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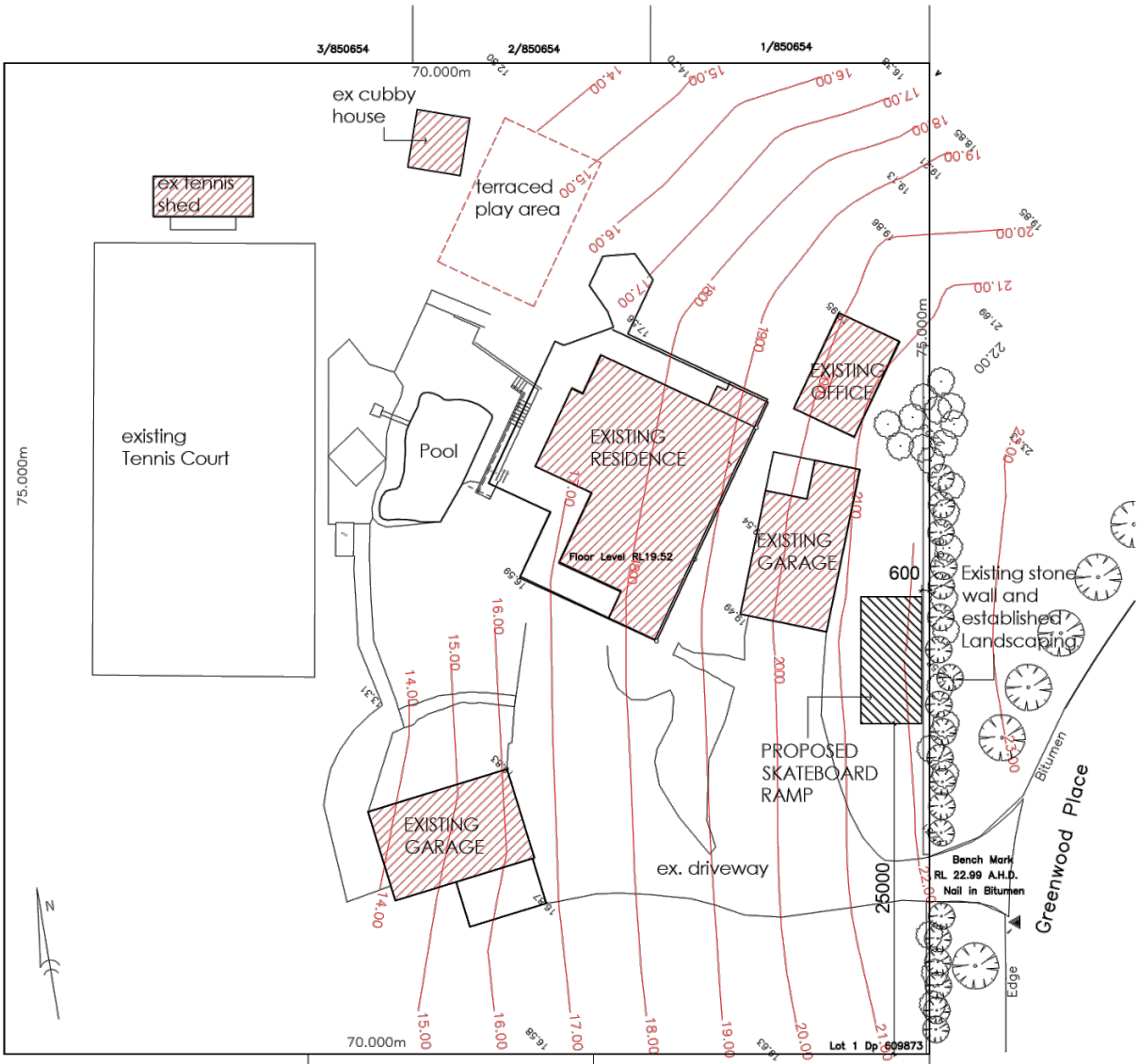
ballina shire council
geographical information system

Projection: GDA94 / MGA zone 56
Date: 7/08/2017



Notes

1. The purpose of these drawings is for Council Application Approvals only. Further details may be required for construction.
2. The work is to be in accordance with The Building Code of Australia and The Australian Standards and to the Satisfaction of the Local Authority or Building Certifier.

SITE PLAN

0 5m

B DA 1/6/17
no amendment date

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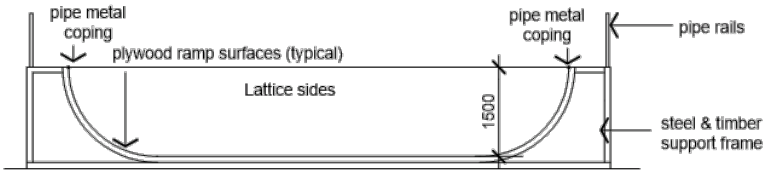
Proposed New Shed
at Lot 1 DP 609873
2-12 Greenwood Place
Lennox Head

Site Plan

scale 1:300 at A3
job no 201603 dwg no S1



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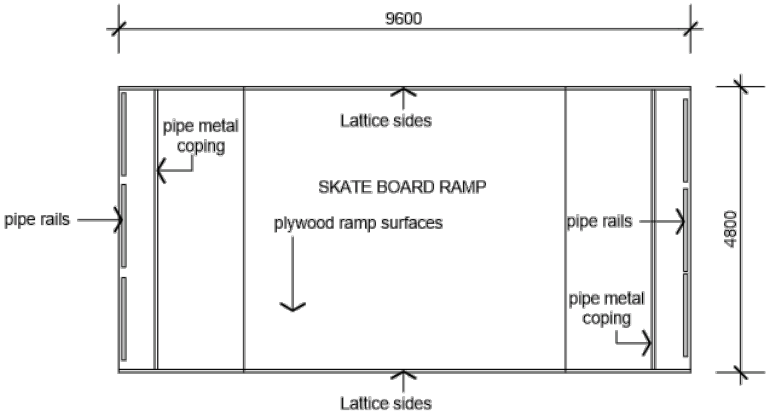

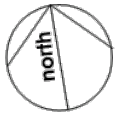

PLAN

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no	amendment	date
B	DA	1/6/17

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Proposed Alterations and Additions to a Residence at Lot 1 DP 609873
2-12 Greenwood Place
Lennox Head

Skate Board Ramp Plans & Elevations

scale *1:100 at A4*

job no *201603* dwg no *S02*

Noise Impact Assessment

Private Skate Ramp 2-12 Greenwood Place Lennox Head

HEALTH SCIENCE ENVIROMENTAL EDUCATION
ENVIRONMENTAL AUDITOR

Noise Impact Assessment

Private Skate Ramp 2-12 Greenwood Place Lennox Head

Prepared for: Vaughan O'Connor
Version: Final
Date: 7 June 2017
Job No. 35/2017
Tim Fitzroy & Associates
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1. Introduction

1.1 Purpose

Tim Fitzroy & Associates has been engaged by Newton Denny Chapelle to undertake a Noise Impact Assessment (NIA) to accompany a Development Application to Ballina Shire Council for a Private Skate Ramp at 2-12 Greenwood Place Lennox Head.

This report provides details on the noise assessment and modelling carried out by *Tim Fitzroy & Associates* and *Noise Measurement Services, Brisbane* to establish existing noise levels at the subject site and investigate potential noise impacts on surrounding residences from the use of the private skate ramp.

The purpose of this noise assessment is to:

1. Establish existing background noise levels across the subject site;
2. Examine the likely impacts from the use of the private skate ramp on sensitive receptors; and
3. Report on noise levels and provide recommendations to ensure that the noise impacts from the use of the private skate ramp on sensitive receptors will comply as far as practicable with the intent of the NSW EPA Noise Guidelines.

1.2 Applicable Noise Criteria

***Protection of the Environment Operations Act 1997* (POEO Act) and the Protection of the Environment Operations (Noise Control) Regulation 2008 (Noise Control Regulation)**

The *Protection of the Environment Operations Act 1997* (POEO Act) and the Protection of the Environment Operations (Noise Control) Regulation 2008 (Noise Control Regulation) provide the main legal framework and basis for managing unacceptable noise.

The POEO Act:

- identifies the authority responsible for regulating noise (s. 6 of the Act)
- defines 'noise' and 'offensive noise' (Dictionary in the Act)
- provides a range of regulatory tools to manage noise, including Noise Control Notices, Prevention Notices, Noise Abatement Directions and Noise Abatement Orders.

Depending on the circumstances, the Noise Control Regulation may require an assessment of a noise's audibility, time of occurrence, duration or offensiveness. The POEO Act does not always require noise to be measured to determine whether it is offensive. However, noise measurement can help in deciding what action, if any, is necessary.

1.2.1 Offensive Noise

Depending on the type of noise under consideration, noise can be considered as offensive in three ways according to it's:

- audibility
- duration
- inherently offensive characteristics.

Given the nature of the noise complaints, it will be necessary for Council to consider a range of factors to determine whether the noise is offensive, including the following:

- the loudness of the noise, especially compared with other noise in the area
- the character of the noise
- the time and duration of the noise
- whether the noise is typical for the area
- how often the noise occurs
- the number of people affected by the noise.

1.2.2 Intrusive Noise

Noise is identified as 'intrusive' if it is noticeably louder than the background noise and considered likely to disturb or interfere with those who can hear it.

1.2.3 Sleep Disturbance

Specific provisions relate to sleep disturbance and the World Health Organization recommends that a maximum level of 45 dB (A) should not be exceeded inside a bedroom. For practical purposes this is equivalent to a maximum level of 55 dB (A) outside a residence, with an open window to the bedroom (Guidelines for Community Noise WHO 1999).

1.3 Overview of Noise Assessment

This noise assessment establishes the existing background noise levels within the vicinity of the nearest affected sensitive receiver.

The noise assessment process included the following components:

- Measurement and determination of the existing background and ambient noise at the site;
- Consideration of potential noise impacts on surrounding residences; and
- Consideration of what feasible and reasonable noise mitigation measures ought to be considered where the project-specific noise levels are exceeded.

1.4 Site Description

The site is located approximately 1 km west of the centre of Lennox Head and about 300m north of the Coast Road.

A site locality diagram is provided in **Illustration 1.1**.

1.4.1 Topography

The private skate ramp is located at the highest point in the site at RL 22m. The site falls west to a level of about RL14m

1.4.2 Climate

Weather recording data was collected from the official Bureau of Meteorology (BOM) Weather Station at Ballina Airport. Observations were taken from the Ballina Airport weather station (13 to 15 May 2017) and, while they give an indication of the weather

conditions they are not representative of the exact conditions while on site. Rain fall and wind greater than 5km/hr was excluded from the noise monitoring results.

1.4.3 Surrounding Land use

The site adjoins residential development. The Coast Road is approximately 300m to the south.

1.5 Proposed Development

The private skate ramp is located forward of the front building line immediately adjacent to a stone fence. The development plans for the proposed private skate ramp are located in **Appendix A**).

Site Locality Plan

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2. Instrumentation

2.1 Noise Monitoring Equipment

Tim Fitzroy & Associates utilised the following equipment in this Noise Impact Assessment:

- A Type 2 Rion NL24 environmental noise logger; and
- A Type 1, 1/3 Octave Band Larson Davis Noise Meter with sound recording and event trigger features.

Calibration of the noise monitoring equipment was undertaken prior to use. To ensure no significant tonal drift occurred over the monitoring period, the calibration was checked before and after each measurement period.

2.2 Monitoring Methodology

Consistent with the purpose of the acoustic assessment, the aim of the noise monitoring process was to establish:

- The existing background and ambient noise at the site;
- An assessment of noise levels produced by the existing skate ramp operations;
- A description and the results of a computer model prepared to predict the impact of the skate ramp use on the environment;
- The computer model was calibrated using the results of the noise measurements taken on site. The results of the modelling are used to assess the noise impact of the private skate ramp use on existing neighbouring residences; and
- consideration of what feasible and reasonable noise mitigation measures ought to be considered where the project-specific noise levels are exceeded.

Long term noise monitoring was undertaken to establish the existing background noise environment at the subject site. Ambient sound pressure levels were measured generally in accordance with Australian Standard AS1055.1:1997 - 'Acoustics-Description and measurement of environmental noise - Part 1: General procedures'.

A Rion NL24, a type 2 environmental noise logger was placed at a measurement location ML1 to monitor the ambient noise levels, in continuous 15 minute intervals from 13 to 15 May 2017 to gather information of background noise during the day, evening and night. The microphone at each location was 1.35m above ground level.

Illustration 2.1 shows the location of the noise meter.

Noise Monitoring Locations

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3. Acoustic Assessment

3.1 The Decibel Scale

The human ear responds to sound pressure levels over a very wide range – the loudest sound pressure level to which the human ear responds is ten million times greater than the quietest. This large ratio is reduced to a more manageable size by the use of logarithms. To avoid scale which is too compressed a factor of ten is introduced, giving rise to the decibel. The following **Table 3.1** provides an indication of typical A-Weighted sound pressure levels measured in decibels with typical noise sources. The table provides a good reference when comparing decibel readings.

Table 3.1 Example noise sources and the corresponding A-weighted decibel levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
140	Long range gun, gunner's ear	
130	Threshold of pain	Extremely noisy to intolerable
120	Jet take-off at 100m	
110	Night club dance floor	
100	Loud car horn at 3 metres	Very noisy
90	Heavy truck at 10m	
80	Curbside of busy street	Loud
70	Car interior	
60	Normal conversation at 1m	Moderate to quiet
50	Office noise	
40	Living room in quiet area	Quiet to very quiet
30	Inside bedroom at night	
20	Unoccupied recording studio	Almost silent

The sensitivity of people to noise level changes varies from person to person. However generally, a change of up to 3 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness.

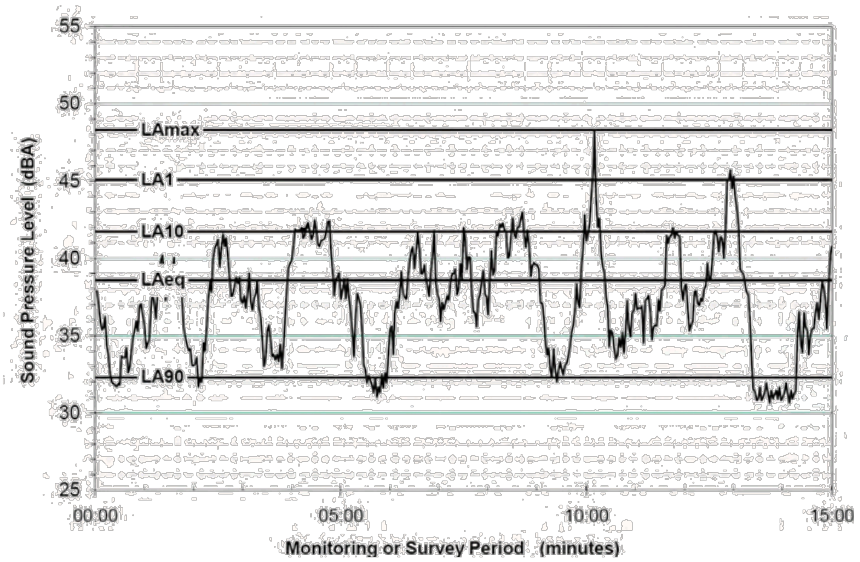
3.2 Acoustical Terms

This report makes reference to a number of different acoustical terms. Particularly the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} descriptors. Each descriptor is briefly explained below.

- The L_{Aeq} is essentially the average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time; varying sound over a defined measurement period.
- The L_{Amax} noise level is the maximum A-weighted noise level.
- The L_{A10} is the A-weighted sound pressure level exceeded 10% of a given measurement period and is utilised normally to characterise typical maximum noise levels.
- The L_{A90} noise level is the A-weighted sound pressure level exceeded 90% of a given measurement period and is representative of the average minimum background sound level (in the absence of the source under consideration), or simply the "background" level.

A graphical display of typical noise indices and the relationship between each noise descriptor is provided below in Figure 3.1.

Figure 3.1 Graphical Display of Typical Noise Indices



3.3 Existing Noise Environment

The primary noise observed while on site emanates from bird calls, and vehicular movements along The Coast road. Secondary noise sources impacting on the subject site observed were occasional vehicular movements along Greenwood Place. .

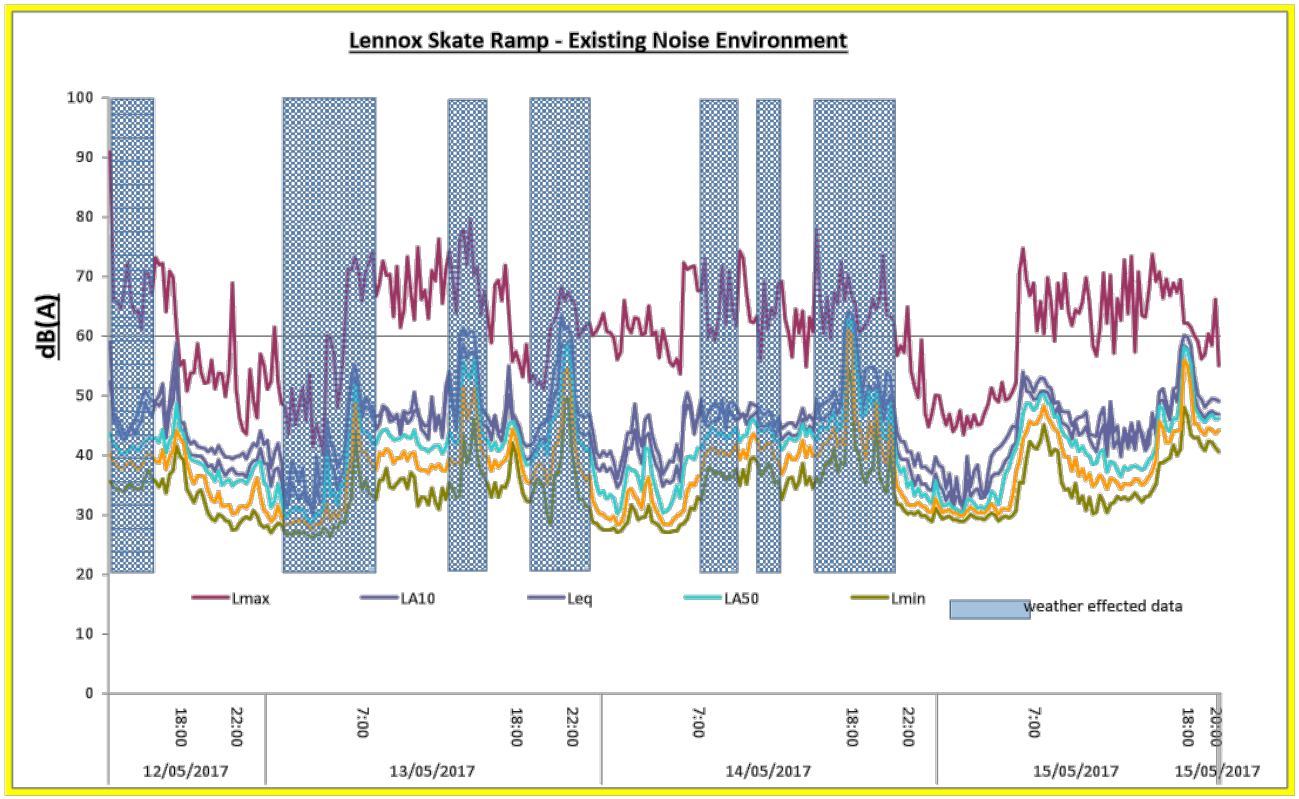
A summary of the results obtained from analysis of data from the background day, evening and night time noise monitoring is provided below in **Table 3.2**.
Full copies of the raw data for the monitoring site can be found in **Appendix B**.

