is located at 10 Victoria Street, Berry, in the Shoalhaven City Council area of NSW. The site is currently owned by "The Arbour", however it is undeveloped.

The proposal is for the development of the site, comprising of the development of 11 detached independent living units within the retirement village. The proposed Stage 6 development will be located in the North Eastern corner of the property, with a proposed new road to be built off Pepper Farm Drive to access the independent living units.

The proposed Stage 6 development has one road frontage with Victoria Street to the North. To the north of the proposed Stage 6 development is existing houses. To the south of the subject site is the current retirement village associated with this development.

The proposed Stage 6 development is shown in the Location Map, Aerial Photo and Drawings presented within **Appendix A**.

1.3 SCOPE

Acoustic Dynamics has been engaged to provide a road traffic noise intrusion assessment suitable for submission to Shoalhaven City Council as part of a Development Application by the Client.

The scope of the assessment is to include the following:

- Review of legislation, Council criteria and Australian Standards relevant to the external noise intrusion at the proposed development;
- Travel to site to conduct inspections and measurements;
- Conduct noise monitoring to establish traffic noise levels at the development site;
- Examination of architectural drawings and review of the proposed construction/materials;
- Calculation of the sound transmission reduction required to meet the criteria; and
- Recommendation of materials and construction techniques to achieve compliance with the relevant acoustic requirements and criteria.

2 ASSESSMENT CRITERIA AND STANDARDS

Acoustic Dynamics has conducted a review of the local council, state government and federal legislation that is applicable to noise assessment for the proposed Stage 6 development. The relevant sections of the legislation are presented below. The most stringent criteria which have been used in the assessment of the proposed Stage 6 development are summarised below.

2.1 NSW DEPARTMENT OF PLANNING & INFRASTRUCTURE (DP&I)

2.1.1 STATE ENVIRONMENTAL PLANNING POLICY (SEPP) (INFRASTRUCTURE) 2007

The NSW Department of Planning & Infrastructure's (DP&I) State Environmental Planning Policy (SEPP) (Infrastructure) 2007 provides information and criteria for the assessment of infrastructure development within NSW, and identifies matters to be considered in the assessment of development adjacent to particular types of infrastructure projects.

The policy details issues to be considered when assessing the impact of road traffic and rail noise on residential development, such as the proposed development. The following relevant guidelines and criteria are set out within the policy:

> *"**102 Impact of road noise or vibration on non-road development***
>
> *(1) This clause applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 20,000 vehicles (based on the traffic volume data published on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:*
>
> *(a) a building for residential use,*
> *(b) a place of public worship,*
> *(c) a hospital,*
> *(d) an educational establishment or child care centre.*
>
> *(3) If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:*
>
> *(a) in any bedroom in the building—35 dB(A) at any time between 10.00 pm and 7.00 am,*
> *(b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway)—40 dB(A) at any time.*
>
> *(4) In this clause, freeway, tollway and transitway have the same meanings as they have in the Roads Act 1993."*

Table 2.1 – Internal Noise criteria for residential buildings

Residential Buildings		
Type of Occupancy	**Internal $L_{Aeq(1hr)}$ Noise Level Criteria (dBA)**	**Applicable Time Period**
Sleeping areas (bedroom)	35	Night-time: 10 pm to 7 am
Other habitable rooms (excl. Garages, kitchens, bathrooms & hallways)	40	At any time

The above planning conditions may be enforced under the Environmental Planning and Assessment Act of 1979.

2.1.2 DEVELOPMENT NEAR RAIL CORRIDORS AND BUSY ROADS

If internal noise levels with windows or doors open exceed the criteria by more than 10 dBA, the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia.

2.2 SHOALHAVEN CITY COUNCIL CRITERIA

2.2.1 LOCAL ENVIRONMENT PLAN

A review of Shoalhaven City Council Local Environment Plan (LEP) 2014 did not yield specific criteria relating to acoustics.

2.2.2 DEVELOPMENT CONTROL PLANS

A review of Shoalhaven City Council's Development Control Plan (DCP) 2014 did not yield specific criteria relating to acoustics.

2.3 AUSTRALIAN STANDARDS

Acoustic Dynamics has conducted a review of relevant Australian Standards in relation to the subject development. The following details this review.

2.3.1 AS2107 "ACOUSTICS – RECOMMENDED DESIGN SOUND LEVELS"

Australian Standard 2107:2000 recommends satisfactory and maximum design sound levels for various types of occupancy within buildings. AS 2107 recommends the following satisfactory and maximum design sound levels for the various types of occupancies and areas within the proposed Stage 6 development.

Table 2.3 Recommended Design Sound Levels for Different Areas of Occupancy in Buildings (Extract from Australian Standard 2107 Table 1)

Type of Occupancy / Activity	Recommended Design Sound Level	
	Satisfactory	Maximum
7 RESIDENTIAL BUILDINGS		
Houses and apartments near major roads -		
Living Areas	35 dB(A)	45 dB(A)
Sleeping Areas	30 dB(A)	40 dB(A)
Work Areas	35 dB(A)	45 dB(A)
Apartment common areas (e.g. foyer)	45 dB(A)	55 dB(A)

2.3.2 AUSTRALIAN STANDARD 3671:1989

Australian Standard 3671 "*Acoustics - Road Traffic Noise Intrusion - Building Siting and Construction*" concerns the reduction of road traffic noise intrusion in buildings in areas near new or upgraded freeways, tollways, major roads and national routes or other roads carrying more than 2000 vehicles per day. The standard may also be used to assess the acoustical adequacy of existing buildings in similar areas. The standard provides methodology for the assessment of noise intrusion from road traffic and guidance for determining the type of building construction necessary to achieve acceptable noise levels indoors, for different types of occupancy.

2.4 INSTRUMENTATION & MEASUREMENT STANDARDS

All noise measurements are conducted in accordance with Australian Standard 1055.1-1997, *"Acoustics - Description and Measurement of Environmental Noise Part 1: General Procedures"*. Acoustic Dynamics' sound measurements are conducted using precision sound level meters conforming to the requirements of IEC 61672-2002 *"Electroacoustics: Sound Level Meters – Part 1: Specifications"*. The reference sound pressure level was checked prior to and after the measurements using the acoustic calibrator and remained within acceptable limits.

3 ROAD TRAFFIC NOISE INTRUSION ASSESSMENT

The following subsections provide an assessment of the proposed Stage 6 development against the various noise criteria and objectives outlined in section 2 above.

3.1 SITE SURVEY & NOISE MONITORING

Acoustic Dynamics advises that the existing road traffic noise levels at the subject development site has been determined based on the results of unattended noise logging conducted at the subject site from Friday 18 January to Friday 25 January 2019.

The prevailing weather conditions during the unattended noise monitoring were generally calm and did not influence the noise measurements taken. The results from the unattended noise logger are presented graphically in **Appendix B**.

The prevailing weather conditions during the operator-attended noise were generally calm and did not influence the noise measurements taken. The measurement location is shown in **Appendix A.**

The external L_{Aeq} noise levels have been determined for daytime and night-time periods, in accordance with the relevant assessment guidelines. The following table presents the processed noise data obtained from the unattended noise logger.

Table 3.1 - Measured $L_{Aeq(1\ hr)}$ Noise Levels

Location	Time of Day	Maximum Measured $L_{Aeq(1\ hr)}$ Noise Level[1] [dB]
Cnr Pepper Farm Drive and Victoria Street, Berry	Daytime (7am – 10pm)	64
	Night-time (10pm – 7am)	58

Note: 1) Measured noise levels at ground level location with no corrections included.

3.2 EXTERNAL NOISE INTRUSION ASSESSMENT

It was noted during the site attendance that the L_{Aeq} noise environment at the site is dominated by road traffic noise from the Princes Highway, Pepper Farm Drive and Victoria Street. Accordingly, the assessment of external noise intrusion uses the procedure outlined in AS 3671.