Table 3.2 Background Sound Pressure Levels

Period	$L_{Aeq(period)}$*	RBL*	Intrusive Noise Criteria RBL+5 dB
(1)	(2)	(3)	
Day	*46*	*37*	***42***
Evening	*41*	*34*	***39***
Night	*42*	*29*	***34***

As can be seen from the above table, the existing Laeq exceeds the intrusive noise criteria project fro all time periods for the day and evening. The ambient and background noise levels (without skate ramp in use) measured at ML1 over the monitoring period are presented in **Figure 3.2**.

Figure 3.2 Ambient and Background Noise Levels at Measurement Location ML1



3.4 Impact of Private Skate Ramp Use on Surrounding Neighbours

3.4.1 Noise Modelling

Noise levels from the existing skate ramp at 2 Greenwood Place, Lennox Head have been predicted at surrounding neighbours using SoundPLAN v7.0 and the prediction methodology *ISO9613-2: 1996.* Sound power levels used in the noise model have been calculated from on-site measurements of the subject noise source.

All prediction models have limits to their accuracy of prediction. This is due to the inherent nature of the calculation algorithms that go into the design of the models, the assumptions made in the implementation of the model, and the availability of good source sound power data. Various researchers have suggested that an un-calibrated model has an accuracy of ±5 dB while a calibrated model has an accuracy of ±2 dB. ISO 9613-2 has an estimated accuracy for broadband noise of ±3 dB at 1000 metres. Calibration means that the model has been established with reference to measured sound levels at a receiver, known source levels and tightly defined propagation variables (wind speed and direction, for example). Alternatively, a series of predictions with different programs but the same assumption variables can be used for verification purposes.

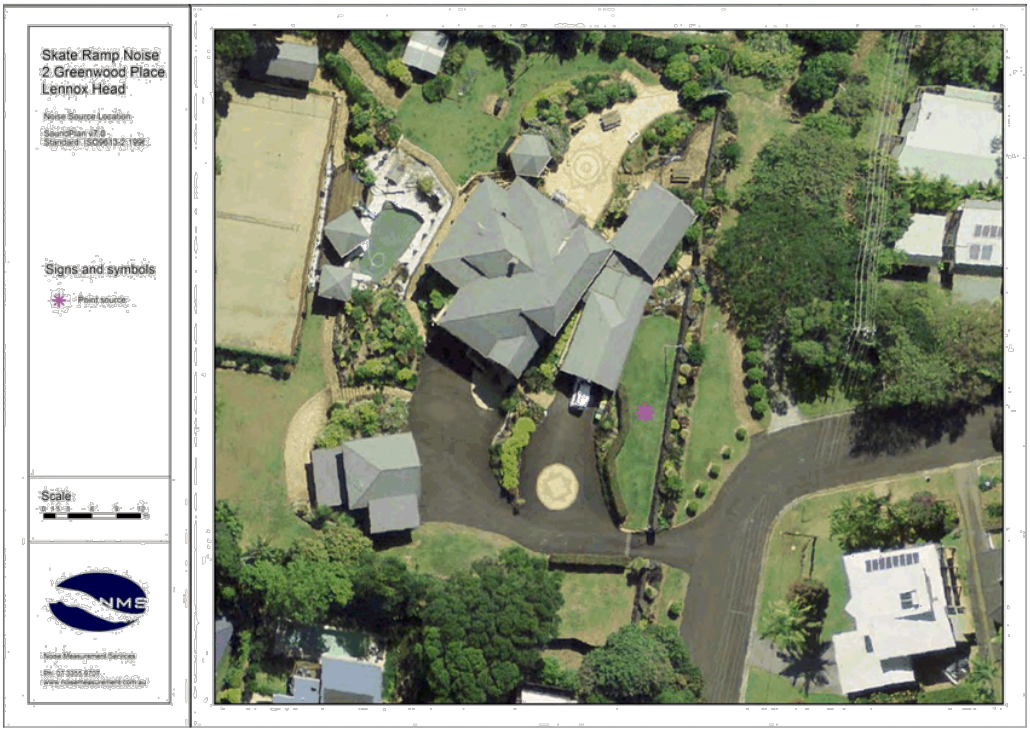
3.4.2 Noise Source Levels

Source levels have been calculated from on-site noise measurements and are presented in **Table 3.3.** The L_{eaq} noise source represents the average noise level of general skating on the ramp over time. The L_{max} noise source represents the instantaneous noise level of the loudest aspects of the activity, i.e. impact noise from 'dropping-in' and tapping of the metal on the lip of the ramp. The noise sources used in the model are positioned as shown in **Plate 3.1.**

Table 3.3 Noise Sources

Description	dB(Z)										
	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz	Sum
Skating on ramp (L_{eq})	80	83	78	75	71	65	61	60	55	46	86
Drop In / Tapping (L_{max})	98	99	104	101	95	90	84	77	67	55	107

Plate 3.1 **Location of noise sources**



3.4.3 Sensitive Receptors

Several receptor points have been placed at the most exposed facades of dwellings surrounding the subject site. The receptor locations are presented in **Table 3.4** and **Plate 3.2.**

Table 3.4 **Sensitive receptors**

Receptor	Address	Facade
1	Sunrise Crescent, 01 (2/2)	N
2	Sunrise Crescent, 01 (2/2)	W
3	Sunrise Crescent, 01 (1/2)	W
4	Greenwood Place, 14	N
5	Greenwood Place, 16	N
6	Greenwood Place, 18	NE
7	Cooloola Avenue, 11	N
8	Cooloola Avenue, 09	E
9	Cooloola Avenue, 07	E
10	Cooloola Avenue, 05	E
11	Cooloola Avenue, 03	SE
12	Lakefield Avenue, 05	S
13	Lakefield Avenue, 03	S

14	Lakefield Avenue, 01	S
15	Sunrise Crescent, 02	S

Plate 3.2 Location of sensitive receptors

3.4.4 Weather Conditions

Noise modeling has been made using the prediction methodology *ISO9613-2: 1996* which, by default, presents noise levels at the receiver for meteorological conditions which are favourable for propagation from the sound source to the receiver.

The predicted noise levels are considered to represent the average propagation under meteorological conditions including wind and temperature inversion.

3.4.5 Model Verification

The noise model has been validated against an on-site measurement taken 4m from the skate ramp as presented in **Table 3.5**. A receptor is placed in the L_{eq} noise model at the test location 4m from the noise source. The two methods predict within 1dB(A) at the measurement location which presents a good level of fit between the predictions.

Table 3.5 Model Verification

Source to Receptor (m)	Measured (dB(A) L_{eq})	SoundPLAN (dB(A) L_{eq})	Difference (dB(A))
4	52.6	52.7	+0.1

3.4.6 Calculation of Noise Levels

Predicted noise levels from skate ramp activities are made to each receptor for L_{eq} and L_{max} noise levels. Predicted L_{eq} noise levels are assessed against intrusiveness criteria of RBL + 5dB, while predicted L_{max} noise levels are assessed against sleep disturbance criteria RBL + 15dB. Predicted noise levels and assessment are presented in **Table 3.6 and Table 3.7.** Visual noise contours are presented in **Plates 3.3 and 3.4.**

Table 3.6 Predicted L_{eq} noise levels are assessed against intrusiveness criteria RBL + 5dB. Levels are in dB(A), façade-affected.

Receptor			Noise Level (dB(A) L_{eq})		Within Criteria?		
#	Address	Facade	Ground Floor	First Floor	Day (42dB(A))	Evening (39dB(A))	Night (35dB(A))
1	Sunrise Crescent, 01 (2/2)	N	29	30	PASS	PASS	PASS
2	Sunrise Crescent, 01 (2/2)	W	29	31	PASS	PASS	PASS
3	Sunrise Crescent, 01 (1/2)	W	28	27	PASS	PASS	PASS
4	Greenwood Place, 14	N	30	-	PASS	PASS	PASS
5	Greenwood Place, 16	N	28	-	PASS	PASS	PASS
6	Greenwood Place, 18	NE	22	-	PASS	PASS	PASS
7	Cooloola Avenue, 11	N	20	-	PASS	PASS	PASS
8	Cooloola Avenue, 09	E	19	-	PASS	PASS	PASS
9	Cooloola Avenue, 07	E	23	-	PASS	PASS	PASS
10	Cooloola Avenue, 05	E	14	-	PASS	PASS	PASS
11	Cooloola Avenue, 03	SE	10	-	PASS	PASS	PASS
12	Lakefield Avenue, 05	S	10	12	PASS	PASS	PASS
13	Lakefield Avenue, 03	S	11	15	PASS	PASS	PASS
14	Lakefield Avenue, 01	S	13	17	PASS	PASS	PASS
15	Sunrise Crescent, 02	S	26	27	PASS	PASS	PASS

Table 3.7 Predicted Lmax noise levels are assessed against sleep disturbance criteria RBL + 15dB. Levels are in dB(A), façade-affected.

Receptor			Noise Level (dB(A) L_{eq})		Within Criteria?
#	Address	Facade	Ground Floor	First Floor	Night (45dB(A) L_{max})
1	Sunrise Crescent, 01 (2/2)	N	53	55	+10
2	Sunrise Crescent, 01 (2/2)	W	54	55	+10
3	Sunrise Crescent, 01 (1/2)	W	53	51	+8
4	Greenwood Place, 14	N	54	-	+10
5	Greenwood Place, 16	N	52	-	+7
6	Greenwood Place, 18	NE	46	-	+1
7	Cooloola Avenue, 11	N	45	-	PASS
8	Cooloola Avenue, 09	E	46	-	+1
9	Cooloola Avenue, 07	E	47	-	+2
10	Cooloola Avenue, 05	E	38	-	PASS
11	Cooloola Avenue, 03	SE	34	-	PASS
12	Lakefield Avenue, 05	S	34	36	PASS
13	Lakefield Avenue, 03	S	36	40	PASS
14	Lakefield Avenue, 01	S	37	42	PASS
15	Sunrise Crescent, 02	S	50	51	+6

Plate 3.3 **Noise contours at 1.8m above ground, dB (A) L_{eq}, free-field**

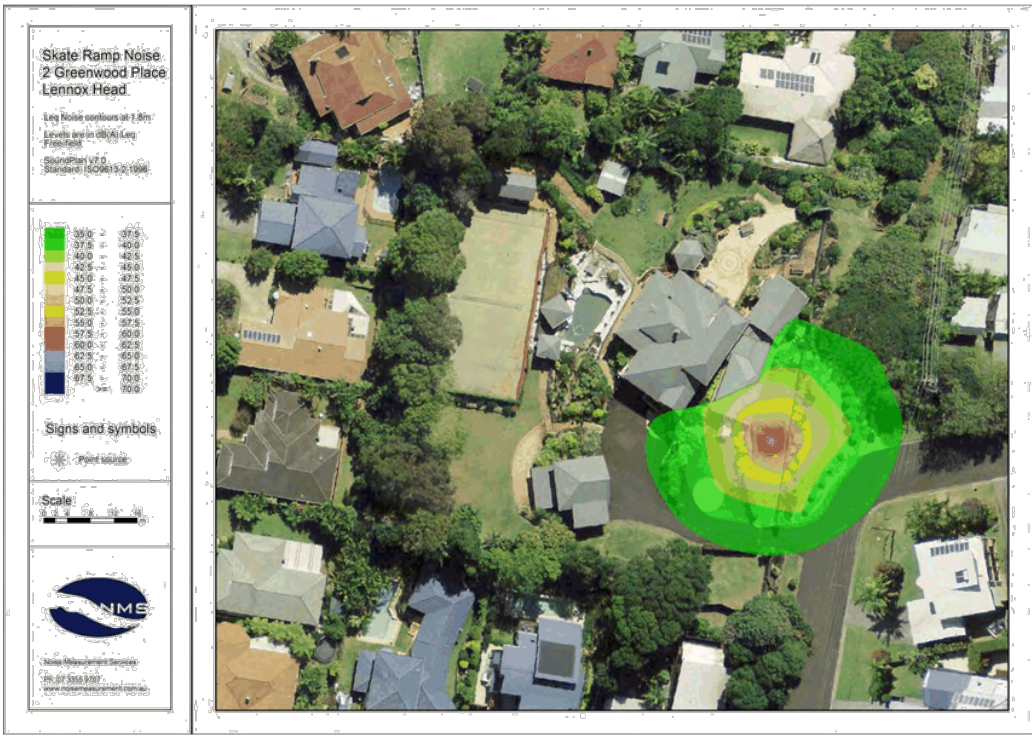
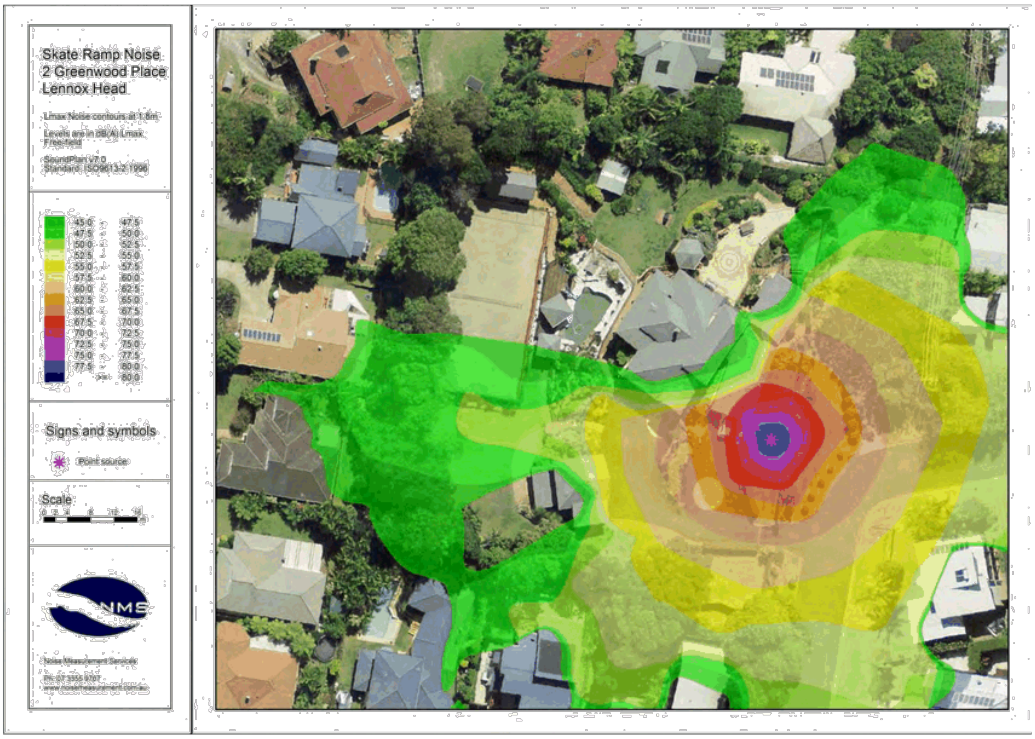


Plate 3.4 Noise contours at 1.8m above ground, dB(A) Lmax, free-field.

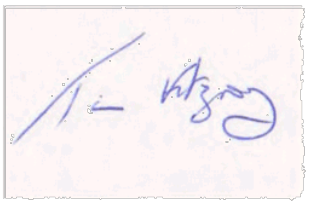


4. Conclusion

A noise model has been constructed to predict the propagation of noise from the use of a Private Skate Ramp at 2-12 Greenwood Place Lennox Head on neighbouring dwellings. The model includes shielding effects from surrounding buildings and topography. Topography information included in the model was sourced from the NSW Six Maps service (10m contours) and from dwelling site-plan (2m contours surrounding the dwelling).

- The model includes shielding effects from surrounding buildings and topography. Topography information included in the model was sourced from the NSW Six Maps service (10m contours) and from the dwelling site-plan (0.25m contours surrounding the dwelling).
- Average noise levels from skate ramp activities are predicted to be within the intrusiveness criteria at all receptors during all time periods.
- L_{max} noise events from skate ramp activities are predicted to exceed the sleep disturbance criteria by up to 10dB(A) at surrounding dwellings. It is assumed that these noise events (i.e. impact noise from 'dropping-in' and tapping of the metal on the lip of the ramp) will occur regularly while the skate ramp is in use, therefore use of the skate ramp during night-time hours is not recommended.

This report has been prepared by Tim Fitzroy of *Tim Fitzroy & Associates* and Matt Dever of *Noise Measurement Services, Brisbane*



Tim Fitzroy
Environmental Health Scientist

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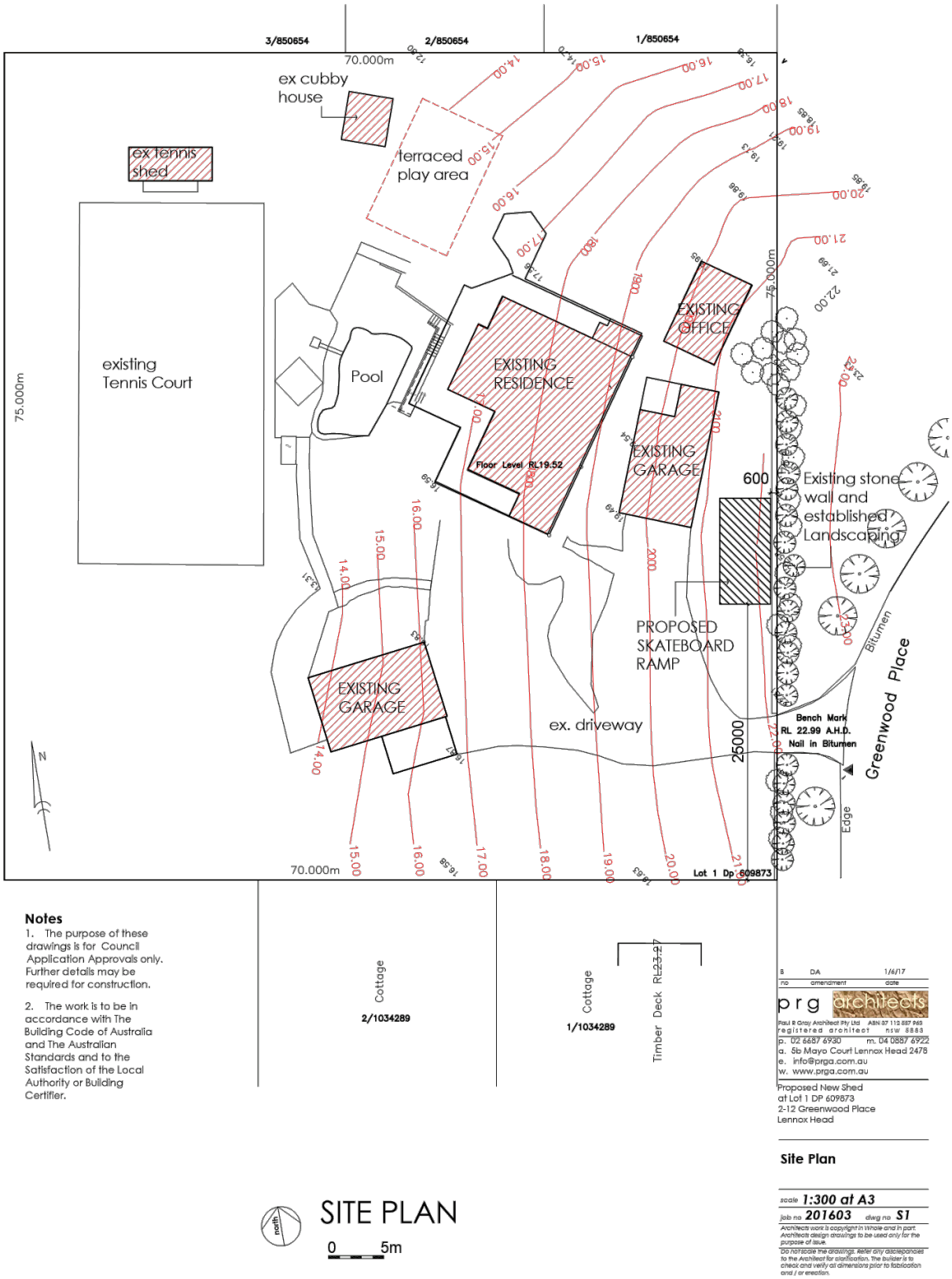
A Development Plan


3/850654
2/850654
1/850654
70.000m
ex cubby house
ex tennis shed
terraced play area
existing Tennis Court
Pool
EXISTING RESIDENCE
Floor Level RL19.52
EXISTING OFFICE
EXISTING GARAGE
EXISTING GARAGE
PROPOSED SKATEBOARD RAMP
ex. driveway
600
Existing stone wall and established Landscaping
Bitumen
Greenwood Place
Bench Mark RL 22.99 A.H.D. Nail in Bitumen
Edge
25000
75.000m
Lot 1 Dp 609873
Cottage
2/1034289
Cottage
1/1034289
Timber Deck RL23.27
N
Notes
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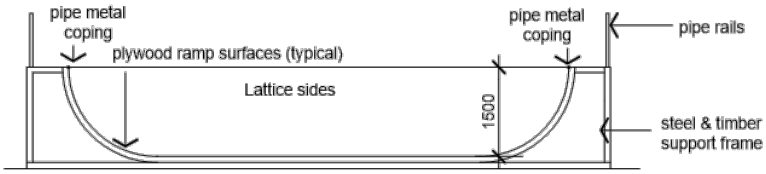
north
SITE PLAN
0 5m



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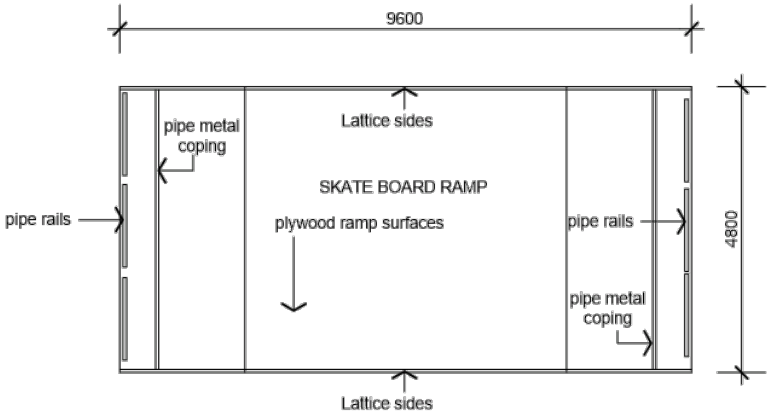

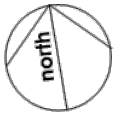

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0 5m

no	amendment	date
B	DA	1/6/17

prg architects
Paul R Gray Architect Pty Ltd ABN 37 112 557 963
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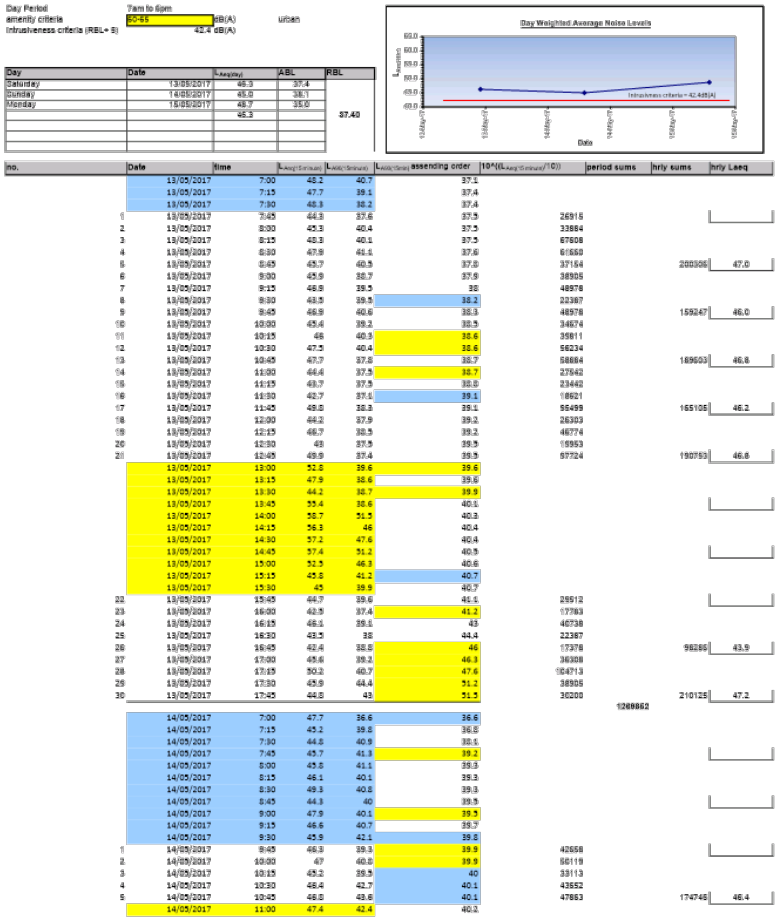
Proposed Alterations and Additions to a Residence at Lot 1 DP 609873
2-12 Greenwood Place
Lennox Head

Skate Board Ramp Plans & Elevations

scale *1:100 at A4*
job no *201603* dwg no *S02*

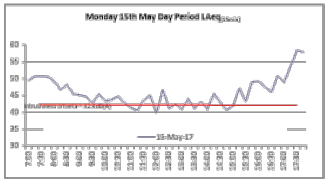
B Noise Data

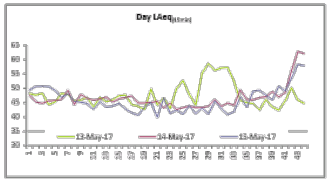


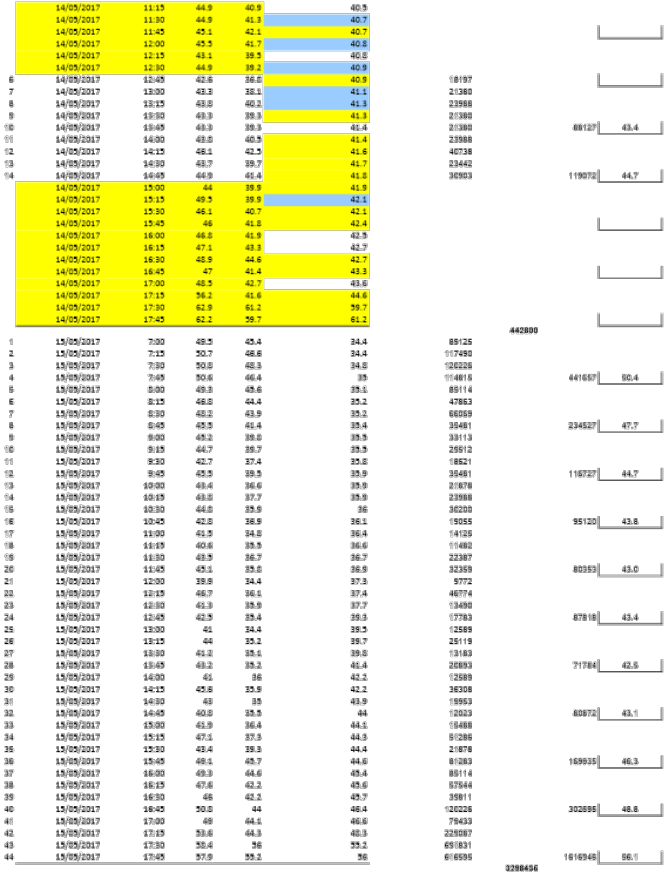
Day Period	7am to 6pm		
amenity criteria	50-55	dB(A)	urban
intrusiveness criteria (RBL+ 5)		42.4 dB(A)	

Day	Date	$L_{Aeq(day)}$	ABL	RBL
Saturday	13/05/2017	46.3	37.4	
Sunday	14/05/2017	45.8	38.1	
Monday	15/05/2017	48.7	35.0	
		46.3		37.40

no.	Date	time	$L_{Aeq(15minute)}$	$L_{ASK(15min)}$	$L_{ASK(15min)}$	assending order	$10^{(L_{Aeq(15minute)}/10)}$	period sums	hrly sums	hrly Leq
	13/05/2017	7:00	48.2	40.7		37.1				
	13/05/2017	7:15	47.7	39.1		37.4				
	13/05/2017	7:30	45.3	38.2		37.4				
1	13/05/2017	7:45	44.3	37.6		37.5	26915			
2	13/05/2017	8:00	45.3	40.4		37.5	33884			
3	13/05/2017	8:15	45.3	40.1		37.5	67608			
4	13/05/2017	8:30	47.9	41.1		37.6	61650			
5	13/05/2017	8:45	45.7	40.5		37.8	37154		288306	47.0
6	13/05/2017	9:00	45.9	38.7		37.9	38905			
7	13/05/2017	9:15	46.8	39.5		38	48978			
8	13/05/2017	9:30	43.5	39.5		38.2	22387			
9	13/05/2017	9:45	46.9	40.6		38.3	48978		159247	46.0
10	13/05/2017	10:00	45.4	39.2		38.5	34674			
11	13/05/2017	10:15	46	40.3		38.6	39811			
12	13/05/2017	10:30	47.5	40.4		38.6	56234			
13	13/05/2017	10:45	47.7	37.8		38.7	58884		189603	46.8
14	13/05/2017	11:00	44.4	37.5		38.7	27542			
15	13/05/2017	11:15	43.7	37.5		38.8	23442			
16	13/05/2017	11:30	42.7	37.5		39.1	18621			
17	13/05/2017	11:45	46.6	38.8		39.1	56499		165105	46.2
18	13/05/2017	12:00	44.2	37.5		39.2	26303			
19	13/05/2017	12:15	46.7	38.5		39.2	46774			
20	13/05/2017	12:30	43	37.5		39.5	19953			
21	13/05/2017	12:45	46.9	37.4		39.5	97724		190753	46.8
	13/05/2017	13:00	52.8	39.6		39.6				
	13/05/2017	13:15	47.9	38.6		39.6				
	13/05/2017	13:30	44.2	38.7		39.9				
	13/05/2017	13:45	55.4	38.6		40.1				
	13/05/2017	14:00	58.7	51.5		40.3				
	13/05/2017	14:15	56.3	46		40.4				
	13/05/2017	14:30	57.2	47.6		40.4				
	13/05/2017	14:45	57.4	51.2		40.5				
	13/05/2017	15:00	52.5	46.3		40.6				
	13/05/2017	15:15	45.6	41.2		40.7				
	13/05/2017	15:30	45	39.9		40.7				
22	13/05/2017	15:45	44.7	39.6		41.1	29512			
23	13/05/2017	16:00	42.5	37.4		41.2	17783			
24	13/05/2017	16:15	46.1	39.5		43	40738			
25	13/05/2017	16:30	43.5	38		44.4	22387			
26	13/05/2017	16:45	42.4	38.8		46	17378		98286	43.9
27	13/05/2017	17:00	45.6	39.2		46.3	36308			
28	13/05/2017	17:15	50.2	40.7		47.6	104713			
29	13/05/2017	17:30	45.9	44.4		51.2	38905			
30	13/05/2017	17:45	44.8	43		51.5	30200		210125	47.2
								1289852		
	14/05/2017	7:00	47.7	36.6		36.6				
	14/05/2017	7:15	45.2	39.8		36.8				
	14/05/2017	7:30	44.8	40.9		38.1				
	14/05/2017	7:45	45.7	41.3		39.2				
	14/05/2017	8:00	45.8	41.1		39.3				
	14/05/2017	8:15	46.1	40.1		39.3				
	14/05/2017	8:30	49.3	40.8		39.3				
	14/05/2017	8:45	44.3	40		39.5				
	14/05/2017	9:00	47.9	40.1		39.5				
	14/05/2017	9:15	46.6	40.7		39.7				
	14/05/2017	9:30	45.9	42.1		39.8				
1	14/05/2017	9:45	46.3	39.3		39.9	42656			
2	14/05/2017	10:00	47	40.8		39.9	50119			
3	14/05/2017	10:15	45.2	39.5		40	33113			
4	14/05/2017	10:30	46.4	42.7		40.1	43652			
5	14/05/2017	10:45	48.8	43.6		40.1	47853		174746	46.4
	14/05/2017	11:00	47.4	42.4		40.2				



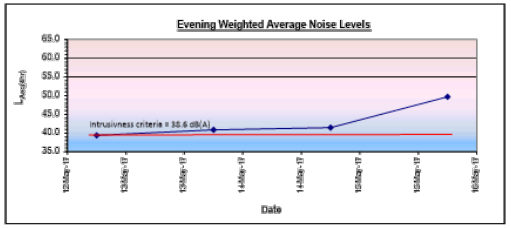


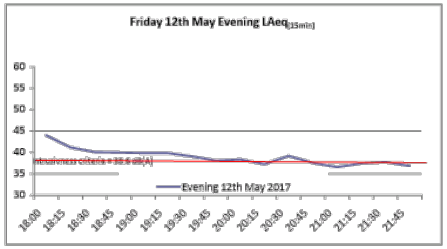


	14/05/2017	11:15	44.9	40.9	40.9				
	14/05/2017	11:30	44.9	41.3	40.7				
	14/05/2017	11:45	45.1	42.1	40.7				
	14/05/2017	12:00	45.5	41.7	40.8				
	14/05/2017	12:15	43.1	39.5	40.8				
	14/05/2017	12:30	44.9	39.2	40.9				
6	14/05/2017	12:45	42.6	36.8	40.9	18197			
7	14/05/2017	13:00	43.3	38.1	41.1	21380			
8	14/05/2017	13:15	43.6	40.2	41.3	23988			
9	14/05/2017	13:30	43.3	39.3	41.3	21380			
10	14/05/2017	13:45	43.3	39.3	41.4	21380	88127	43.4	
11	14/05/2017	14:00	43.6	40.5	41.4	23988			
12	14/05/2017	14:15	46.1	42.5	41.6	40738			
13	14/05/2017	14:30	43.7	39.7	41.7	23442			
14	14/05/2017	14:45	44.9	41.4	41.8	36903	119972	44.7	
	14/05/2017	15:00	44	39.9	41.9				
	14/05/2017	15:15	49.5	39.9	42.1				
	14/05/2017	15:30	46.1	40.7	42.1				
	14/05/2017	15:45	46	41.8	42.4				
	14/05/2017	16:00	46.8	41.9	42.5				
	14/05/2017	16:15	47.1	43.3	42.7				
	14/05/2017	16:30	45.9	44.6	42.7				
	14/05/2017	16:45	47	41.4	43.3				
	14/05/2017	17:00	48.5	42.7	43.6				
	14/05/2017	17:15	56.2	41.6	44.6				
	14/05/2017	17:30	62.9	61.2	59.7				
	14/05/2017	17:45	62.2	59.7	61.2				
							442890		
1	15/05/2017	7:00	48.5	45.4	34.4	88125			
2	15/05/2017	7:15	50.7	48.6	34.4	117490			
3	15/05/2017	7:30	50.8	48.3	34.8	120226			
4	15/05/2017	7:45	50.6	46.4	35	114815	441657	50.4	
5	15/05/2017	8:00	49.3	45.6	35.1	88114			
6	15/05/2017	8:15	48.8	44.4	35.2	47863			
7	15/05/2017	8:30	48.2	43.9	35.2	66059			
8	15/05/2017	8:45	45.5	41.4	35.4	35481	234527	47.7	
9	15/05/2017	9:00	45.2	39.8	35.5	33113			
10	15/05/2017	9:15	44.7	39.7	35.5	29512			
11	15/05/2017	9:30	42.7	37.4	35.8	18521			
12	15/05/2017	9:45	45.5	39.5	35.9	35481	116727	44.7	
13	15/05/2017	10:00	43.4	36.6	35.9	20678			
14	15/05/2017	10:15	48.8	37.7	35.9	23988			
15	15/05/2017	10:30	44.8	35.9	36	36238			
16	15/05/2017	10:45	42.8	36.9	36.1	19055	95120	43.8	
17	15/05/2017	11:00	41.5	34.8	36.4	14125			
18	15/05/2017	11:15	40.6	35.5	36.6	11482			
19	15/05/2017	11:30	43.5	36.7	36.7	22387			
20	15/05/2017	11:45	45.1	35.6	36.9	32358	80353	43.0	
21	15/05/2017	12:00	39.9	34.4	37.3	9772			
22	15/05/2017	12:15	46.7	36.1	37.4	46774			
23	15/05/2017	12:30	41.3	35.9	37.7	13490			
24	15/05/2017	12:45	42.5	35.4	39.3	17783	87818	43.4	
25	15/05/2017	13:00	41	34.4	39.5	12589			
26	15/05/2017	13:15	44	35.2	39.7	25119			
27	15/05/2017	13:30	41.2	35.1	39.8	13183			
28	15/05/2017	13:45	43.2	35.2	41.4	26693	77784	42.5	
29	15/05/2017	14:00	41	36	42.2	12589			
30	15/05/2017	14:15	45.6	35.9	42.2	36308			
31	15/05/2017	14:30	43	35	43.9	19953			
32	15/05/2017	14:45	40.8	35.5	44	12023	68972	43.1	
33	15/05/2017	15:00	41.9	36.4	44.1	18488			
34	15/05/2017	15:15	47.1	37.5	44.3	50285			
35	15/05/2017	15:30	43.4	39.3	44.4	21878			
36	15/05/2017	15:45	48.1	45.7	44.6	61383	169935	46.3	
37	15/05/2017	16:00	49.3	44.6	45.4	88114			
38	15/05/2017	16:15	47.6	42.2	45.6	57544			
39	15/05/2017	16:30	46	42.2	45.7	35811			
40	15/05/2017	16:45	50.8	44	46.4	120226	302695	48.8	
41	15/05/2017	17:00	49	44.1	46.6	79433			
42	15/05/2017	17:15	53.6	44.3	48.3	229087			
43	15/05/2017	17:30	53.4	56	55.2	691831			
44	15/05/2017	17:45	57.9	55.2	56	616595	1616948	56.1	
							3298456		