3.3 INTERNAL DESIGN SOUND LEVELS

The internal design sound level for a particular area of the subject development is the maximum permissible $L_{Aeq(1\ hour)}$ noise level within that area, with external windows and doors closed. The internal design sound levels applicable to the critical areas of any potential residential developments have been determined in accordance with the criteria and guidelines of Council, and the NSW DP&I and are presented in **Table 3.2** below.

3.4 TRAFFIC NOISE REDUCTION (TNR)

Traffic Noise Reduction is the level in dB of traffic noise attenuation required to satisfy the relevant criterion. It is used to evaluate the suitability of building components to achieve the required noise reduction.

The TNR is determined by subtracting the **internal design sound level** for the internal spaces from the **maximum external road traffic noise level** at the facade of each area.

The likely TNR to be incorporated into any potential residential building's envelope has been determined in accordance with the DP&I's SEPP (Infrastructure). Acoustic Dynamics has conducted initial calculations based on similar developments to roughly determine the likely Traffic Noise Attenuation (TNA_c) and R_W for required components for any potential residential development. The likely TNR's are presented in **Table 3.2** below.

3.5 TRAFFIC NOISE ATTENUATION (TNA) AND R_W

The likely Traffic Noise Attenuation (TNA_c) and R_W for required components have been determined for any potential residential development. The likely TNA_c and R_w have been determined in accordance with the guidelines set out in Australian Standard 3671.

The likely required TNA_c and R_W values are presented in **Table 3.2, 3.3 and 3.4** below.

3.5.1 LOCATION 1

The following likely required TNA_c and R_W values presented in **Table 3.2** and **3.3** are calculated for buildings on the Western most location (refer to appendix A for location markups)

Table 3.2 – Likely TNR, Component Noise Attenuation & R_w for Residential Development – Type 1

Type of Area	Maximum Indoor Design Sound Level (windows closed) [dB][1]	Calculated Maximum External Traffic Noise Level [dB][2]	Likely Maximum TNR [dB]	Required Component Traffic Noise Attenuation					
				Walls		Windows/ Glass Door		Roof	
				TNA_c	R_w	TNA_c	R_w	TNA_c	R_w
Bedroom 1									
Northern Wall	35	58	23	28	34	25	31	31	37
Eastern Wall				25	31	22	28	31	37
Western Wall				30	36	-	-	31	37
Bedroom 2									
Western Wall	35	58	23	28	34	-	-	29	35
Southern Wall				27	33	24	30	29	35
Bedroom 3									
Southern Wall	35	58	23	25	31	23	29	28	34
Living Area									
Northern Wall	40	64	24	22	28	26	32	31	37
Southern Wall				22	28	26	32	31	37

Note: 1) Maximum indoor design sound level based on SEPP criteria. See **Table 3.1**.

2) The Calculated Maximum External Traffic Noise Levels are $L_{Aeq(1\ hr)}$ noise levels, based on the measured daytime/night-time noise levels, and include adjustments to take account of distance losses and shielding provided by intervening structures.

Table 3.3 – Likely TNR, Component Noise Attenuation & R_w for Residential Development – Type 2B

Type of Area	Maximum Indoor Design Sound Level (windows closed) [dB][1]	Calculated Maximum External Traffic Noise Level [dB][2]	Likely Maximum TNR [dB]	Required Component Traffic Noise Attenuation					
				Walls		Windows/ Glass Door		Roof	
				TNA_c	R_w	TNA_c	R_w	TNA_c	R_w
Bedroom 1									
Northern Wall	35	58	23	29	35	-	-	31	37
Eastern Wall				25	31	22	28	31	37
Western Wall				29	35	22	28	31	37
Bedroom 2									
Northern Wall	35	58	23	26	32	19	25	28	34
Bedroom 3									
Western Wall	35	58	23	30	36	-	-	32	38
Southern Wall	35	58	23	31	37	25	31	32	38
Living Area									
Eastern Wall	40	64	24	28	34	22	28	31	37

Note: 1) Maximum indoor design sound level based on SEPP criteria. See **Table 3.1**.
2) The Calculated Maximum External Traffic Noise Levels are $L_{Aeq(1\ hr)}$ noise levels, based on the measured daytime/night-time noise levels, and include adjustments to take account of distance losses and shielding provided by intervening structures.

3.5.2 LOCATION 2

The following likely required TNA_c and R_W values presented in **Table 3.4** are calculated for buildings on the Eastern most location (refer to appendix A for location markups)

Table 3.4 – Likely TNR, Component Noise Attenuation & R_w for Residential Development – Type 2B

Type of Area	Maximum Indoor Design Sound Level (windows closed) [dB][1]	Calculated Maximum External Traffic Noise Level [dB][2]	Likely Maximum TNR [dB]	Required Component Traffic Noise Attenuation					
				Walls		Windows/ Glass Door		Roof	
				TNA_c	R_w	TNA_c	R_w	TNA_c	R_w
Bedroom 1									
Northern Wall	35	58	23	26	32	-	-	28	34
Eastern Wall				22	28	19	25	28	34
Western Wall				26	32	19	25	28	34
Bedroom 2									
Northern Wall	35	58	23	23	29	16	22	25	31
Bedroom 3									
Western Wall	35	58	23	27	33	-	-	29	35
Southern Wall	35	58	23	28	34	21	27	29	35
Living Area									
Eastern Wall	40	64	24	25	31	19	25	28	34

Note: 1) Maximum indoor design sound level based on SEPP criteria. See **Table 3.1**.
2) The Calculated Maximum External Traffic Noise Levels are $L_{Aeq(1\ hr)}$ noise levels, based on the measured daytime/night-time noise levels, and include adjustments to take account of distance losses and shielding provided by intervening structures.

The Australian Standard 3671 provides the following note:

> *"Either STC or R_W may be used as a guide to the selection of components able to provide a desired TNA_c value, provided that approximate allowance is made for the spectral composition of the noise as follows-*

$$TNA_c \approx R_w - 6 \text{ or } R'_w - 6"$$

During peak periods of high traffic noise levels, the calculated noise levels within some of the rooms for any potential development may exceed the relevant internal noise level criteria by more than 10 dB, with the windows and/or glass doors open. Acoustic Dynamics advises that air-conditioning should be installed to service any potential residential development. This will provide the option for mechanical ventilation of the dwelling, and provide building occupants with the option to leave external doors and windows closed, during peak periods of high traffic noise levels.

Construction systems and materials should be selected to provide the required design noise reduction shown in **Table 3.2 - 3.4** for the respective areas within the development.

4 RECOMMENDED DESIGN – ROAD TRAFFIC NOISE INTRUSION

Acoustic Dynamics' analysis and prediction calculations indicate the following recommendations should be incorporated into the proposed Stage 6 development, as a minimum, to ensure that the internal design sound levels are achieved in relation to road traffic noise intrusion.

4.1 EXTERNAL WALL SYSTEMS

Acoustic Dynamics understands that the external wall system for the proposed Stage 6 development is to be a brick veneer wall. The following tables detail the proposed constructions which Acoustic Dynamics confirms will ensure the internal design sound levels are achieved.

Table 4.1 - Proposed Construction for External Walls – Steel Frame

External Wall Leaf
1. Masonry veneer wall with FRL 60/60/60; with
Air-gap
2. Minimum 40mm cavity; to
Frame
3. Steel studs at 600mm maximum centres; with 4. 75mm Acoustigard R1.7; to
Internal Wall Leaf
5. 1 layer of 10mm Gyprock Plus Plasterboard

Table 4.2 - Proposed Construction for External Walls – Timber Frame

External Wall Leaf
1. Masonry veneer wall with FRL 60/60/60; with
Air-gap
2. Minimum 40mm cavity; to
Frame
3. Timber studs at 600mm maximum centres; with 4. 75mm Gold Batts R1.5; to
Internal Wall Leaf
5. 1 layer of 10mm Gyprock Plus Plasterboard

The wall systems within **Table 4.1** and **Table 4.2** above will exceed the minimum required design sound transmission performance.