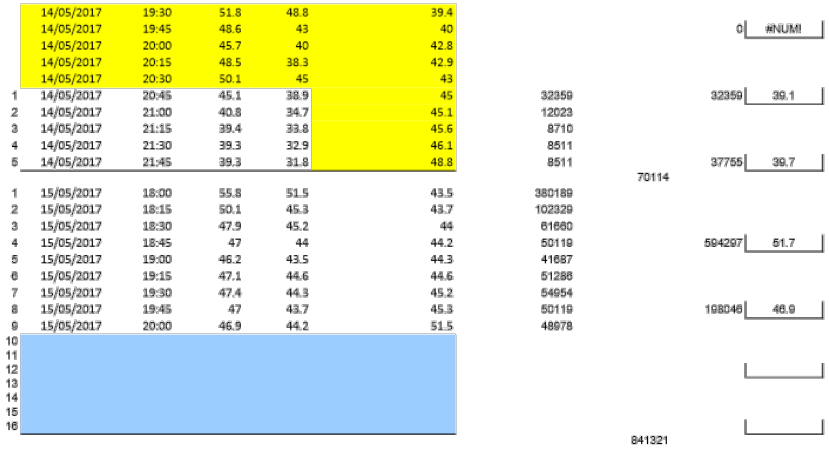
Evening Period 6pm to 10pm
amenity criteria 50-55 dB(A) urban
Intrusiveness criteria (RBL+ 5) 38.6 dB(A)

Day	Date	$L_{Aeq(evening)}$	ABL	RBL
Friday Evening	12/05/2017	39.4	30.3	
Saturday Evening	13/05/2017	40.9	35.3	
Sunday Evening	14/05/2017	41.5	31.8	
Monday Evening	15/05/2017	49.7	43.5	33.6
		41.2		





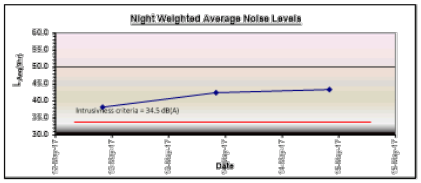
no.	Date	time	$L_{Aeq(15\ minute)}$	$L_{A90(15minute)}$	$L_{A90(15min)}$ assending order	$10^{((L_{Aeq(15\ minute)}/10))}$	period sums	hrly sums	hrly Laeq
1	12/05/2017	18:00	44	42.1	30.2	25119			
2	12/05/2017	18:15	41.2	38.6	30.3	13183			
3	12/05/2017	18:30	40.1	36.5	31.5	10233			
4	12/05/2017	18:45	40	35.3	31.5	10000		58534	41.7
5	12/05/2017	19:00	39.9	36.6	31.7	9772			
6	12/05/2017	19:15	39.9	36.6	32.2	9772			
7	12/05/2017	19:30	39.1	36.4	32.6	8128			
8	12/05/2017	19:45	38.1	34.1	33.8	6457		34130	39.3
9	12/05/2017	20:00	38.4	32.6	34.1	6918			
10	12/05/2017	20:15	37.3	32.2	35.3	5370			
11	12/05/2017	20:30	39.2	33.8	36.4	8318			
12	12/05/2017	20:45	37.6	31.5	36.5	5754		26361	38.2
13	12/05/2017	21:00	36.6	31.5	36.6	4571			
14	12/05/2017	21:15	37.5	31.7	36.6	5623			
15	12/05/2017	21:30	37.8	30.2	38.6	6026			
16	12/05/2017	21:45	36.9	30.3	42.1	4898		21118	37.2
							140142		
1	13/05/2017	18:00	43.2	40.2	35.2	20893			
2	13/05/2017	18:15	40.3	37.3	35.3	10715			
3	13/05/2017	18:30	39.2	35.7	35.7	8318			
4	13/05/2017	18:45	39.5	35.3	36.3	8913		48838	40.9
5	13/05/2017	19:00	40.4	36.3	36.8				
6	13/05/2017	19:15	41.2	38	37.3				
7	13/05/2017	19:30	42.7	38.6	38				
8	13/05/2017	19:45	42.8	38.2	38.2				
9	13/05/2017	20:00	42.2	35.2	38.6				
10	13/05/2017	20:15	47	36.8	40.2				
11	13/05/2017	20:30	50.1	41.5	41.5				
12	13/05/2017	20:45	51.2	42.1	42.1				
13	13/05/2017	21:00	58.8	45	45				
14	13/05/2017	21:15	58.1	53.8	47.8				
15	13/05/2017	21:30	59.1	54.6	53.8				
16	13/05/2017	21:45	55.3	47.8	54.6				
							48838		
	14/05/2017	18:00	57.8	46.1	31.8				
	14/05/2017	18:15	52.4	45.1	32.9				
	14/05/2017	18:30	47.4	42.9	33.8				
	14/05/2017	18:45	50	39.4	34.7			0	#NUM!
	14/05/2017	19:00	51.6	45.6	38.3				
	14/05/2017	19:15	50.9	42.8	38.9				

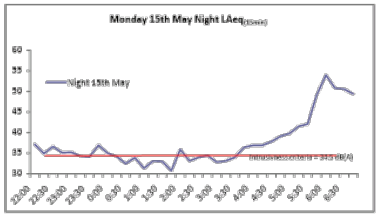


	14/05/2017	19:30	51.8	48.8	39.4			0	#NUM!
	14/05/2017	19:45	48.6	43	40				
	14/05/2017	20:00	45.7	40	42.8				
	14/05/2017	20:15	48.5	38.3	42.9				
	14/05/2017	20:30	50.1	45	43				
1	14/05/2017	20:45	45.1	38.9	45	32359		32359	39.1
2	14/05/2017	21:00	40.8	34.7	45.1	12023			
3	14/05/2017	21:15	39.4	33.8	45.6	8710			
4	14/05/2017	21:30	39.3	32.9	46.1	8511			
5	14/05/2017	21:45	39.3	31.8	48.8	8511		37755	39.7
							70114		
1	15/05/2017	18:00	55.8	51.5	43.5	380189			
2	15/05/2017	18:15	50.1	45.3	43.7	102329			
3	15/05/2017	18:30	47.9	45.2	44	61660			
4	15/05/2017	18:45	47	44	44.2	50119		594297	51.7
5	15/05/2017	19:00	46.2	43.5	44.3	41687			
6	15/05/2017	19:15	47.1	44.6	44.6	51286			
7	15/05/2017	19:30	47.4	44.3	45.2	54954			
8	15/05/2017	19:45	47	43.7	45.3	50119		198046	46.9
9	15/05/2017	20:00	46.9	44.2	51.5	48978			
10									
11									
12									
13									
14									
15									
16									
							841321		

Night Period 10pm to 7am
amenity criteria 45-50 dB(A) urban
Intrusiveness criteria (RBL+ 5) 34.5 dB(A)

Night	Date	$L_{eq(night)}$	ABL	RBL
Saturday Night	12/05/2017	38.2	29.5	
Sunday Night	13/05/2017	42.5	28.4	
Monday Night	14/05/2017	43.4	30.1	
		42.5		29.5





no.	Date	time	$L_{Aeq(15\ minute)}$	$L_{A90(15minute)}$	$L_{A90(15min)}$ assending order	$10^{((L_{Aeq(15\ minute)}/10))}$	period sums	hrly sums	hrly Laeq
1	12/05/2017	22:00	36.8	31.3	27.7	4786			
2	12/05/2017	22:15	36.9	31.5	27.9	4898			
3	12/05/2017	22:30	36.3	31.2	28.3	4266			
4	12/05/2017	22:45	36.3	32.1	28.3	6761		20711	37.1
5	12/05/2017	23:00	39.1	34.4	28.5	8128			
6	12/05/2017	23:15	39.2	36.2	28.6	8318			
7	12/05/2017	23:30	41.2	33.3	28.6	13183			
8	12/05/2017	23:45	38.6	30.7	28.7	7244		36873	39.6
9	13/05/2017	0:00	38.6	30.2	28.9	7244			
10	13/05/2017	0:15	34.8	28.9	28.9	3020			
11	13/05/2017	0:30	37.6	29.5	28.9	5754			
12	13/05/2017	0:45	37.9	31.6	29	6166		22185	37.4
13	13/05/2017	1:00	35.6	29.7	29.1				
14	13/05/2017	1:15	31.2	28.3	29.3				
15	13/05/2017	1:30	32	28.5	29.5				
16	13/05/2017	1:45	35.5	28.7	29.5				
17	13/05/2017	2:00	33.8	29	29.7				
18	13/05/2017	2:15	32.6	28.9	30.2				
19	13/05/2017	2:30	33.8	29.1	30.5				
20	13/05/2017	2:45	32.4	28.6	30.7				
21	13/05/2017	3:00	31.9	27.9	30.8				
22	13/05/2017	3:15	30	27.7	30.9				
23	13/05/2017	3:30	35.3	28.6	31.2				
24	13/05/2017	3:45	32.2	28.3	31.3				
25	13/05/2017	4:00	32.3	29.3	31.5				
26	13/05/2017	4:15	42.4	31.7	31.6				
27	13/05/2017	4:30	38.4	28.9	31.7				
28	13/05/2017	4:45	37.6	30.5	32.1				
29	13/05/2017	5:00	34.2	29.5	33.3				
30	13/05/2017	5:15	36.4	30.9	34.4				
31	13/05/2017	5:30	37.5	30.8	36.2				
32	13/05/2017	5:45	48.4	37.1	37.1				
33	13/05/2017	6:00	51.9	39.3	39.3				
34	13/05/2017	6:15	53	48.8	40.4				
35	13/05/2017	6:30	50	43.4	43.4				
36	13/05/2017	6:45	46.3	40.4	48.8				
							79768		
	13/05/2017	22:00	46.7	41.5	28.4				
	13/05/2017	22:15	44	38	28.4				
	13/05/2017	22:30	43.5	37.2	28.4				
	13/05/2017	22:45	43.4	35.6	28.6				
	13/05/2017	23:00	43.9	36.8	28.6				
1	13/05/2017	23:15	41	32.4	29.1	12589			
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							545948		
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4	14/05/2017	22:45	35.1	31.5	30.3	3236		16026	36.0
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11	15/05/2017	0:30	32.4	30.7	30.5	1738			
12	15/05/2017	0:45	33.9	30.9	30.7	2455		9985	34.0
13	15/05/2017	1:00	31.3	30.3	30.7	1349			
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16	15/05/2017	1:45	30.7	29.9	30.9	1175		6861	32.1
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34	15/05/2017	6:15	50.8	44	44	120226			
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36	15/05/2017	6:45	49.4	45.2	45.7	87096		573327	51.6
							788411		

Greg Alderson & Associates

Chartered Professional Engineers and Scientists

ABN 58 594 160 789

OUR REF: 17402_NS20170407_1
YOUR REF:

General Manager
Ballina Shire Council
PO Box 450
BALLINA NSW 2478

6 July 2017

Attention: Environmental Officer

Re: DA 2017/312 Skate Ramp at Lot 1 DP 609873, 2-12 Greenwood Place, Lennox Head
Comments on Noise Impact Assessment Report

Dear Sir/Madam,

Greg Alderson and Associates have been engaged by to prepare comments for a submission in relation to potential noise impacts for the above-mentioned Development Application

Please see below for a summary of our comments in relation to the following noise report prepared for DA 2017/312:

"Noise Impact Assessment for Private Skate Ramp 2-12 Greenwood Place, Lennox Head", Prepared for Vaughan O'Connor, 7 June 2017, No. 35/2017

1. The Noise report does not comment on the potential of the noise source, being the use of the skate ramp, to contain 'annoying' characteristics such as tonal or impulsive noise. As outlined in Table 4.1 of the NSW Industrial Noise Policy (INP) this may warrant the need for adjustments of up to 10 dB to the noise source measurements. Such characteristics may be attributed to the noise emissions produced from the 'tapping of metal on the lip of the ramp'.

2. The report comments that the ramp is situated on the highest point of the site. This high point could allow for a free field of noise to impact on neighbouring properties. Consideration to other locations on the site could have been provided.

3. The noise model predicts impacts at the façade of the building. The NSW Industrial Noise Policy (2000) requires noise emissions to typically be assessed at the most affect point within 30m of the residence.

4. It is noted that the report considers potential noise impacts on both the ground floor and first floor of neighbouring receivers. We understand that some receivers, for example, 16 Greenwood Place, have first floor living spaces that were not included in the assessment. As the skate ramp is located on the high point of the property this may influence residences with a second storey.

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MEMBER OF THE CIVIL COLLEGE, NATIONAL REGISTERED CIVIL ENGINEER, RPEQ 4907

5. The report provides a measured L_{Aeq} at 4m from the source of 52.6 dB(A) (Table 3.5). A first principles calculation reveals this to be a source Sound Power Level (Lw) of approximately 75.6 dB(A). The table below provides a summary of the noise levels of skate ramps as presented in the Noise Impacted Assessment for the Wollongbar Skate Ramp, prepared by Greg Alderson & Associates. The level measured at Greenwood Place is also provided in the table for comparison purposes. It is shown that the measured level of 52.6 dB(A) at 4m from the Greenwood Place skate ramp is quieter than those levels presented in the Wollongbar report. Whilst the Greenwood Place ramp may be constructed of a different material to that of the other skate ramps presented in Table 1, further justification of the measured level is recommended to ensure neighbouring noise amenity is maintained.

Table 1 - Noise emissions from skate ramps and associated activities

Item	L_{Aeq} dB(A)	Distance to source	Sound Power Level (Lw dB(A))
Nimbin steel ramp	74.5	3m	95.0
Suffolk Park – Skaters using footpath	80.1	1m	91.1
Suffolk Park ramp	76.6	1m	87.6
Monkton skateboard run	62-69	3m	82.5-89.5
Monkton Micro scooter run	61-73	3m	81.5-93.5
2-12 Greenwood Place skate ramp	**52.6**	**4m**	**75.6**

6. The report doesn't detail the nature of the skate ramp user during the test period (if it is representative or typical of the expected life-cycle use of the ramp). That is, is there only one person going to use the skate ramp or more.

7. No specific comments are provided in the report on the potential for multiple skate ramp users simultaneously, and the potential this may have for a cumulative increase in noise emissions.

8. It seems that no best practice measures are commented on, such as improvements to the acoustics of the ramp. Such recommendations would add to reduction of potential noise impacts.

We trust that this information assists Council and if you have any questions, please contact this office.

Yours faithfully,
Greg Alderson and Associates

Wendy Attrill
Senior Environmental Scientist

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tim fitzroy & associates
environmental health | environmental education | environmental auditing

21 July 2017

Ref: 35/2017

General Manager
Ballina Shire Council
PO Box 450
BALLINA NSW 2478

Attention: Rachael Jenner

Dear Rachael

RE: Response to Request for Additional Information: Noise Impact Assessment Proposed Private Skate Ramp

This letter has been prepared in response to matters raised by Council's Environmental Health Officer, Rachael Jenner and Greg Alderson & Associates (GAA) in their letter to Council dated 6 July 2017 with regard to the Noise Impact Assessment for a Proposed Private Skate Ramp, 2-12 Greenwood Place, Lennox Head (Tim Fitzroy & Associates, 7 June 2017).

At the outset it should be noted that the proposed development is for private use only. It is not for commercial or industrial use and therefore the Industrial Noise Policy (NSW EPA 2000) does not apply to this development.

We offer the following in response to the matters raised by Environmental Health Officer:

1. Rating Background Level (RBL)

As noted above the INP does not apply to the proposed development. With the experience of 27 years monitoring noise it is our view the RBL derived over the 48 hour period reflect the noise environment of similar suburban settings in the Northern Rivers.

Period	$L_{Aeq(period)}$*	RBL*	Intrusive Noise Criteria RBL+5 dB
(1)	(2)	(3)	
Day	*46*	*37*	***42***
Evening	*41*	*34*	***39***
Night	*42*	*29*	***34***

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2. Modifying Factors
All on-site measurements were checked and are not tonal according to assessment methods outlined in ISO 1996-2:2007(E). Impulsiveness is expected from the activity and a penalty of 2dB is recommended under AS1055.1-1997. As a conservative assessment, a 5dBA penalty has been applied to the predictions in the new noise model results (see Revised Noise Impact Assessment, **Attachment A**).

3. Noise Modelling
The ramp is small and for domestic use only by a single rider at a time. It is neither practical, nor safe for more than 1 rider to use the ramp at any time. Noise modelling has therefore been undertaken based on the proposed use by a single rider at a time.

If, theoretically there were 2 skaters operating on the ramp at the same time consistently, the noise output is conservatively predicted to increase by 3 dB. The resultant output at the nearest affateced residence would increase to 41 dB and remain compliant with the daytime intrusive criteria.

The noise from 2 skaters operating in tandem at the skate ramp would comply with the daytime intrusive criteria at all neighbouring residences.

We offer the following in response to the matters raised by Greg Alderson & Associates:

1 All on-site measurements were checked and are not tonal according to assessment methods outlined in ISO 1996-2:2007(E). Impulsiveness is expected from the activity and a penalty of 2dB is recommended under AS1055.1-1997. As a conservative assessment, a 5dBA penalty has been applied to the predictions in the new noise model results (see Revised Noise Impact Assessment, **Attachment A**).
2 The location of the ramp seems logical. Other available spaces on the property are closer to surrounding dwellings.
3 A revised Noise Impact Assessment (see **Attachment A**) has been prepared with receivers been placed at the most exposed property boundaries in the updated model. There is little change to the result as the façades are only a short distance from the property boundary.
4. Predictions have been updated to include first floor for all neighbours in the revised NIA (see **Attachment A**).
5. The measurements reflect the actual skate ramp under investigation with 1 skater using the ramp. The ramp is for domestic ramp use and TFA's assumes it is smaller than the skate ramps to the measurements that GAA's refers to. The subject ramp has capacity for only one skater at a time, so a lower noise level could be expected.
6. The ramp is for domestic use only by a single rider at a time.
7. The expected use of the ramp (i.e. as measured in real life, during daytime hours) is predicted to be comfortably compliant, noise reduction measures are not generally considered where compliance is predicted.

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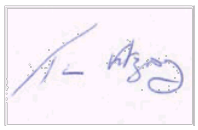
Regards,



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Appendix A Revised Noise Impact Assessment

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Revised Noise Impact Assessment

Private Skate Ramp 2-12 Greenwood Place Lennox Head

HEALTH SCIENCE ENVIROMENTAL EDUCATION
ENVIRONMENTAL AUDITOR

Revised Noise Impact Assessment

Private Skate Ramp 2-12 Greenwood Place Lennox Head

Prepared for: Vaughan O'Connor
Version: Revised Final
Date: 21 July 2017
Job No. 35/2017
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1. Introduction

1.1 Purpose

Tim Fitzroy & Associates has been engaged by Newton Denny Chapelle to undertake a Noise Impact Assessment (NIA) to accompany a Development Application to Ballina Shire Council for a Private Skate Ramp at 2-12 Greenwood Place Lennox Head.

This report provides details on the noise assessment and modelling carried out by *Tim Fitzroy & Associates* and *Noise Measurement Services, Brisbane* to establish existing noise levels at the subject site and investigate potential noise impacts on surrounding residences from the use of the private skate ramp.

At the outset it should be noted that the proposed development is for private use only. It is not for commercial or industrial use and therefore the Industrial Noise Policy (NSW EPA 2000) does not apply to this development.

This report has been revised in response to comments by Council's Environmental Health Officer and Greg Alderson & Associates.

The purpose of this noise assessment is to:

1. Establish existing background noise levels across the subject site;
2. Examine the likely impacts from the use of the private skate ramp on sensitive receptors; and
3. Report on noise levels and provide recommendations to ensure that the noise impacts from the use of the private skate ramp on sensitive receptors will comply as far as practicable with the intent of the NSW EPA Noise Guidelines.

1.2 Applicable Noise Criteria

Protection of the Environment Operations Act 1997 (POEO Act) and the Protection of the Environment Operations (Noise Control) Regulation 2008 (Noise Control Regulation)

The *Protection of the Environment Operations Act 1997 (*POEO Act) and the Protection of the Environment Operations (Noise Control) Regulation 2008 (Noise Control Regulation) provide the main legal framework and basis for managing unacceptable noise.

The POEO Act:

- identifies the authority responsible for regulating noise (s. 6 of the Act)
- defines 'noise' and 'offensive noise' (Dictionary in the Act)
- provides a range of regulatory tools to manage noise, including Noise Control Notices, Prevention Notices, Noise Abatement Directions and Noise Abatement Orders.

Depending on the circumstances, the Noise Control Regulation may require an assessment of a noise's audibility, time of occurrence, duration or offensiveness. The POEO Act does not always require noise to be measured to determine whether it is offensive. However, noise measurement can help in deciding what action, if any, is necessary.

1.2.1 Offensive Noise

Depending on the type of noise under consideration, noise can be considered as offensive in three ways according to it's:

- audibility
- duration
- inherently offensive characteristics.

Given the nature of the noise complaints, it will be necessary for Council to consider a range of factors to determine whether the noise is offensive, including the following:

- the loudness of the noise, especially compared with other noise in the area
- the character of the noise
- the time and duration of the noise
- whether the noise is typical for the area
- how often the noise occurs
- the number of people affected by the noise.

1.2.2 Intrusive Noise

Noise is identified as 'intrusive' if it is noticeably louder than the background noise and considered likely to disturb or interfere with those who can hear it.

1.2.3 Sleep Disturbance

Specific provisions relate to sleep disturbance and the World Health Organization recommends that a maximum level of 45 dB (A) should not be exceeded inside a bedroom. For practical purposes this is equivalent to a maximum level of 55 dB (A) outside a residence, with an open window to the bedroom (Guidelines for Community Noise WHO 1999).

1.3 Overview of Noise Assessment

This noise assessment establishes the existing background noise levels within the vicinity of the nearest affected sensitive receiver.

The noise assessment process included the following components:

- Measurement and determination of the existing background and ambient noise at the site;
- Consideration of potential noise impacts on surrounding residences; and
- Consideration of what feasible and reasonable noise mitigation measures ought to be considered where the project-specific noise levels are exceeded.

1.4 Site Description

The site is located approximately 1 km west of the centre of Lennox Head and about 300m north of the Coast Road.

A site locality diagram is provided in **Illustration 1.1**.

1.4.1 Topography

The private skate ramp is located at the highest point in the site at RL 22m. The site falls west to a level of about RL14m

1.4.2 Climate

Weather recording data was collected from the official Bureau of Meteorology (BOM) Weather Station at Ballina Airport. Observations were taken from the Ballina Airport weather station (13 to 15 May 2017) and, while they give an indication of the weather conditions they are not representative of the exact conditions while on site. Rain fall and wind greater than 5km/hr was excluded from the noise monitoring results.

1.4.3 Surrounding Land use

The site adjoins residential development. The Coast Road is approximately 300m to the south.

1.5 Proposed Development

The private skate ramp is located forward of the front building line immediately adjacent to a stone fence. The development plans for the proposed private skate ramp are located in **Appendix A**).

Site Locality Plan

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2. Instrumentation

2.1 Noise Monitoring Equipment

Tim Fitzroy & Associates utilised the following equipment in this Noise Impact Assessment:

- A Type 2 Rion NL24 environmental noise logger; and
- A Type 1, 1/3 Octave Band Larson Davis Noise Meter with sound recording and event trigger features.

Calibration of the noise monitoring equipment was undertaken prior to use. To ensure no significant tonal drift occurred over the monitoring period, the calibration was checked before and after each measurement period.

2.2 Monitoring Methodology

Consistent with the purpose of the acoustic assessment, the aim of the noise monitoring process was to establish:

- The existing background and ambient noise at the site;
- An assessment of noise levels produced by the existing skate ramp operations;
- A description and the results of a computer model prepared to predict the impact of the skate ramp use on the environment;
- The computer model was calibrated using the results of the noise measurements taken on site. The results of the modelling are used to assess the noise impact of the private skate ramp use on existing neighbouring residences; and
- consideration of what feasible and reasonable noise mitigation measures ought to be considered where the project-specific noise levels are exceeded.

Long term noise monitoring was undertaken to establish the existing background noise environment at the subject site. Ambient sound pressure levels were measured generally in accordance with Australian Standard AS1055.1:1997 - 'Acoustics-Description and measurement of environmental noise - Part 1: General procedures'.

A Rion NL24, a type 2 environmental noise logger was placed at a measurement location ML1 to monitor the ambient noise levels, in continuous 15 minute intervals from 13 to 15 May 2017 to gather information of background noise during the day, evening and night. The microphone at each location was 1.35m above ground level.

Illustration 2.1 shows the location of the noise meter.

Noise Monitoring Locations

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3. Acoustic Assessment

3.1 The Decibel Scale

The human ear responds to sound pressure levels over a very wide range – the loudest sound pressure level to which the human ear responds is ten million times greater than the quietest. This large ratio is reduced to a more manageable size by the use of logarithms. To avoid scale which is too compressed a factor of ten is introduced, giving rise to the decibel. The following **Table 3.1** provides an indication of typical A-Weighted sound pressure levels measured in decibels with typical noise sources. The table provides a good reference when comparing decibel readings.

Table 3.1 Example noise sources and the corresponding A-weighted decibel levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
140	Long range gun, gunner's ear	
130	Threshold of pain	Extremely noisy to intolerable
120	Jet take-off at 100m	
110	Night club dance floor	
100	Loud car horn at 3 metres	Very noisy
90	Heavy truck at 10m	
80	Curbside of busy street	Loud
70	Car interior	
60	Normal conversation at 1m	Moderate to quiet
50	Office noise	
40	Living room in quiet area	Quiet to very quiet
30	Inside bedroom at night	
20	Unoccupied recording studio	Almost silent

The sensitivity of people to noise level changes varies from person to person. However generally, a change of up to 3 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness.

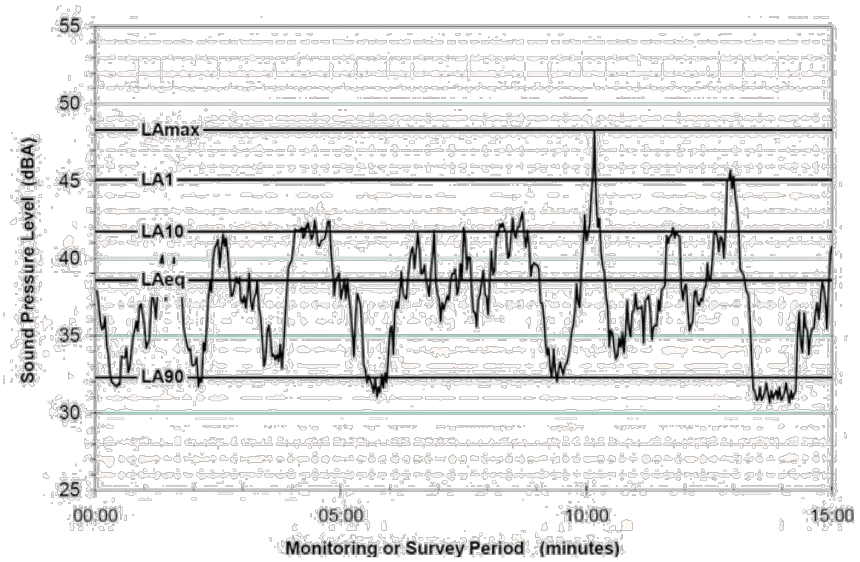
3.2 Acoustical Terms

This report makes reference to a number of different acoustical terms. Particularly the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} descriptors. Each descriptor is briefly explained below.

- The L_{Aeq} is essentially the average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time; varying sound over a defined measurement period.
- The L_{Amax} noise level is the maximum A-weighted noise level.
- The L_{A10} is the A-weighted sound pressure level exceeded 10% of a given measurement period and is utilised normally to characterise typical maximum noise levels.
- The L_{A90} noise level is the A-weighted sound pressure level exceeded 90% of a given measurement period and is representative of the average minimum background sound level (in the absence of the source under consideration), or simply the "background" level.

A graphical display of typical noise indices and the relationship between each noise descriptor is provided below in Figure 3.1.

Figure 3.1 Graphical Display of Typical Noise Indices



3.3 Existing Noise Environment

The primary noise observed while on site emanates from bird calls, and vehicular movements along The Coast road. Secondary noise sources impacting on the subject site observed were occasional vehicular movements along Greenwood Place.

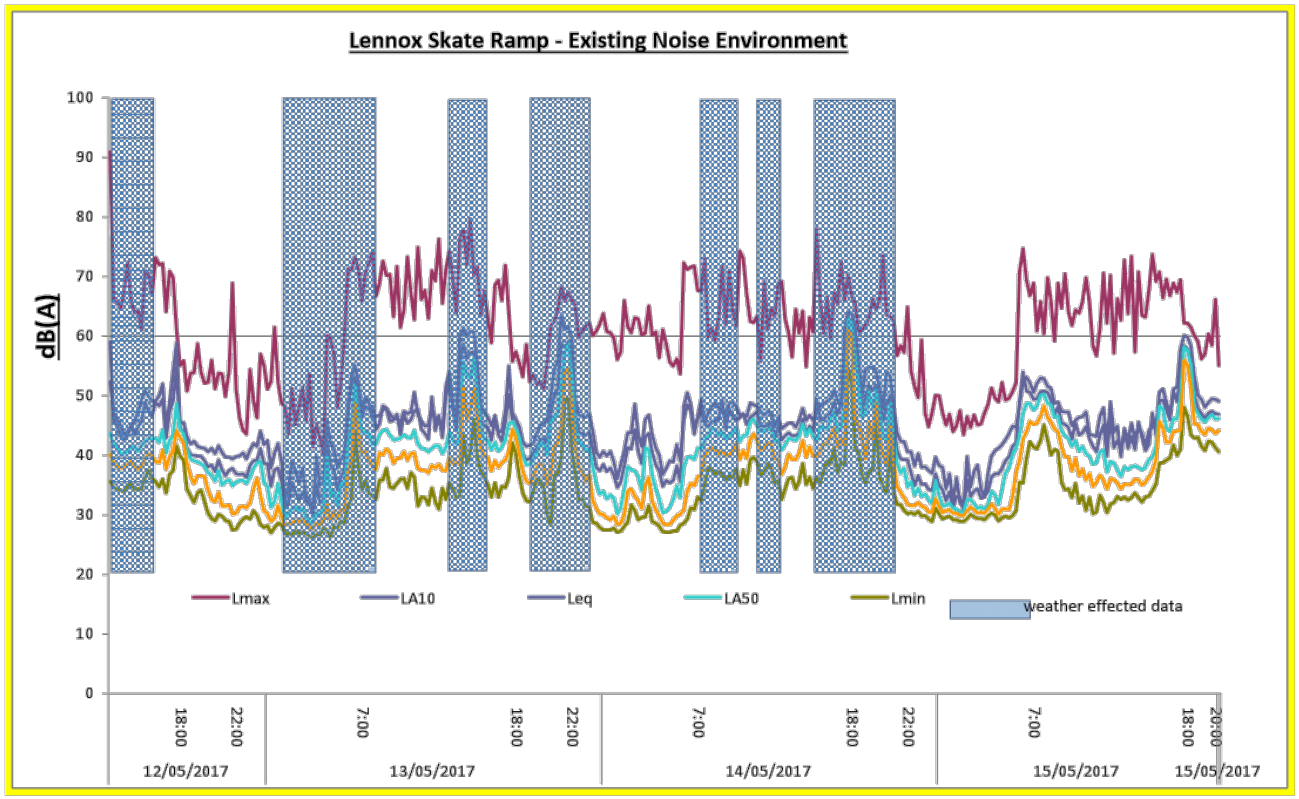
A summary of the results obtained from analysis of data from the background day, evening and night time noise monitoring is provided below in **Table 3.2**.
Full copies of the raw data for the monitoring site can be found in **Appendix B**.

Table 3.2 Background Sound Pressure Levels

Period	$L_{Aeq(period)}$*	RBL*	Intrusive Noise Criteria RBL+5 dB
(1)	(2)	(3)	
Day	*46*	*37*	***42***
Evening	*41*	*34*	***39***
Night	*42*	*29*	***34***

As can be seen from the above table, the existing Laeq exceeds the intrusive noise criteria project for all time periods for the day and evening. The RBL derived over the 48 hour period reflects the noise environment of similar suburban settings in the Northern Rivers. The ambient and background noise levels (without skate ramp in use) measured at ML1 over the monitoring period are presented in **Figure 3.2**.

Figure 3.2 Ambient and Background Noise Levels at Measurement Location ML1



3.4 Impact of Private Skate Ramp Use on Surrounding Neighbours

3.4.1 Noise Modelling

Noise levels from the existing skate ramp at 2 Greenwood Place, Lennox Head have been predicted at surrounding neighbours using SoundPLAN v7.0 and the prediction methodology *ISO9613-2: 1996.* Sound power levels used in the noise model have been calculated from on-site measurements of the subject noise source.

All prediction models have limits to their accuracy of prediction. This is due to the inherent nature of the calculation algorithms that go into the design of the models, the assumptions made in the implementation of the model, and the availability of good source sound power data. Various researchers have suggested that an un-calibrated model has an accuracy of ±5 dB while a calibrated model has an accuracy of ±2 dB. ISO 9613-2 has an estimated accuracy for broadband noise of ±3 dB at 1000 metres. Calibration means that the model has been established with reference to measured sound levels at a receiver, known source levels and tightly defined propagation variables (wind speed and direction, for example). Alternatively, a series of predictions with different programs but the same assumption variables can be used for verification purposes.

3.4.2 Noise Source Levels

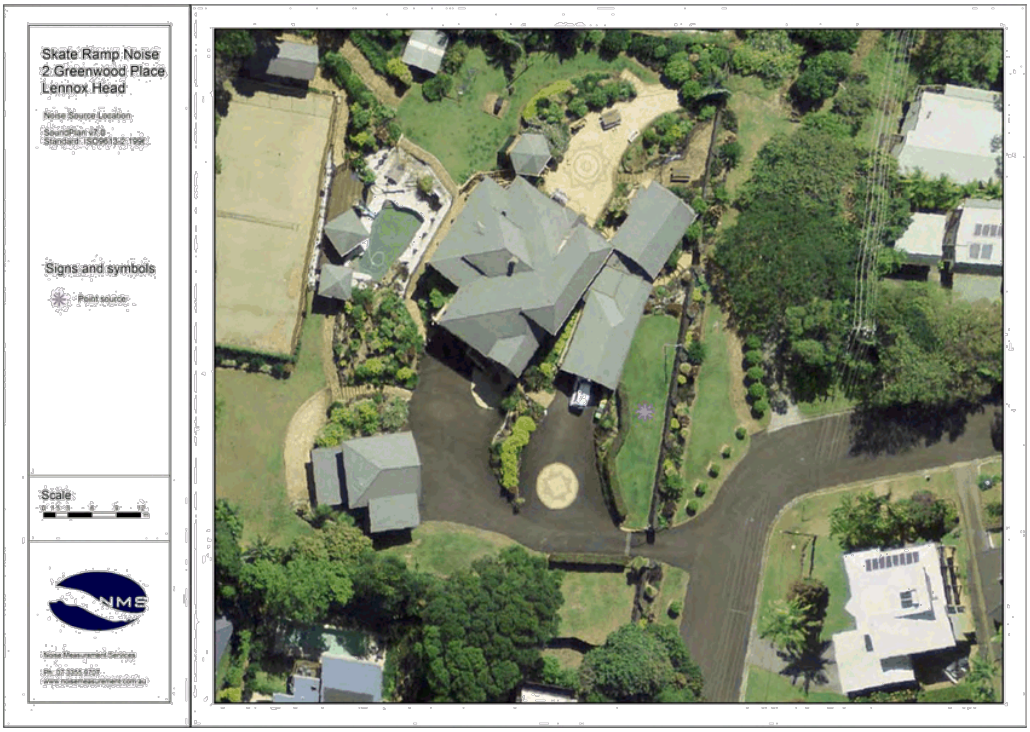
Source levels have been calculated from on-site noise measurements and are presented in **Table 3.3.** The L_{eaq} noise source represents the average noise level of general skating on the ramp over time. The L_{max} noise source represents the instantaneous noise level of the loudest aspects of the activity, i.e. impact noise from 'dropping-in' and tapping of the metal on the lip of the ramp. The noise sources used in the model are positioned as shown in **Plate 3.1.**

Predicted noise levels include a 5dB (A) penalty for possible tonality and impulsiveness.