4.2 ROOF SYSTEM

Acoustic Dynamics understands that the proposed roof construction for the proposed Stage 6 development is to be of steel sheet construction. The following table details the proposed construction, which Acoustic Dynamics confirms will ensure the internal design sound levels are achieved.

Table 4.3 - Proposed Construction for Roof System

External
1. Selected corrugated metal roof sheeting; to 2. Layer of min. 60mm foil faced Bradford Anticon roof insulation (or equivalent); with 3. Minimum 40mm battens; to 4. Minimum 140mm timber or steel rafters or trusses at 600mm centres; with
Insulation
5. Minimum 185mm thick Gold Batts R3.5 insulation batts (or equivalent); to
Internal
6. 1 layer of 13mm Gyprock Standard plasterboard (or equivalent).

Note: 1) Roof system from CSR Redbook. System Number CSR 6420. Refer to CSR Redbook for more information.

The roof system within **Table 4.3** above will exceed the minimum required design sound transmission performance.

4.3 WINDOWS / GLASS DOORS

The following table sets out the minimum required glazing for the windows and glass doors throughout the proposed Stage 6 development to ensure that the internal design sound levels are achieved.

Table 4.4 - Window & Glass Door Glazing Thickness Schedule – Location 1

Facade	Area / Room	Required R_W of Window/Glass Door System	Minimum Glazing Recommended[1]	
			Option 1	Option 2
Bedroom 1 – Type 1, Location 1				
Northern	Bedroom	31	8mm Monolithic	8.38mm Laminated
Eastern	Bedroom	28	6mm Monolithic	6.38mm Laminated
Bedroom 2 – Type 1, Location 1				
Southern	Bedroom	30	8mm Monolithic	8.38mm Laminated
Bedroom 3 – Type 1, Location 1				
Southern	Bedroom	29	8mm Monolithic	8.38mm Laminated
Living Area – Type 1, Location 1				
Northern	Other Habitable Rooms	32	8mm Monolithic	8.38mm Laminated
Southern	Other Habitable Rooms	32	8mm Monolithic	8.38mm Laminated
Bedroom 1 – Type 2B, Location 1				
Eastern	Bedroom	28	6mm Monolithic	6.38mm Laminated
Western	Bedroom	28	6mm Monolithic	6.38mm Laminated
Bedroom 2 – Type 2B, Location 1				
Northern	Bedroom	25	6mm Monolithic	6.38mm Laminated
Bedroom 3 – Type 2B, Location 1				
Southern	Bedroom	31	8mm Monolithic	8.38mm Laminated
Living Area – Type 2B, Location 1				
Eastern	Other Habitable Rooms	28	6mm Monolithic	6.38mm Laminated

Note: 1) Minimum glazing has been specified to meet acoustic requirements. Acoustic Dynamics advises that some windows/glass doors may also need to meet applicable safety standards. Additional advice should be sought to verify such requirements.

Table 4.5 - Window & Glass Door Glazing Thickness Schedule – Location 2

Facade	Area / Room	Required R_W of Window/Glass Door System	Minimum Glazing Recommended[1]	
			Option 1	Option 2
Bedroom 1 – Type 2B, Location 2				
Eastern	Bedroom	25	6mm Monolithic	6.38mm Laminated
Western	Bedroom	25	6mm Monolithic	6.38mm Laminated
Bedroom 2 – Type 2B, Location 2				
Northern	Bedroom	22	6mm Monolithic	6.38mm Laminated
Bedroom 3 – Type 2B, Location 2				
Southern	Bedroom	27	6mm Monolithic	6.38mm Laminated
Living Area – Type 2B, Location 2				
Eastern	Other Habitable Rooms	25	6mm Monolithic	6.38mm Laminated

Note: 1) Minimum glazing has been specified to meet acoustic requirements. Acoustic Dynamics advises that some windows/glass doors may also need to meet applicable safety standards. Additional advice should be sought to verify such requirements.

Acoustic Dynamics advises that the installation of all windows and glass doors must ensure an adequate acoustic (air tight) seal when closed. Any sound flanking paths around the windows must be sealed to provide adequate acoustic insulation. All gaps between the window frame and the wall structure should be sealed using polystyrene rods and silicone mastic sealant, prior to the fitting of architraves.

It is advised that the acoustic performance of the selected windows frames should be confirmed with the suppliers, to ensure that the glazing and frame systems will achieve the minimum acoustic performance levels (R_w) recommended in **Table 4.4 and 4.5** above.

4.4 PROVISION OF MECHANICAL VENTILATION

Due to the initial calculated maximum internal noise levels within the potential residential dwellings when windows and external doors are open, Acoustic Dynamics recommends that there may be a need for appropriate mechanical ventilation to be installed to service potential residential developments to ensure compliance with the applicable acoustic requirements.

The installation of mechanical ventilation (fresh air) would provide occupants with the option to leave external doors and windows closed, during peak periods of high traffic noise levels.

5 CONCLUSION

Acoustic Dynamics has conducted an assessment of road traffic noise intrusion assessment for the proposed Stage 6 residential development at 10 Victoria Street, Berry, NSW. A review of applicable noise standards and local authority noise criteria was conducted. Noise levels were assessed in accordance with the requirements of:

(a) Shoalhaven Council;
(b) NSW Department of Planning & Infrastructure; and
(c) Australian Standards.

The performance of the building components proposed for use in the development have been assessed as presented in **Tables 3.2–3.4**, to determine their suitability for achieving compliance with the noise criteria.

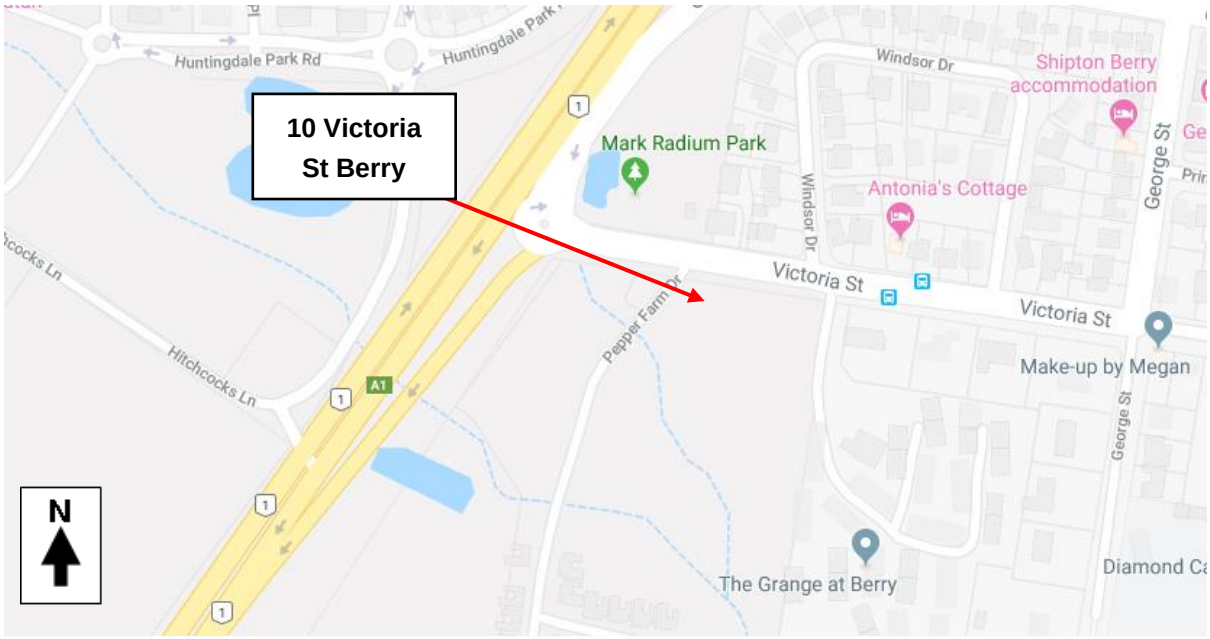
The assessment examined the facades most exposed to road traffic noise intrusion, as well as facades less exposed to external noise intrusion, providing a minimum requirement and allowing for the optimised selection of components for the respective areas within the development.

Should alternative construction systems and materials be selected, they must meet the required objective design noise reduction shown in **Tables 3.2-3.4** for the respective areas within the development.

Acoustic Dynamics advises that the incorporation of the recommendations of this report into the design and construction of the proposed development will achieve compliance with the relevant acoustic design requirements of Shoalhaven Council and the NSW Department of Planning & Infrastructure.

APPENDIX A – LOCATION MAP, AERIAL PHOTO & DRAWINGS

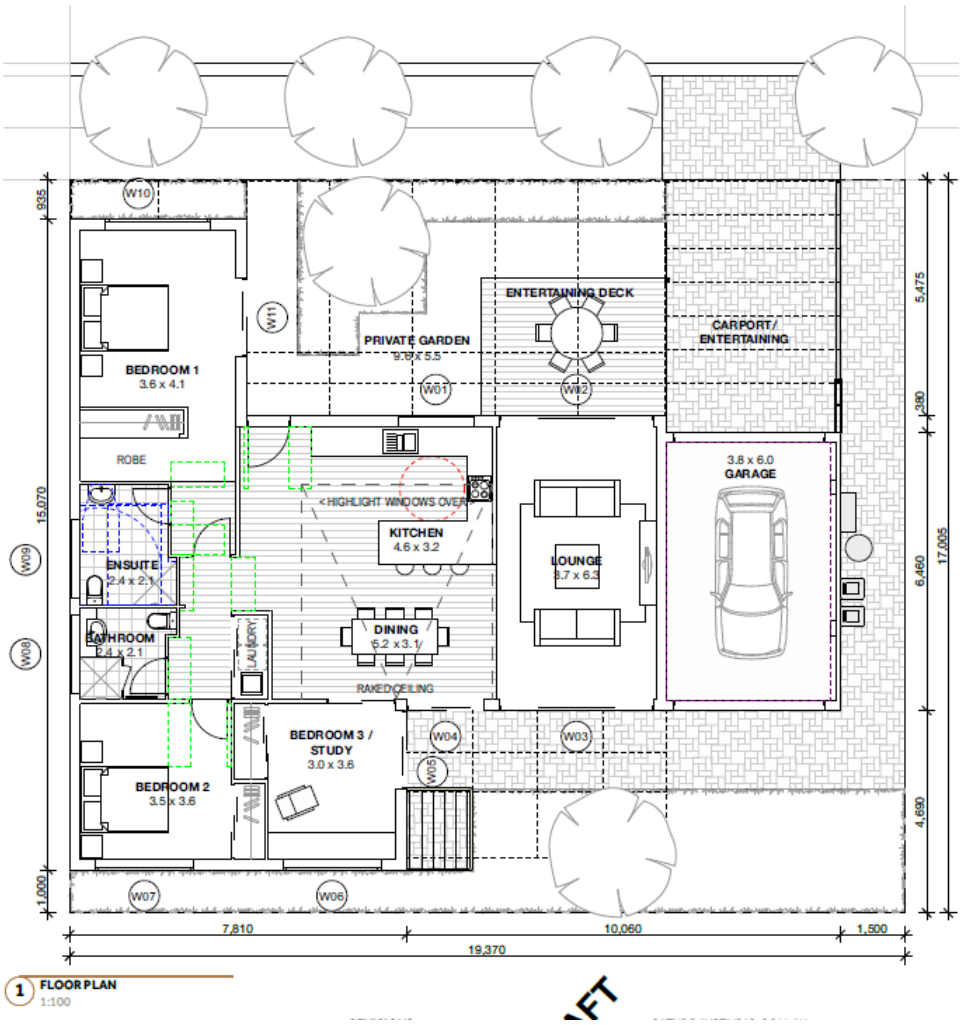
A.1 LOCATION MAP