Table 3.3 Noise Sources

Description	dB(Z)										
	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz	Sum
Skating on ramp (L_{eq})	80	83	78	75	71	65	61	60	55	46	86
Drop In / Tapping (L_{max})	98	99	104	101	95	90	84	77	67	55	107

Plate 3.1 **Location of noise sources**



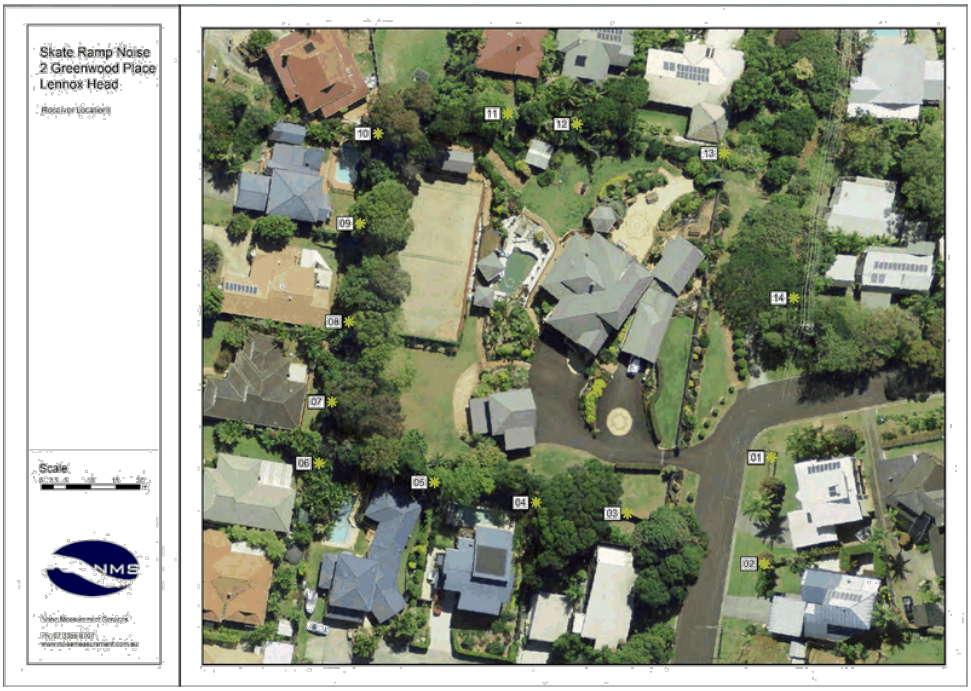
3.4.3 Sensitive Receptors

Several receptor points have been placed at the most exposed property boundary of dwellings surrounding the subject site. The receptor locations are presented in **Table 3.4** and **Plate 3.2.**

Table 3.4 **Sensitive receptors**

Receptor	Address
1	Sunrise Crescent, 01 (2/2)
2	Sunrise Crescent, 01 (1/2)
3	Greenwood Place, 14
4	Greenwood Place, 16
5	Greenwood Place, 18
6	Cooloola Avenue, 11
7	Cooloola Avenue, 09
8	Cooloola Avenue, 07
9	Cooloola Avenue, 05
10	Cooloola Avenue, 03
11	Lakefield Avenue, 05
12	Lakefield Avenue, 03
13	Lakefield Avenue, 01
14	Sunrise Crescent, 02

Plate 3.2 **Location of sensitive receptors**



3.4.4 Weather Conditions

Noise modeling has been made using the prediction methodology *ISO9613-2: 1996* which, by default, presents noise levels at the receiver for meteorological conditions which are favourable for propagation from the sound source to the receiver.

The predicted noise levels are considered to represent the average propagation under meteorological conditions including wind and temperature inversion.

3.4.5 Model Verification

The noise model has been validated against an on-site measurement taken 4m from the skate ramp as presented in **Table 3.5**. A receptor is placed in the L_{eq} noise model at the test location 4m from the noise source. The two methods predict within 1dB(A) at the measurement location which presents a good level of fit between the predictions.

Table 3.5 **Model Verification**

Source to Receptor (m)	Measured (dB(A) L_{eq})	SoundPLAN (dB(A) L_{eq})	Difference (dB(A))
4	52.6	52.7	+0.1

3.4.6 Calculation of Noise Levels

Predicted noise levels from skate ramp activities are made to each receptor for L_{eq} and L_{max} noise levels. Predicted L_{eq} noise levels are assessed against intrusiveness criteria of RBL + 5dB, while predicted L_{max} noise levels are assessed against sleep disturbance criteria RBL + 15dB. Predicted noise levels and assessment are presented in **Table 3.6 and Table 3.7**. Visual noise contours are presented in **Plates 3.3, 3.4 and 3.6.**

Table 3.6 Predicted L_{eq} noise levels are assessed against intrusiveness criteria RBL + 5dB. Levels are in dB(A), free-field including +5dBA penalty for tonality and impulsiveness.

Receptor		Noise Level (dB(A) L_{eq})		Within Criteria?		
#	Address	Ground Floor	First Floor	Day (42dB(A))	Evening (39dB(A))	Night (35dB(A))
1	Sunrise Crescent, 01 (2/2)	35	38	PASS	PASS	+3
2	Sunrise Crescent, 01 (1/2)	32	34	PASS	PASS	PASS
3	Greenwood Place, 14	37	37	PASS	PASS	+2
4	Greenwood Place, 16	35	35	PASS	PASS	PASS
5	Greenwood Place, 18	28	31	PASS	PASS	PASS
6	Cooloola Avenue, 11	25	27	PASS	PASS	PASS
7	Cooloola Avenue, 09	29	29	PASS	PASS	PASS
8	Cooloola Avenue, 07	29	30	PASS	PASS	PASS
9	Cooloola Avenue, 05	16	16	PASS	PASS	PASS
10	Cooloola Avenue, 03	20	21	PASS	PASS	PASS
11	Lakefield Avenue, 05	16	18	PASS	PASS	PASS
12	Lakefield Avenue, 03	20	21	PASS	PASS	PASS
13	Lakefield Avenue, 01	25	30	PASS	PASS	PASS
14	Sunrise Crescent, 02	34	36	PASS	PASS	+1

Table 3.7 Predicted L_{max} noise levels are assessed against sleep disturbance criteria RBL + 15dB. Levels are in dB(A), free-field including +5dBA penalty for tonality and impulsiveness.

Receptor		Noise Level (dB(A) L_{eq})		Within Criteria?
#	Address	Ground Floor	First Floor	Night (45dB(A) L_{max})
1	Sunrise Crescent, 01 (2/2)	59	62	+20
2	Sunrise Crescent, 01 (1/2)	56	58	+16
3	Greenwood Place, 14	62	62	+20
4	Greenwood Place, 16	59	59	+17
5	Greenwood Place, 18	53	56	+14
6	Cooloola Avenue, 11	50	51	+9
7	Cooloola Avenue, 09	52	53	+11
8	Cooloola Avenue, 07	53	54	+12
9	Cooloola Avenue, 05	40	41	PASS
10	Cooloola Avenue, 03	44	45	PASS
11	Lakefield Avenue, 05	40	43	PASS
12	Lakefield Avenue, 03	45	46	+4
13	Lakefield Avenue, 01	49	54	+12
14	Sunrise Crescent, 02	58	61	+19

Plate 3.3 **Noise contours at 1.8m above ground, dB (A) L_{eq}, free-field**

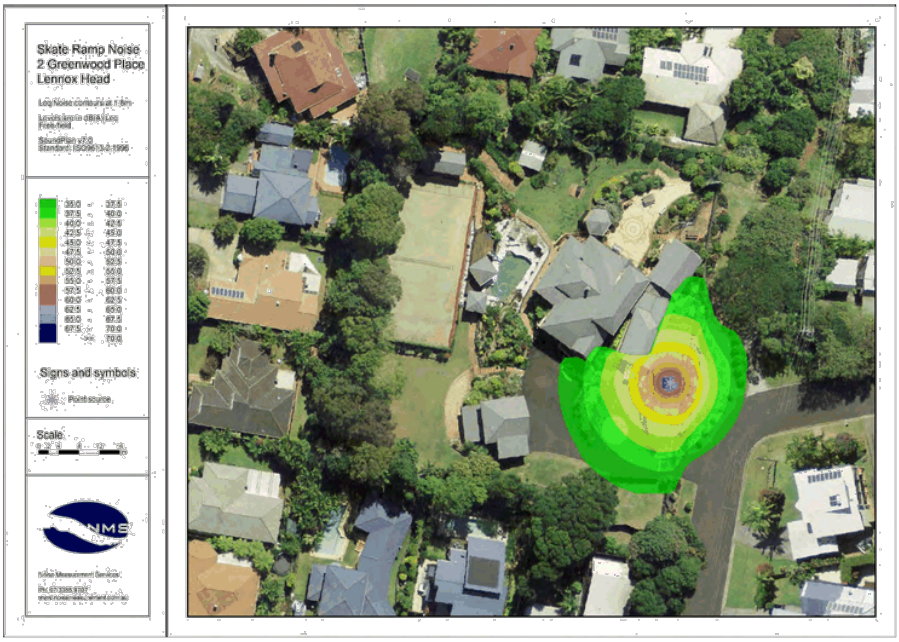


Plate 3.4 **Noise contours at 4.6m above ground, dB(A) L_{eq}, free-field.**

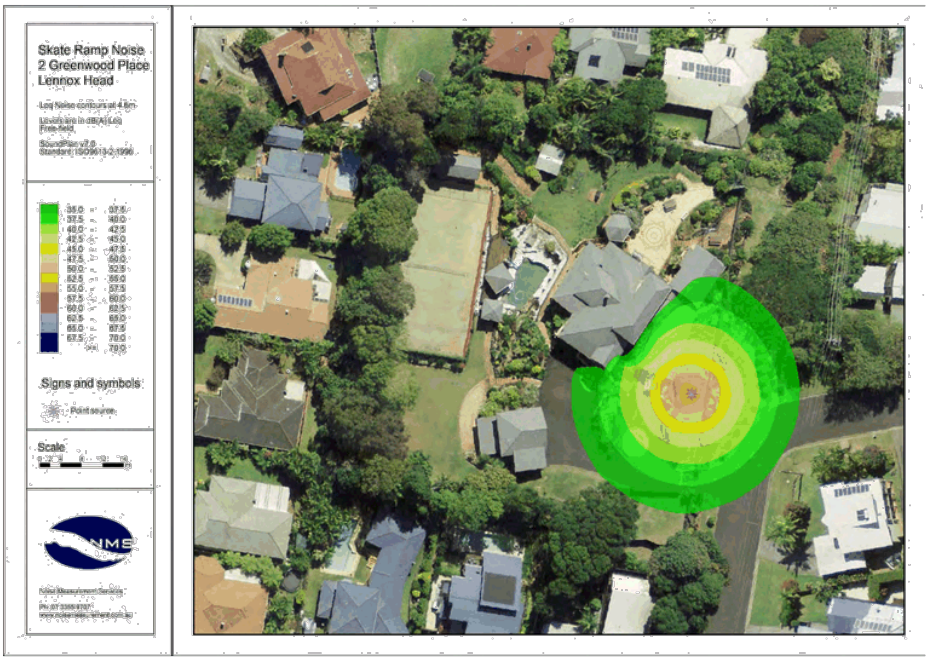


Plate 3.5 Noise contours at 1.8m above ground, dB(A) Lmax, free-field.

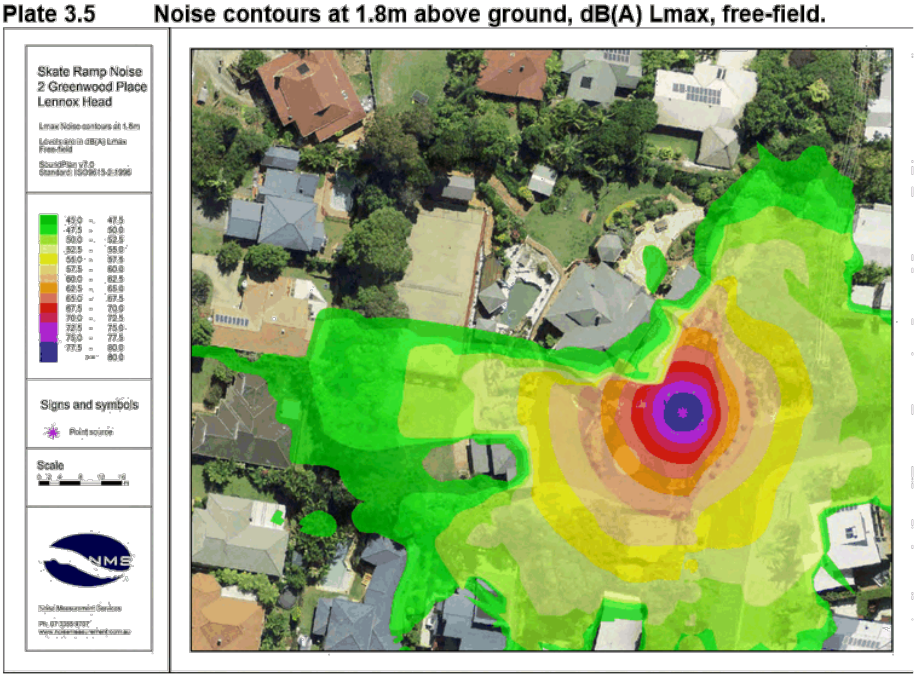
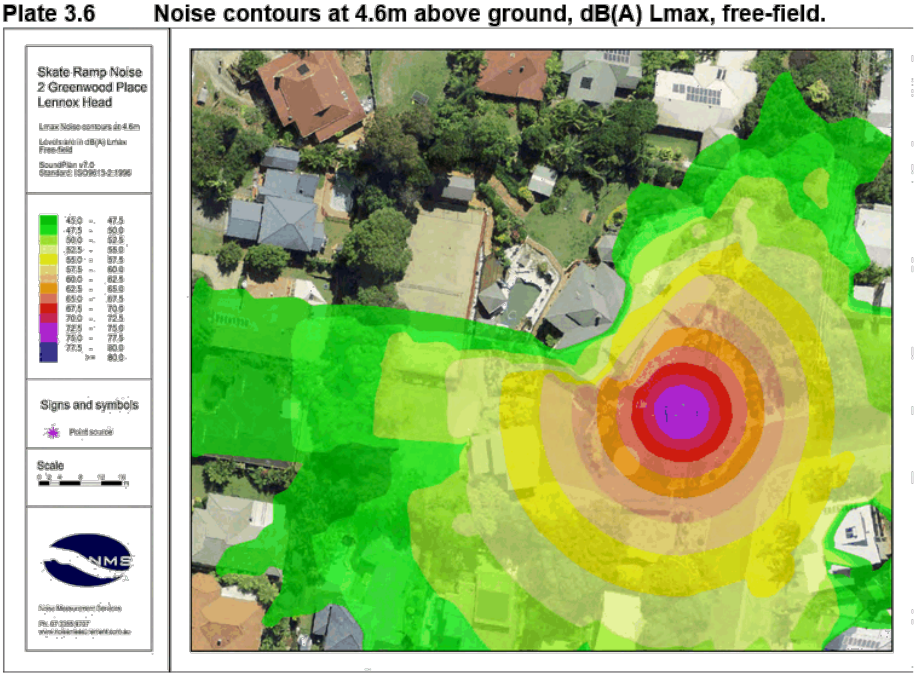


Plate 3.6 Noise contours at 4.6m above ground, dB(A) Lmax, free-field.

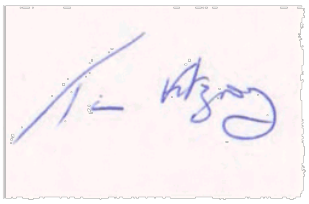


4. Conclusion

A noise model has been constructed to predict the propagation of noise from the use of a Private Skate Ramp at 2-12 Greenwood Place Lennox Head on neighbouring dwellings. The model includes shielding effects from surrounding buildings and topography. Topography information included in the model was sourced from the NSW Six Maps service (10m contours) and from dwelling site-plan (2m contours surrounding the dwelling).

- The model includes shielding effects from surrounding buildings and topography. Topography information included in the model was sourced from the NSW Six Maps service (10m contours) and from the dwelling site-plan (0.25m contours surrounding the dwelling).
- Noise level predictions include a +5dB(A) penalty for possible tonality and impulsiveness.
- Average noise levels from skate ramp activities are predicted to be within the intrusiveness criteria at all receptors during daytime and evening, with exceedances of up to 3dB(A) predicted during night-time.
- L_{max} noise events from skate ramp activities are predicted to exceed the sleep disturbance criteria by up to 20dB(A) at surrounding dwellings. It is assumed that these noise events (i.e. impact noise from 'dropping-in' and tapping of the metal on the lip of the ramp) will occur regularly while the skate ramp is in use, therefore use of the skate ramp during night-time hours is not recommended.