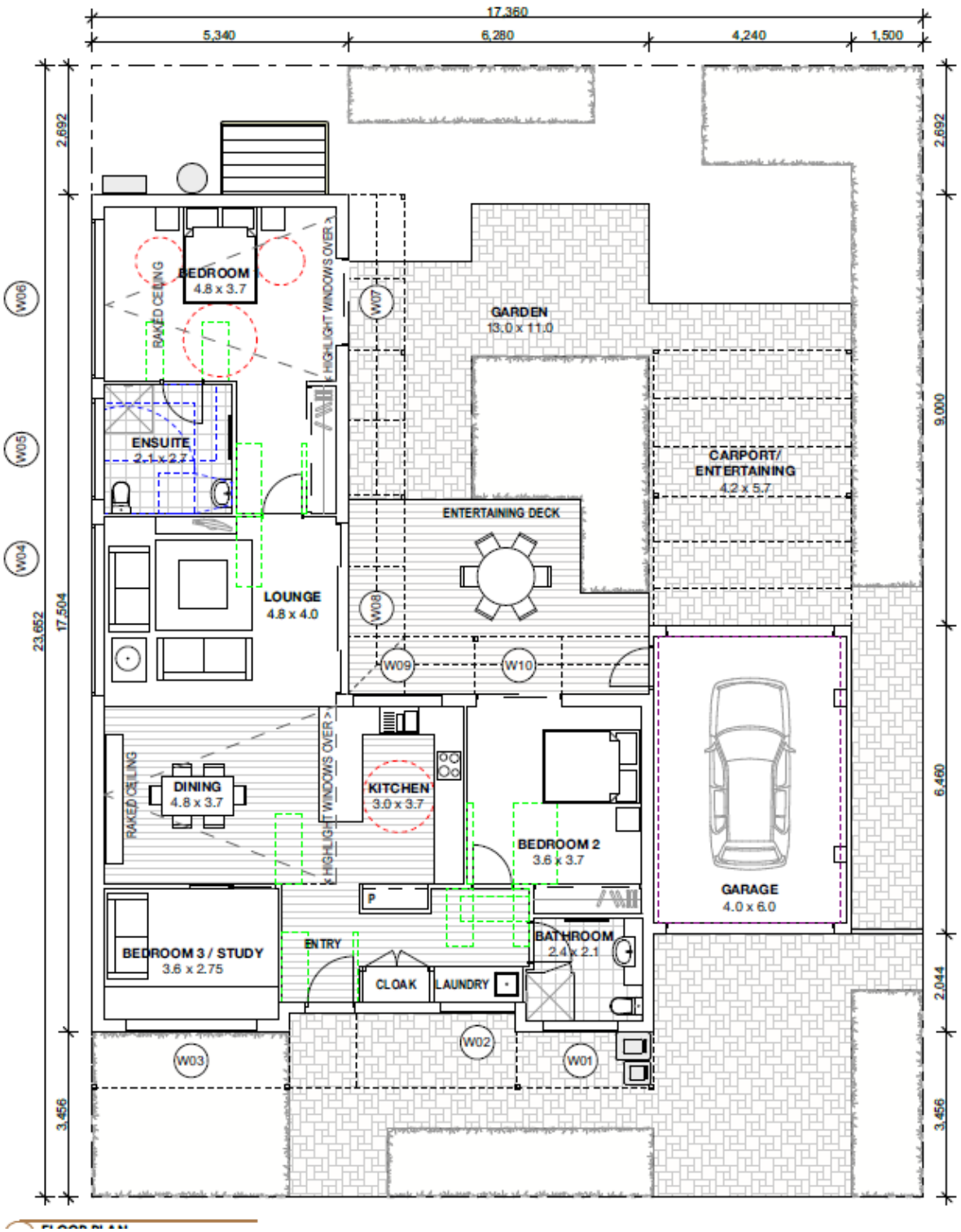
A.2 AERIAL PHOTO

A.3 DRAWINGS

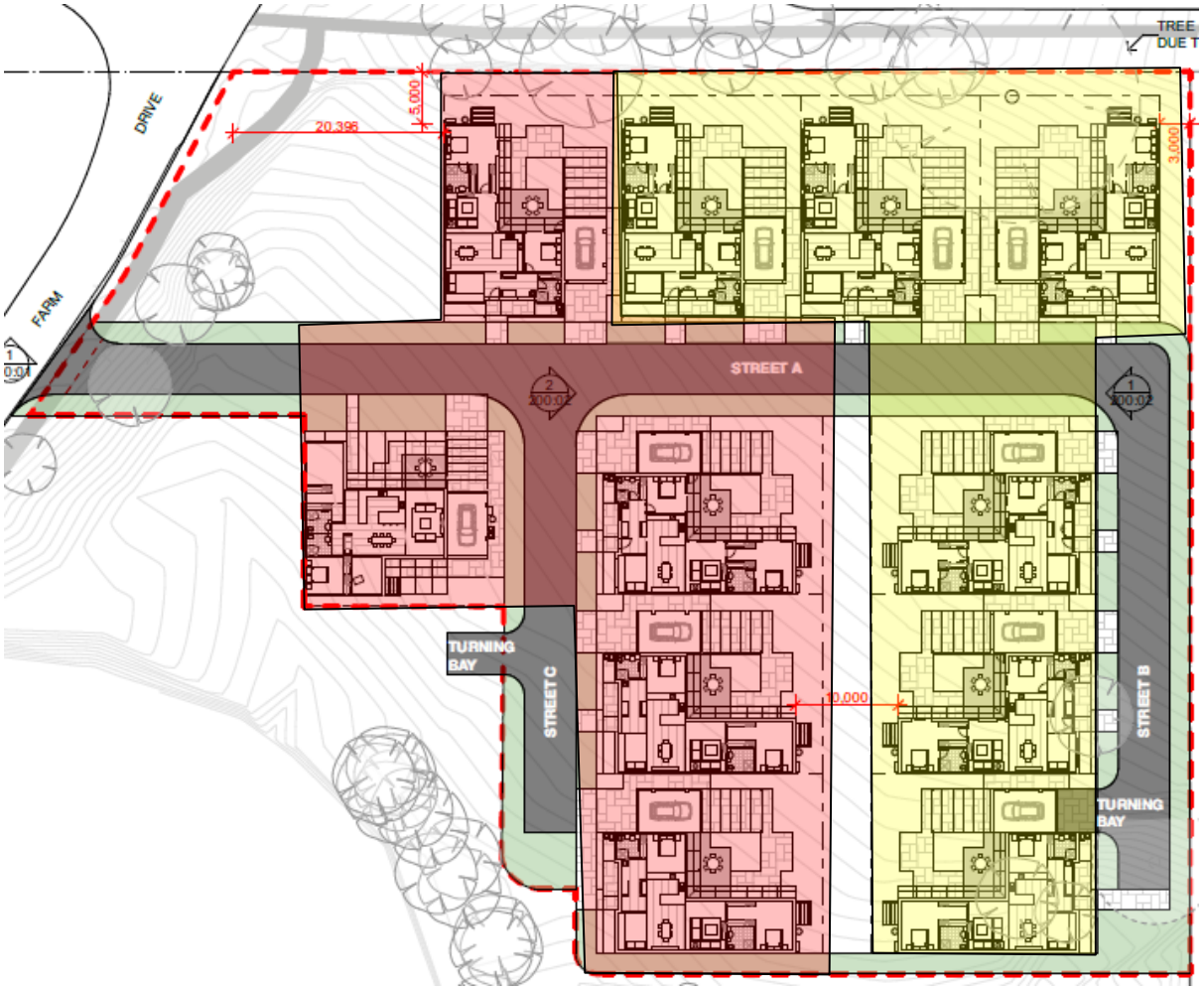
1.1.1 TYPE 1



1.1.2 TYPE 2B

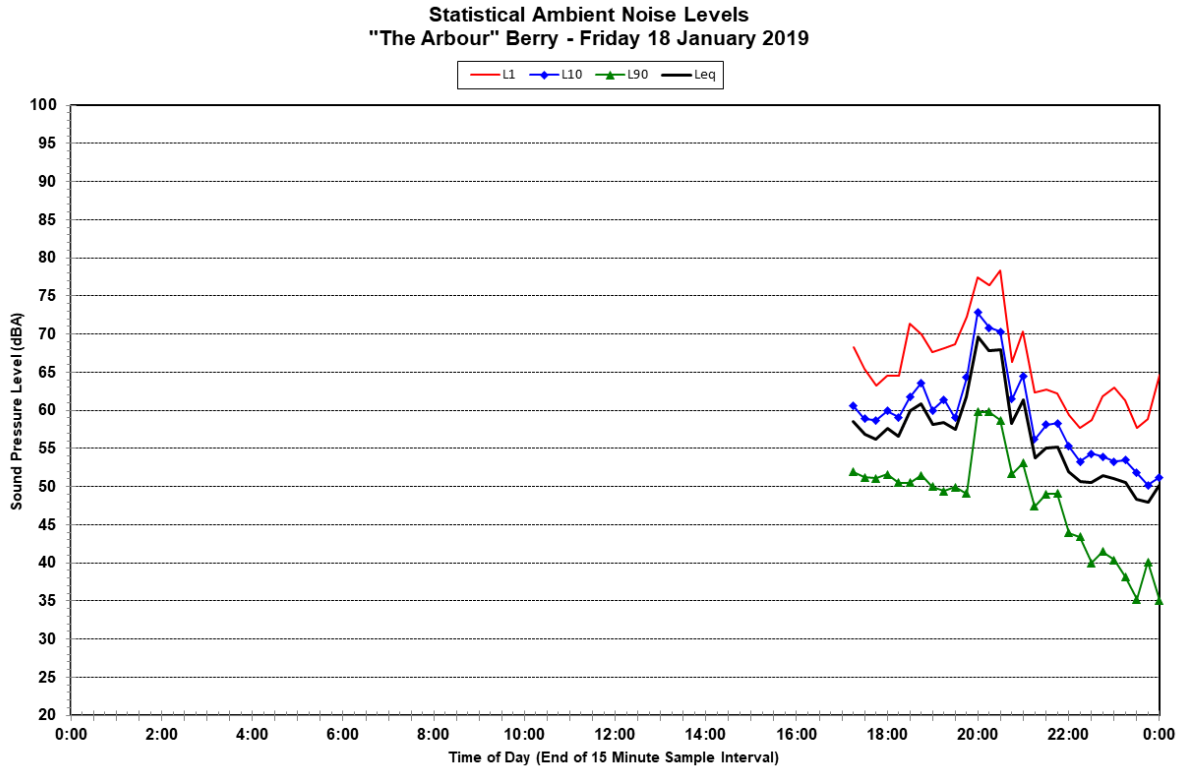

17,360
5,340
6,280
4,240
1,500
2,692
17,504
23,652
9,000
6,460
2,044
3,456
BEDROOM
4.8 x 3.7
RAKED CEILING
HIGHLIGHT WINDOWS OVER
ENSUITE
2.1 x 2.7
LOUNGE
4.8 x 4.0
GARDEN
13.0 x 11.0
CARPORT/
ENTERTAINING
4.2 x 5.7
ENTERTAINING DECK
DINING
4.8 x 3.7
KITCHEN
3.0 x 3.7
BEDROOM 2
3.6 x 3.7
GARAGE
4.0 x 6.0
BEDROOM 3 / STUDY
3.6 x 2.75
ENTRY
CLOAK
LAUNDRY
BATHROOM
2.4 x 2.1
P
W01
W02
W03
W04
W05
W06
W07
W08
W09
W10

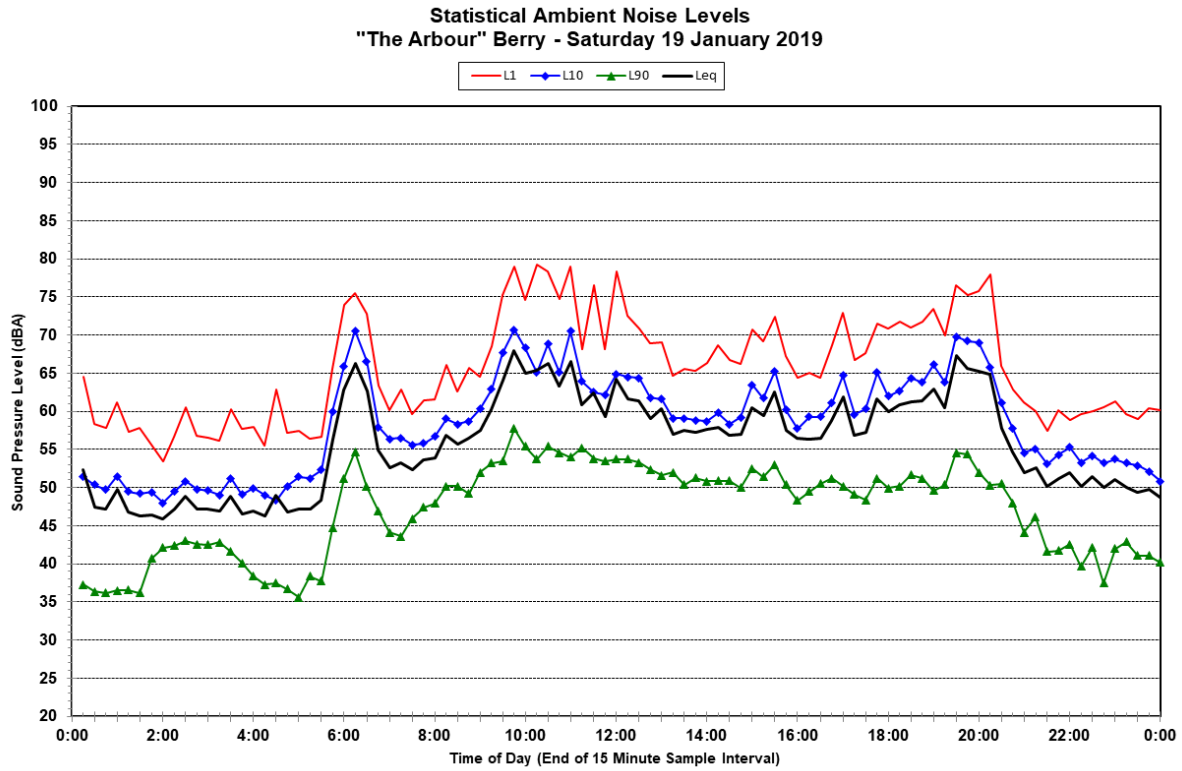
1.1.3 LOCATION MARKUPS

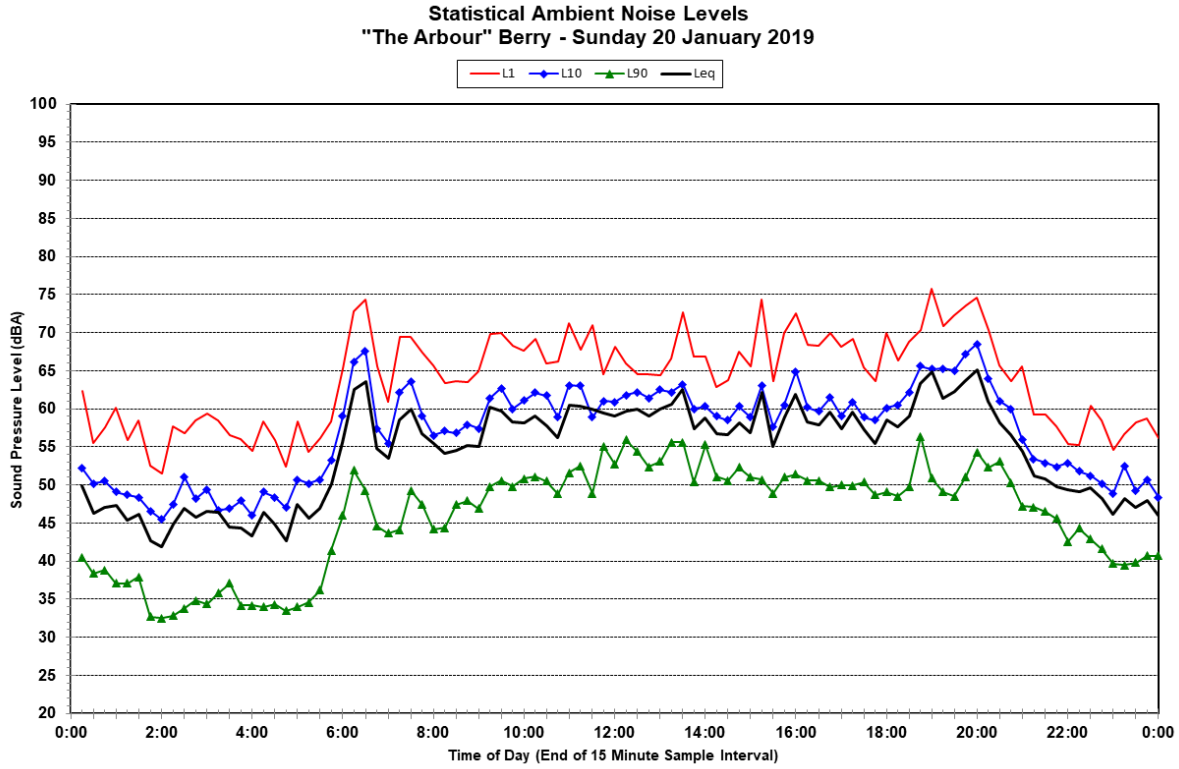


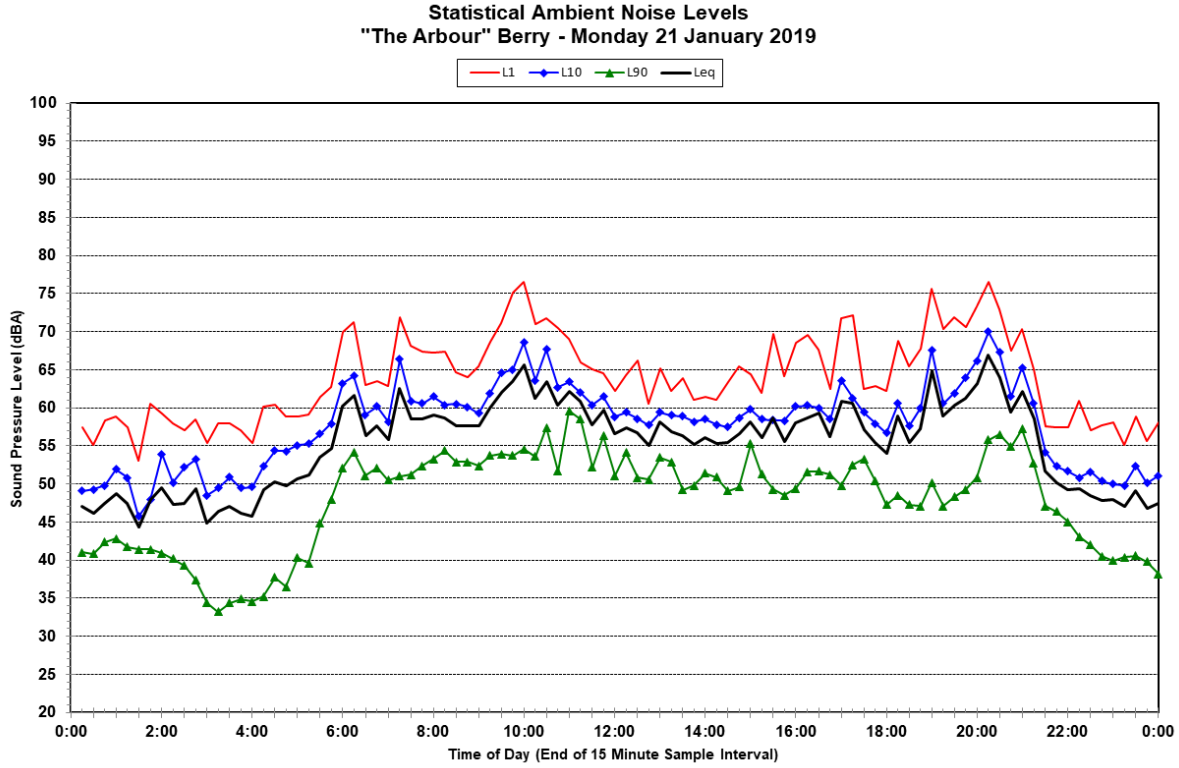