This report has been prepared by Tim Fitzroy of *Tim Fitzroy & Associates* and Matt Dever of *Noise Measurement Services, Brisbane*



Tim Fitzroy
Environmental Health Scientist

References

NSW EPA 2000 Industrial Noise Policy, Environment Protection Authority, Sydney

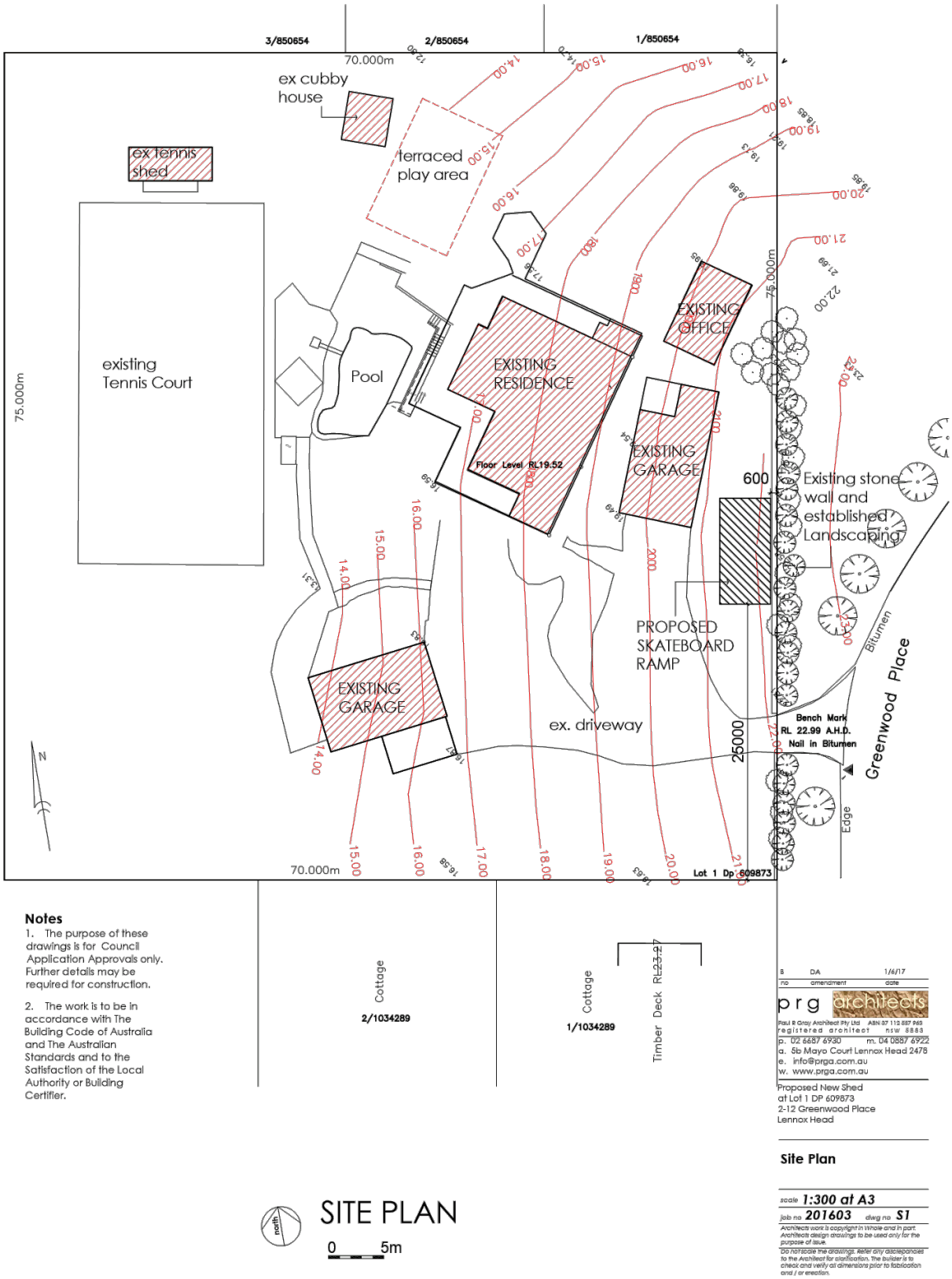
NSW DECC, 2009 Noise Guide for Local Government, Department of Environment, Climate Change & Water, Sydney

A/NZ Standards, 1987 Internal noise limits from Australian/New Zealand Standard AS/NZS 2107:1987.

World Health Organisation 1999 Guidelines for Community Noise (Editor B Berglund et al Geneva Switzerland 1999)

Copyright and Usage

A Development Plan



Notes

1. The purpose of these drawings is for Council Application Approvals only. Further details may be required for construction.
2. The work is to be in accordance with The Building Code of Australia and The Australian Standards and to the Satisfaction of the Local Authority or Building Certifier.

B DA 1/6/17
no amendment date

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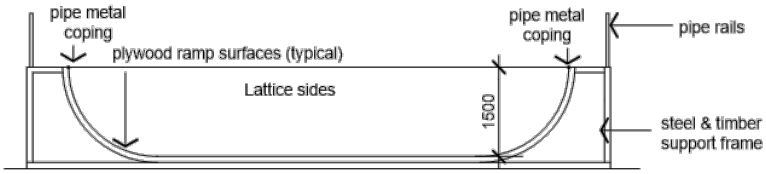
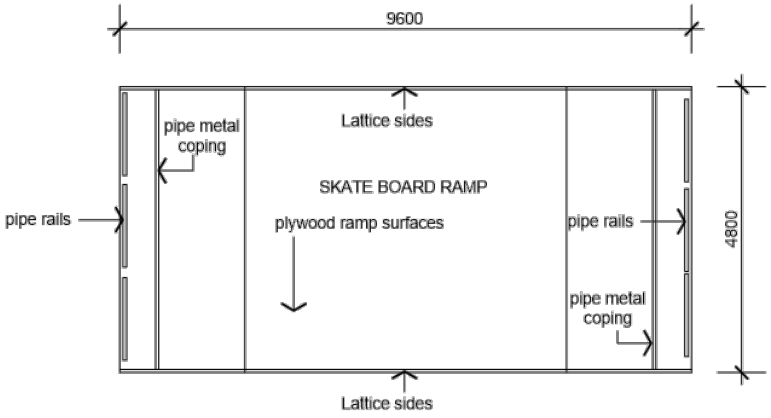
Proposed New Shed
at Lot 1 DP 609873
2-12 Greenwood Place
Lennox Head

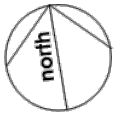
Site Plan

scale 1:300 at A3
job no 201603 dwg no S1



ELEVATION





PLAN

0 5m

B DA 1/6/17
no amendment date

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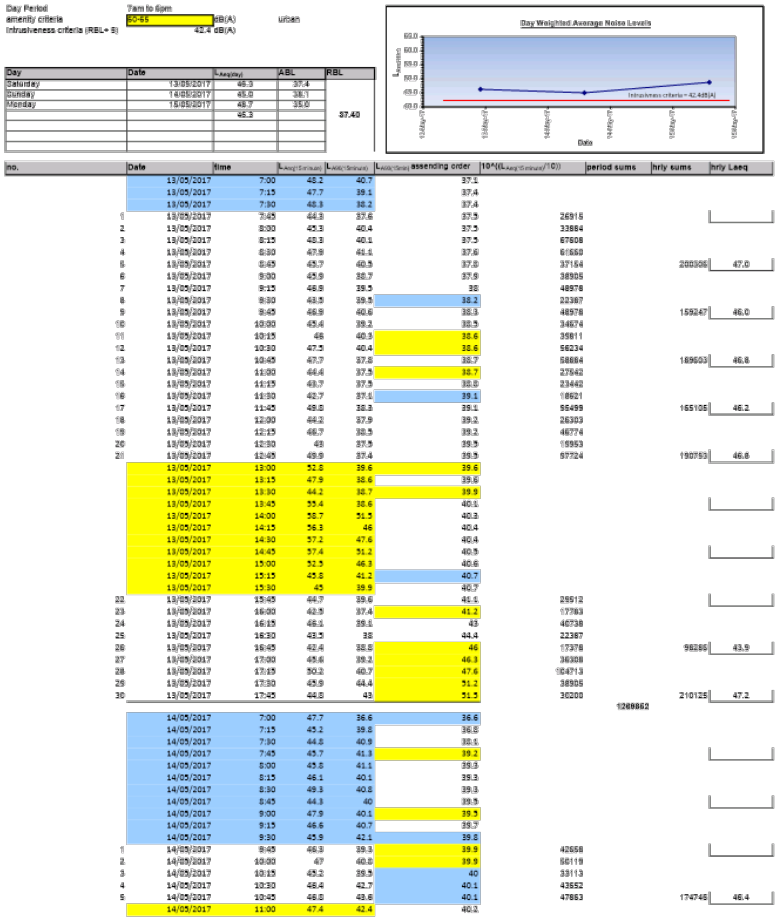
Proposed Alterations and Additions to a Residence at Lot 1 DP 609873
2-12 Greenwood Place
Lennox Head

Skate Board Ramp Plans & Elevations

scale *1:100 at A4*
job no *201603* dwg no *S02*

B Noise Data



Day Period	7am to 6pm		
amenity criteria	50-55	dB(A)	urban
intrusiveness criteria (RBL+ 5)		42.4 dB(A)	

Day	Date	$L_{Aeq(day)}$	ABL	RBL
Saturday	13/05/2017	46.3	37.4	
Sunday	14/05/2017	45.8	38.1	
Monday	15/05/2017	48.7	35.0	
		46.3		37.40

no.	Date	time	$L_{Aeq(15minute)}$	$L_{ASK(15min)}$	$L_{ASK(15min)}$ assending order	$10^{(L_{Aeq(15minute)}/10)}$	period sums	hrly sums	hrly Leq
	13/05/2017	7:00	48.2	40.7	37.1				
	13/05/2017	7:15	47.7	39.1	37.4				
	13/05/2017	7:30	45.3	38.2	37.4				
1	13/05/2017	7:45	44.3	37.6	37.5	26915			
2	13/05/2017	8:00	45.3	40.4	37.5	33884			
3	13/05/2017	8:15	45.3	40.1	37.5	67608			
4	13/05/2017	8:30	47.9	41.1	37.6	61650			
5	13/05/2017	8:45	45.7	40.5	37.8	37154		280306	47.0
6	13/05/2017	9:00	45.9	38.7	37.9	38905			
7	13/05/2017	9:15	46.8	39.5	38	48978			
8	13/05/2017	9:30	43.5	39.5	38.2	22387			
9	13/05/2017	9:45	46.9	40.6	38.3	48978		159247	46.0
10	13/05/2017	10:00	45.4	39.2	38.5	34674			
11	13/05/2017	10:15	46	40.3	38.6	35811			
12	13/05/2017	10:30	47.5	40.4	38.6	56234			
13	13/05/2017	10:45	47.7	37.8	38.7	58884		189603	46.8
14	13/05/2017	11:00	44.4	37.5	38.7	27542			
15	13/05/2017	11:15	43.7	37.5	38.8	23442			
16	13/05/2017	11:30	42.7	37.6	39.1	18621			
17	13/05/2017	11:45	48.6	38.8	39.1	95499		165105	46.2
18	13/05/2017	12:00	44.2	37.9	39.2	26303			
19	13/05/2017	12:15	46.7	38.5	39.2	46774			
20	13/05/2017	12:30	43	37.5	39.5	19953			
21	13/05/2017	12:45	49.9	37.4	39.5	97724		190753	46.8
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	13/05/2017	13:15	47.9	38.6	39.6				
	13/05/2017	13:30	44.2	38.7	39.9				
	13/05/2017	13:45	55.4	38.6	40.1				
	13/05/2017	14:00	58.7	51.5	40.3				
	13/05/2017	14:15	56.3	46	40.4				
	13/05/2017	14:30	57.2	47.6	40.4				
	13/05/2017	14:45	57.4	51.2	40.5				
	13/05/2017	15:00	52.5	46.3	40.6				
	13/05/2017	15:15	45.8	41.2	40.7				
	13/05/2017	15:30	45	39.9	40.7				
22	13/05/2017	15:45	44.7	39.6	41.1	29512			
23	13/05/2017	16:00	42.5	37.4	41.2	17783			
24	13/05/2017	16:15	46.1	39.5	43	40738			
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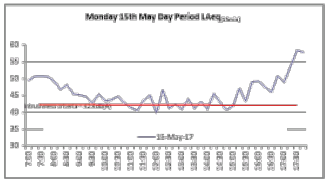

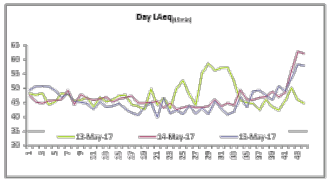

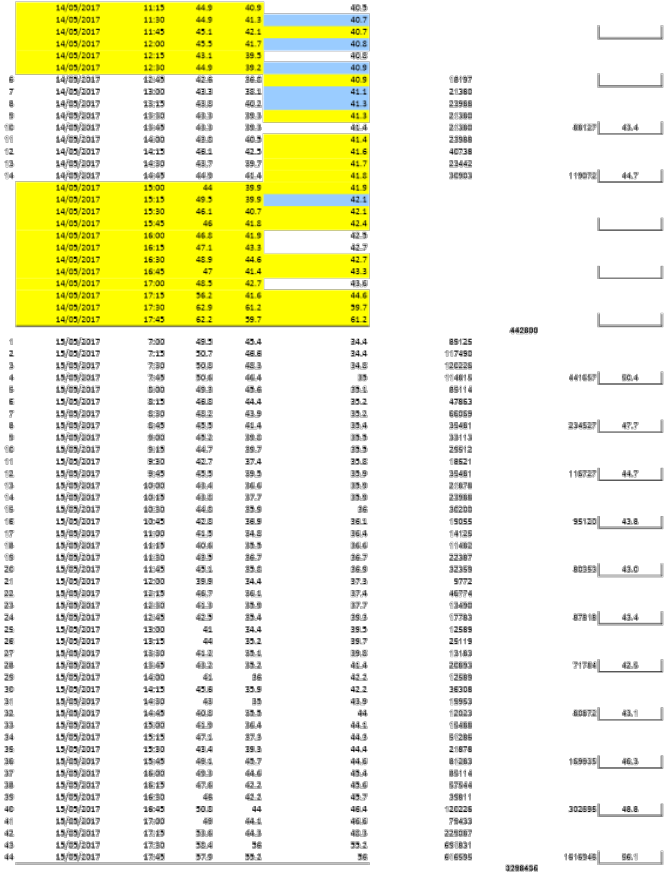

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	14/05/2017	12:00	45.5	41.7	40.8				
	14/05/2017	12:15	43.1	39.5	40.8				
	14/05/2017	12:30	44.9	39.2	40.9				
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10	14/05/2017	13:45	43.3	39.3	41.4	21380	88127	43.4	
11	14/05/2017	14:00	43.6	40.5	41.4	23988			
12	14/05/2017	14:15	46.1	42.5	41.6	40738			
13	14/05/2017	14:30	43.7	39.7	41.7	23442			
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	14/05/2017	15:15	45.5	39.9	42.1				
	14/05/2017	15:30	46.1	40.7	42.1				
	14/05/2017	15:45	46	41.8	42.4				
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	14/05/2017	16:15	47.1	43.3	42.7				
	14/05/2017	16:30	45.9	44.6	42.7				
	14/05/2017	16:45	47	41.4	43.3				
	14/05/2017	17:00	48.5	42.7	43.6				
	14/05/2017	17:15	56.2	41.6	44.6				
	14/05/2017	17:30	62.9	61.2	59.7				
	14/05/2017	17:45	62.2	59.7	61.2				
							442890		
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3	15/05/2017	7:30	50.8	48.3	34.8	120226			
4	15/05/2017	7:45	50.6	46.4	35	114815	441657	50.4	
5	15/05/2017	8:00	49.3	45.6	35.1	88114			
6	15/05/2017	8:15	48.8	44.4	35.2	47863			
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9	15/05/2017	9:00	45.2	39.8	35.5	33113			
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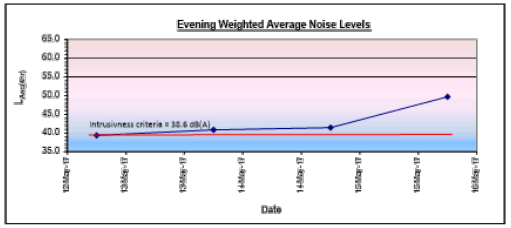
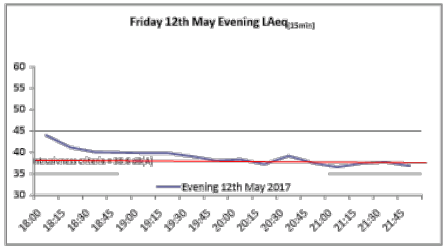
15	15/05/2017	10:30	44.6	35.9	36	36238			
16	15/05/2017	10:45	42.8	36.9	36.1	19055	95120	43.8	
17	15/05/2017	11:00	41.5	34.8	36.4	14125			
18	15/05/2017	11:15	40.6	35.5	36.6	11482			
19	15/05/2017	11:30	43.5	36.7	36.7	22387			
20	15/05/2017	11:45	45.1	35.6	36.9	32358	80353	43.0	
21	15/05/2017	12:00	39.9	34.4	37.3	9772			
22	15/05/2017	12:15	46.7	36.1	37.4	46774			
23	15/05/2017	12:30	43.3	35.9	37.7	13490			
24	15/05/2017	12:45	42.5	35.4	39.3	17783	87818	43.4	
25	15/05/2017	13:00	41	34.4	39.5	12589			
26	15/05/2017	13:15	44	35.2	39.7	25119			
27	15/05/2017	13:30	41.2	35.1	39.8	13183			
28	15/05/2017	13:45	43.2	35.2	41.4	26693	77784	42.5	
29	15/05/2017	14:00	41	36	42.2	12589			
30	15/05/2017	14:15	45.6	35.9	42.2	36308			
31	15/05/2017	14:30	43	35	43.9	19953			
32	15/05/2017	14:45	40.8	35.5	44	12023	68972	43.1	
33	15/05/2017	15:00	41.9	36.4	44.1	18488			
34	15/05/2017	15:15	47.1	37.5	44.3	50285			
35	15/05/2017	15:30	43.4	39.3	44.4	21878			
36	15/05/2017	15:45	48.1	45.7	44.6	61383	169935	46.3	
37	15/05/2017	16:00	49.3	44.6	45.4	88114			
38	15/05/2017	16:15	47.6	42.2	45.6	57544			
39	15/05/2017	16:30	46	42.2	45.7	35811			
40	15/05/2017	16:45	50.8	44	46.4	120226	302695	48.8	
41	15/05/2017	17:00	49	44.1	46.6	79433			
42	15/05/2017	17:15	53.6	44.3	48.3	228087			
43	15/05/2017	17:30	53.4	56	55.2	691831			
44	15/05/2017	17:45	57.9	55.2	56	616595	1616946	56.1	
							3288456		