	Location 1
	Location 2

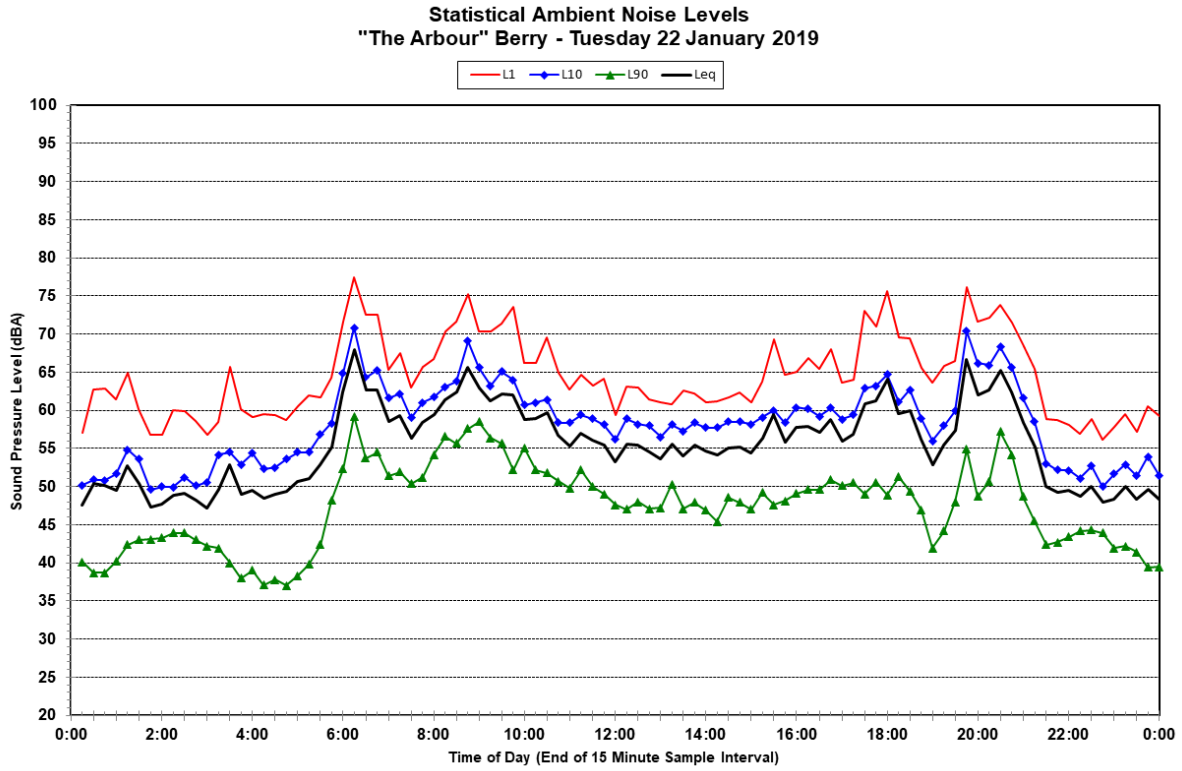
APPENDIX B – UNATTENDED NOISE LOGGER DATA

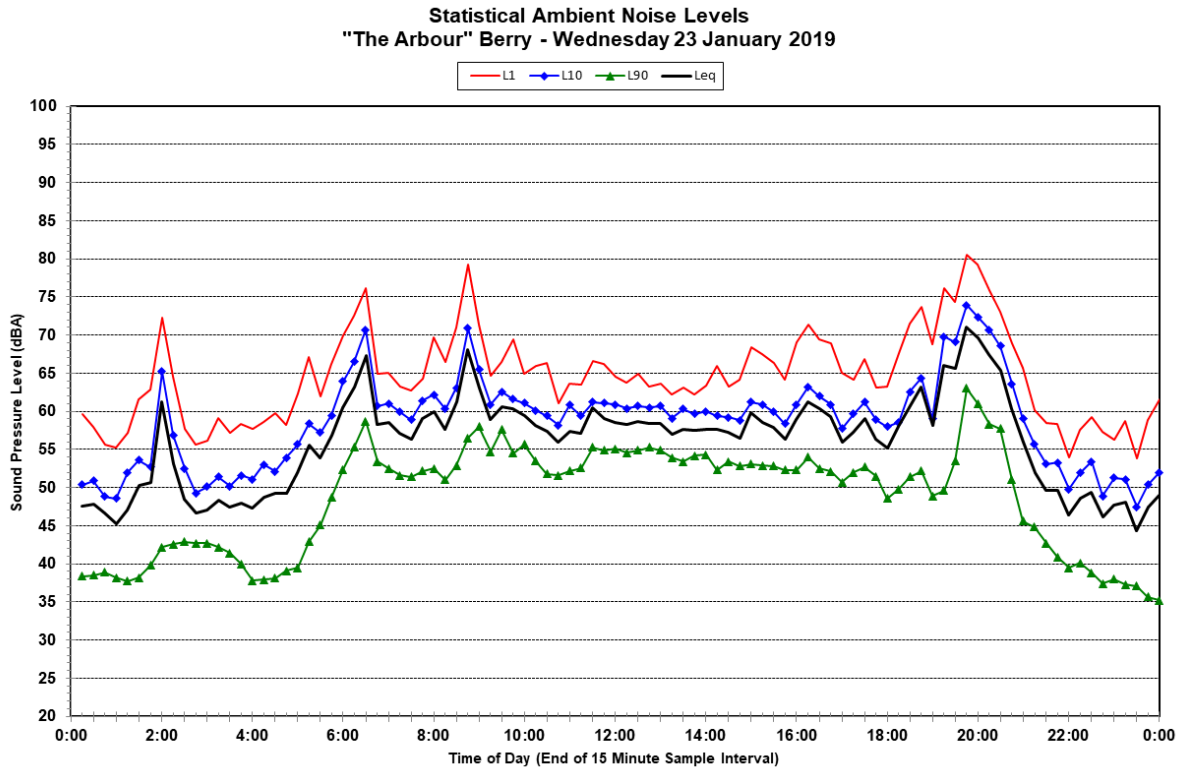


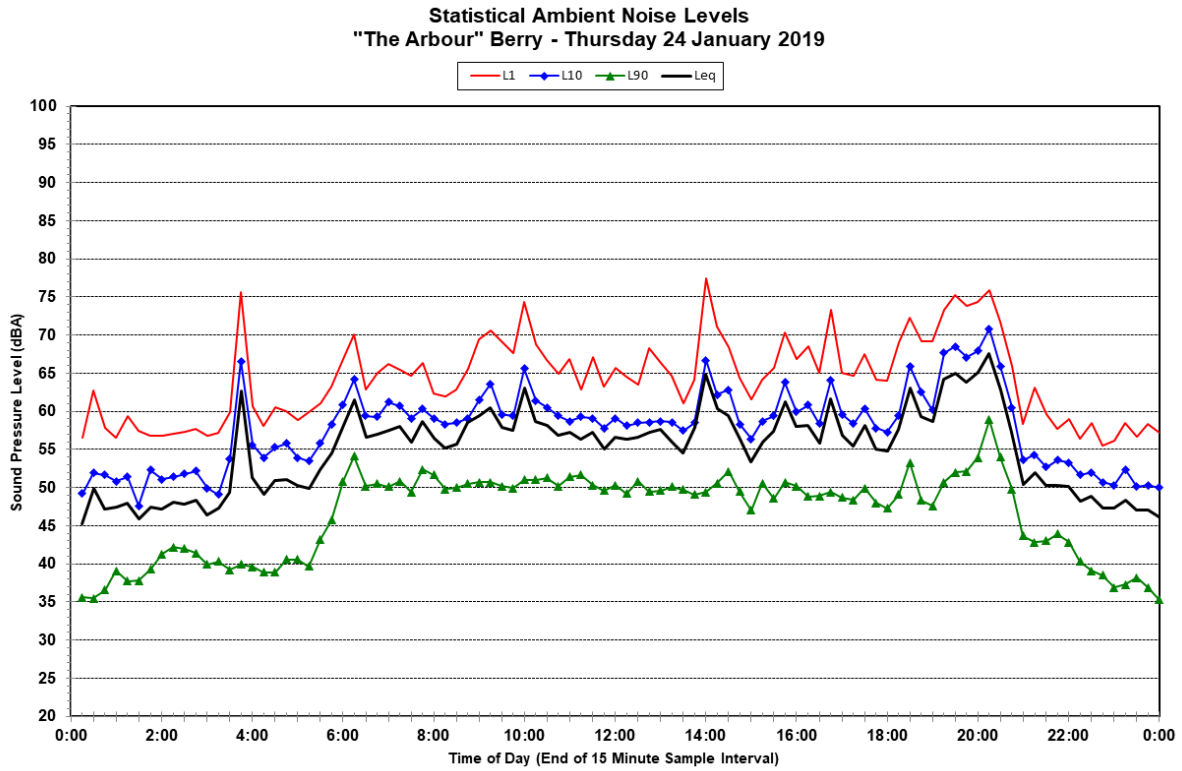


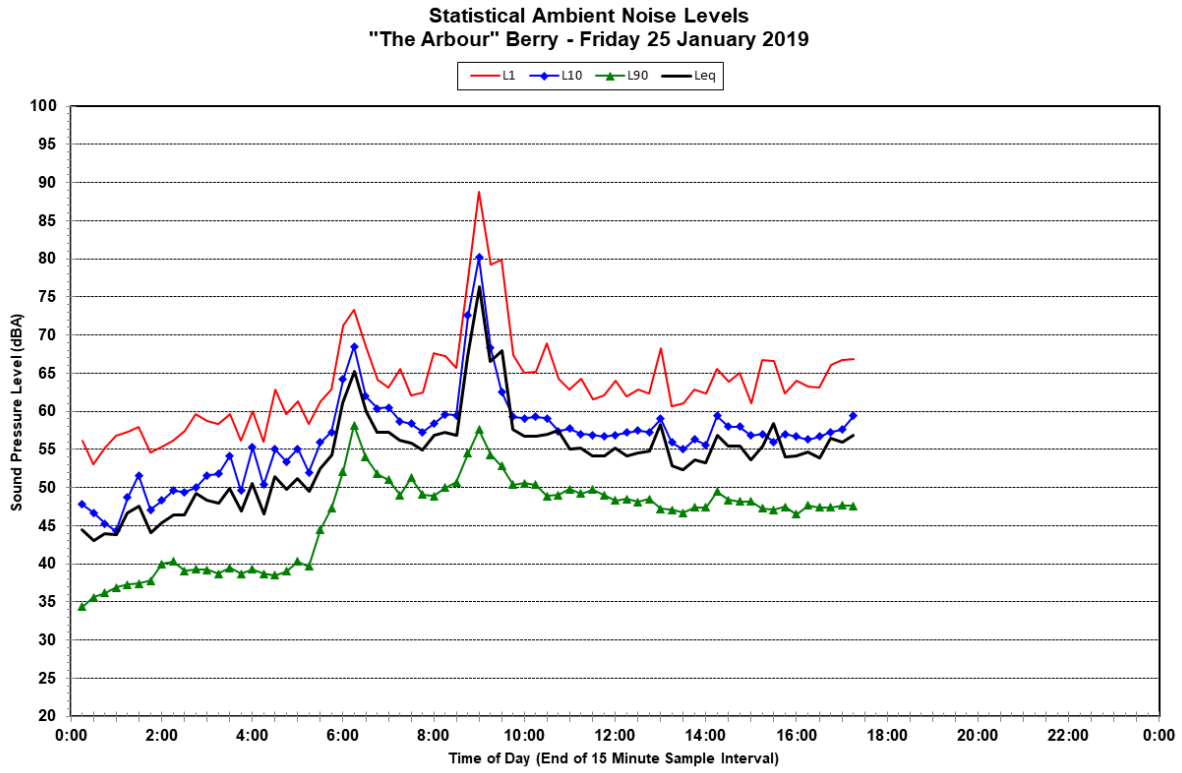

Statistical Ambient Noise Levels
"The Arbour" Berry - Sunday 20 January 2019
L1
L10
L90
Leq
Sound Pressure Level (dBA)
Time of Day (End of 15 Minute Sample Interval)


Statistical Ambient Noise Levels
"The Arbour" Berry - Monday 21 January 2019
L1
L10
L90
Leq
Sound Pressure Level (dBA)
Time of Day (End of 15 Minute Sample Interval)


Statistical Ambient Noise Levels
"The Arbour" Berry - Tuesday 22 January 2019
L1
L10
L90
Leq
Sound Pressure Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Time of Day (End of 15 Minute Sample Interval)


Statistical Ambient Noise Levels
"The Arbour" Berry - Wednesday 23 January 2019
L1
L10
L90
Leq
Sound Pressure Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Time of Day (End of 15 Minute Sample Interval)


Statistical Ambient Noise Levels
"The Arbour" Berry - Thursday 24 January 2019
L1
L10
L90
Leq
Sound Pressure Level (dBA)
Time of Day (End of 15 Minute Sample Interval)


Statistical Ambient Noise Levels
"The Arbour" Berry - Friday 25 January 2019
L1
L10
L90
Leq
Sound Pressure Level (dBA)
Time of Day (End of 15 Minute Sample Interval)