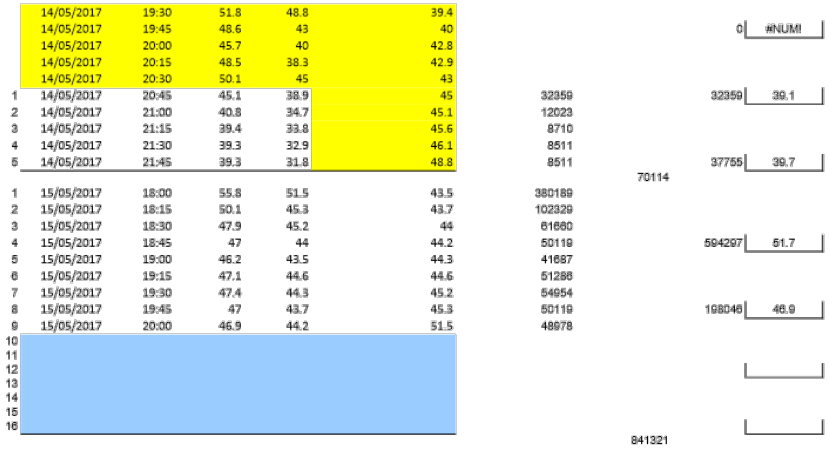
Evening Period: 6pm to 10pm
amenity criteria: 50-55 dB(A) urban
Intrusiveness criteria (RBL+ 5): 38.6 dB(A)

Day	Date	$L_{Aeq(evening)}$	ABL	RBL
Friday Evening	12/05/2017	39.4	30.3	
Saturday Evening	13/05/2017	40.9	35.3	
Sunday Evening	14/05/2017	41.5	31.8	
Monday Evening	15/05/2017	49.7	43.5	33.6
		41.2		





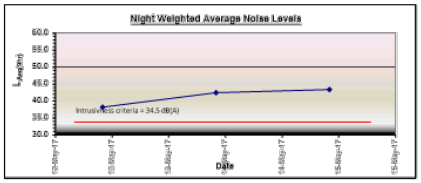
no.	Date	time	$L_{Aeq(15\ minute)}$	$L_{A90(15minute)}$	$L_{A90(15min)}$ assending order	$10^{((L_{Aeq(15\ minute)}/10))}$	period sums	hrly sums	hrly Laeq
1	12/05/2017	18:00	44	42.1	30.2	25119			
2	12/05/2017	18:15	41.2	38.6	30.3	13183			
3	12/05/2017	18:30	40.1	36.5	31.5	10233			
4	12/05/2017	18:45	40	35.3	31.5	10000		58534	41.7
5	12/05/2017	19:00	39.9	36.6	31.7	9772			
6	12/05/2017	19:15	39.9	36.6	32.2	9772			
7	12/05/2017	19:30	39.1	36.4	32.6	8128			
8	12/05/2017	19:45	38.1	34.1	33.8	6457		34130	39.3
9	12/05/2017	20:00	38.4	32.6	34.1	6918			
10	12/05/2017	20:15	37.3	32.2	35.3	5370			
11	12/05/2017	20:30	39.2	33.8	36.4	8318			
12	12/05/2017	20:45	37.6	31.5	36.5	5754		26361	38.2
13	12/05/2017	21:00	36.6	31.5	36.6	4571			
14	12/05/2017	21:15	37.5	31.7	36.6	5623			
15	12/05/2017	21:30	37.8	30.2	38.6	6026			
16	12/05/2017	21:45	36.9	30.3	42.1	4898		21118	37.2
							140142		
1	13/05/2017	18:00	43.2	40.2	35.2	20893			
2	13/05/2017	18:15	40.3	37.3	35.3	10715			
3	13/05/2017	18:30	39.2	35.7	35.7	8318			
4	13/05/2017	18:45	39.5	35.3	36.3	8913		48838	40.9
5	13/05/2017	19:00	40.4	36.3	36.8				
6	13/05/2017	19:15	41.2	38	37.3				
7	13/05/2017	19:30	42.7	38.6	38				
8	13/05/2017	19:45	42.8	38.2	38.2				
9	13/05/2017	20:00	42.2	35.2	38.6				
10	13/05/2017	20:15	47	36.8	40.2				
11	13/05/2017	20:30	50.1	41.5	41.5				
12	13/05/2017	20:45	51.2	42.1	42.1				
13	13/05/2017	21:00	58.8	45	45				
14	13/05/2017	21:15	58.1	53.8	47.8				
15	13/05/2017	21:30	59.1	54.6	53.8				
16	13/05/2017	21:45	55.3	47.8	54.6				
							48838		
	14/05/2017	18:00	57.8	46.1	31.8				
	14/05/2017	18:15	52.4	45.1	32.9				
	14/05/2017	18:30	47.4	42.9	33.8				
	14/05/2017	18:45	50	39.4	34.7			0	#NUM!
	14/05/2017	19:00	51.6	45.6	38.3				
	14/05/2017	19:15	50.9	42.8	38.9				

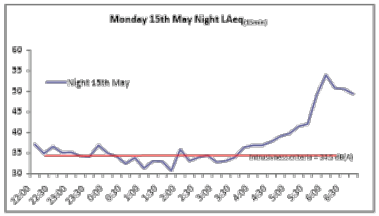


	14/05/2017	19:30	51.8	48.8	39.4			0	#NUM!
	14/05/2017	19:45	48.6	43	40				
	14/05/2017	20:00	45.7	40	42.8				
	14/05/2017	20:15	48.5	38.3	42.9				
	14/05/2017	20:30	50.1	45	43				
1	14/05/2017	20:45	45.1	38.9	45	32359		32359	39.1
2	14/05/2017	21:00	40.8	34.7	45.1	12023			
3	14/05/2017	21:15	39.4	33.8	45.6	8710			
4	14/05/2017	21:30	39.3	32.9	46.1	8511			
5	14/05/2017	21:45	39.3	31.8	48.8	8511		37755	39.7
							70114		
1	15/05/2017	18:00	55.8	51.5	43.5	380189			
2	15/05/2017	18:15	50.1	45.3	43.7	102329			
3	15/05/2017	18:30	47.9	45.2	44	61660			
4	15/05/2017	18:45	47	44	44.2	50119		594297	51.7
5	15/05/2017	19:00	46.2	43.5	44.3	41687			
6	15/05/2017	19:15	47.1	44.6	44.6	51286			
7	15/05/2017	19:30	47.4	44.3	45.2	54954			
8	15/05/2017	19:45	47	43.7	45.3	50119		198046	46.9
9	15/05/2017	20:00	46.9	44.2	51.5	48978			
10									
11									
12									
13									
14									
15									
16									
							841321		

Night Period 10pm to 7am
amenity criteria 45-50 dB(A) urban
Intrusiveness criteria (RBL+ 5) 34.5 dB(A)

Night	Date	$L_{eq(night)}$	ABL	RBL
Saturday Night	12/05/2017	38.2	29.5	
Sunday Night	13/05/2017	42.5	28.4	
Monday Night	14/05/2017	43.4	30.1	
		42.5		29.5





no.	Date	time	$L_{Aeq(15\ minute)}$	$L_{A90(15minute)}$	$L_{A90(15min)}$ assending order	$10^{((L_{Aeq(15\ minute)}/10))}$	period sums	hrly sums	hrly Laeq
1	12/05/2017	22:00	36.8	31.3	27.7	4786			
2	12/05/2017	22:15	36.9	31.5	27.9	4898			
3	12/05/2017	22:30	36.3	31.2	28.3	4266			
4	12/05/2017	22:45	38.3	32.1	28.3	6761		20711	37.1
5	12/05/2017	23:00	39.1	34.4	28.5	8128			
6	12/05/2017	23:15	39.2	36.2	28.6	8318			
7	12/05/2017	23:30	41.2	33.3	28.6	13183			
8	12/05/2017	23:45	38.6	30.7	28.7	7244		36873	39.6
9	13/05/2017	0:00	38.6	30.2	28.9	7244			
10	13/05/2017	0:15	34.8	28.9	28.9	3020			
11	13/05/2017	0:30	37.6	29.5	28.9	5754			
12	13/05/2017	0:45	37.9	31.6	29	6166		22185	37.4
13	13/05/2017	1:00	35.6	29.7	29.1				
14	13/05/2017	1:15	31.2	28.3	29.3				
15	13/05/2017	1:30	32	28.5	29.5				
16	13/05/2017	1:45	35.5	28.7	29.5				
17	13/05/2017	2:00	33.8	29	29.7				
18	13/05/2017	2:15	32.6	28.9	30.2				
19	13/05/2017	2:30	33.8	29.1	30.5				
20	13/05/2017	2:45	32.4	28.6	30.7				
21	13/05/2017	3:00	31.9	27.9	30.8				
22	13/05/2017	3:15	30	27.7	30.9				
23	13/05/2017	3:30	35.3	28.6	31.2				
24	13/05/2017	3:45	32.2	28.3	31.3				
25	13/05/2017	4:00	32.3	29.3	31.5				
26	13/05/2017	4:15	42.4	31.7	31.6				
27	13/05/2017	4:30	38.4	28.9	31.7				
28	13/05/2017	4:45	37.6	30.5	32.1				
29	13/05/2017	5:00	34.2	29.5	33.3				
30	13/05/2017	5:15	36.4	30.9	34.4				
31	13/05/2017	5:30	37.5	30.8	36.2				
32	13/05/2017	5:45	48.4	37.1	37.1				
33	13/05/2017	6:00	51.9	39.3	39.3				
34	13/05/2017	6:15	53	48.8	40.4				
35	13/05/2017	6:30	50	43.4	43.4				
36	13/05/2017	6:45	46.3	40.4	48.8				
							79768		
	13/05/2017	22:00	46.7	41.5	28.4				
	13/05/2017	22:15	44	38	28.4				
	13/05/2017	22:30	43.5	37.2	28.4				
	13/05/2017	22:45	43.4	35.6	28.6				
	13/05/2017	23:00	43.9	36.8	28.6				
1	13/05/2017	23:15	41	32.4	29.1	12589			
2	13/05/2017	23:30	38	31.1	29.2	6310			
3	13/05/2017	23:45	37.4	30.2	29.5	5495		24394	39.1
4	14/05/2017	0:00	38.5	30.1	29.8	7079			
5	14/05/2017	0:15	37.3	29.5	29.9	5370			
6	14/05/2017	0:30	37.9	29.2	29.9	6166			
7	14/05/2017	0:45	36.7	29.8	30.1	4677		23293	37.7

8	14/05/2017	1:00	34.6	28.4	30.1	2884			
9	14/05/2017	1:15	35.5	28.6	30.1	3548			
10	14/05/2017	1:30	38.3	30.1	30.2	6761			
11	14/05/2017	1:45	41.3	34	30.8	13480	26683	38.2	
12	14/05/2017	2:00	41.1	34.4	30.9	12882			
13	14/05/2017	2:15	44.3	33.1	31.1	26915			
14	14/05/2017	2:30	40.7	32.4	31.1	11749			
15	14/05/2017	2:45	38.6	31.1	32.3	7244	58791	41.7	
16	14/05/2017	3:00	43.1	35	32.4	20417			
17	14/05/2017	3:15	43.7	36.3	32.4	23442			
18	14/05/2017	3:30	40.5	32.3	33.1	11220			
19	14/05/2017	3:45	38.4	30.8	34	6918	61998	41.9	
20	14/05/2017	4:00	37.4	29.9	34	5495			
21	14/05/2017	4:15	34.8	28.6	34.4	3020			
22	14/05/2017	4:30	35.8	28.4	34.9	3802			
23	14/05/2017	4:45	35.4	28.4	35	3467	15785	36.0	
24	14/05/2017	5:00	35.8	29.1	35.3	3802			
25	14/05/2017	5:15	38.2	29.9	35.6	6697			
26	14/05/2017	5:30	35.6	30.1	36.3	3631			
27	14/05/2017	5:45	48.2	30.9	36.4	66069	80109	43.0	
28	14/05/2017	6:00	50.5	34	36.8	112282			
29	14/05/2017	6:15	48.6	35.3	37.2	72444			
30	14/05/2017	6:30	44.7	34.9	38	29512			
31	14/05/2017	6:45	46.1	36.4	41.5	40736	254696	48.0	
							545948		
1	14/05/2017	22:00	37.1	31.6	29.9	5129			
2	14/05/2017	22:15	34.9	31.6	29.9	3090			
3	14/05/2017	22:30	36.6	32.1	30.1	4571			
4	14/05/2017	22:45	35.1	31.5	30.3	3236	16026	36.0	
5	14/05/2017	23:00	35.2	31.3	30.3	3311			
6	14/05/2017	23:15	34.3	30.5	30.3	2692			
7	14/05/2017	23:30	34.1	30.5	30.3	2570			
8	14/05/2017	23:45	36.9	32.8	30.4	4898	13471	35.3	
9	15/05/2017	0:00	35	31.5	30.5	3162			
10	15/05/2017	0:15	34.2	30.4	30.5	2630			
11	15/05/2017	0:30	32.4	30.7	30.5	1738			
12	15/05/2017	0:45	33.9	30.9	30.7	2455	9985	34.0	
13	15/05/2017	1:00	31.3	30.3	30.7	1349			
14	15/05/2017	1:15	33.1	30.3	30.9	2042			
15	15/05/2017	1:30	33	29.9	30.9	1995			
16	15/05/2017	1:45	30.7	29.9	30.9	1175	6861	32.1	
17	15/05/2017	2:00	35.9	30.7	31	3690			
18	15/05/2017	2:15	33.1	31.3	31	2042			
19	15/05/2017	2:30	34	30.9	31	2512			
20	15/05/2017	2:45	34.4	30.3	31.1	2754	11198	34.5	
21	15/05/2017	3:00	32.8	30.5	31.3	1935			
22	15/05/2017	3:15	33.1	30.3	31.3	2042			
23	15/05/2017	3:30	34	31	31.5	2512			
24	15/05/2017	3:45	36.4	31.9	31.5	4365	10824	34.3	
25	15/05/2017	4:00	36.9	31.1	31.6	4898			
26	15/05/2017	4:15	36.9	30.1	31.6	4898			
27	15/05/2017	4:30	37.8	31	31.9	6026			
28	15/05/2017	4:45	39.1	31	32.1	8128	23949	37.8	
29	15/05/2017	5:00	39.8	30.9	32.8	9650			
30	15/05/2017	5:15	41.5	33.1	33.1	14125			
31	15/05/2017	5:30	42.1	37.2	37.2	16218			
32	15/05/2017	5:45	49.2	39.1	39.1	83176	123070	44.9	
33	15/05/2017	6:00	54	42.8	42.8	251189			
34	15/05/2017	6:15	50.8	44	44	120226			
35	15/05/2017	6:30	50.6	45.7	45.2	114815			
36	15/05/2017	6:45	49.4	45.2	45.7	87096	573327	51.6	
							788411		

PETITION

To the Mayor and Councillors of the Ballina Shire Council

Subject of petition: DA 2017-312 Seeking approval of illegally constructed Private Skateboard Ramp and use of the Skateboard Ramp.

Action requested: We, the undersigned, request the Mayor and Councillors of the Ballina Shire Council to:

Reject this proposal – the construction of private skateboard ramps in the midst of residential areas is totally inappropriate. The noise associated with this ramp will adversely impact on the health and wellbeing of residents.

WOULD YOU LIKE A PRIVATE SKATEBOARD RAMP IN YOUR NEIGHBOURS YARD?

NAME (please print)	Address (please print)	Phone no or email address	Signature
Ralph Tully	43 North Ck Rd Lennox Hd	0427785561	[signature]
Victor Liniardon	5 Platypus Uralba	0422 253 047	[signature]
Vicki Heathwood	19 Wollongbar Dr Wollongbar	0432 347 264	[signature]
Johanne Tully	43 North Creek Rd, Lennox Head	0427785561	[signature]
PETER CORDERY	61 HUXLEY DR LENNOX HEAD	0423 224 339	[signature]
Lesley Cordery	61 Huxley Dr. Lennox Head	—	[signature]
Michele Wallace	31 Granada Pde, Alstonville	0413686913	[signature]
ROBERT MCRAE	4 TYRONE PL ALSTONVILLE	0478721474	[signature]

Andreas Wagner
Kirsten Michalek-Wagner
7 Cooloola Ave
Lennox Head, NSW 2478
Australia
Phone 0409 471086
andreas@coolplanetdesign.com.au

Date: 11th July 2017
To: The Ballina Council

Ref: Objection against the Development of a skate ramp outlined under DA 2017/312
Attn: David Tyler, Ballina Shire Council

DA NO: DA 2017/312

APPLICANT: Newton Denny Chapelle

PROPERTY: Lot: 1 DP: 609873, 2-12 Greenwood Place LENNOX HEAD

PROPOSAL: Construction and use of a private skateboard ramp facility

Dear David,

With this letter we would like to express our strongest objection against the development of a skate ramp as outlined under DA 2017/312.

We have, like most neighbours objected against the first DA in the different location on the property, which was closer to our own property. This was based on the fact that the vast majority of privately build skate ramps have being subsequently closed down due to noise disturbances, all throughout NSW.

Given that the "proposed" ramp has already been built without Council Approval in a slightly different location from where it was first rejected, the entire process of seeking approval at this stage has already severely been compromised by the proponents.

If the proponent really cared about the noise impact on us neighbours they would have carried out **real** sound modeling instead of a computer simulation. More importantly, the consultant has been paid for by the proponents, and therefore the independence and due process is compromised.

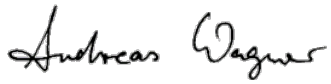
Furthermore, it is questionable that mere computer modeling can simulate accurately and completely the future noise patterns of this skate ramp. We all know skate ramps are not only used for skating, but are a place for kids and young adults to hang out, skate and party.

It is outright false to claim that noise is not travelling down to our house. In fact, we regularly close all windows and doors when our neighbours turn on their music.

Given that the Ballina Shire Council has made ample provisions for skating enthusiasts with a public skate park that is a mere 4 minutes walking distance away from the proposed ramp, we feel that this DA is not only out of place for the planning set out for our neighbourhood, but that it is completely unnecessary.

Sincerely,

Kirsten Michalek-Wagner



Andreas Wagner

Dear Councillors

Re: DA2017-312

It has come to our attention that this application seeks to gain approval for an illegally constructed skate ramp in a backyard in what is a residential area.

It seems to us that many in the community would like to pursue or practise their hobby or sport in the convenience of our own back yard but we cannot because of dangers and or inconvenience to our neighbours. There is no doubt that skateboarding down a ramp would cause undue and unwelcome noise intrusion into neighbouring households, A community funded skate ramp has been provided nearby.

We ask that you vote against approving the development because it is an inappropriate activity to be carried out in a residential area.

Yours faithfully

Trevor and Pam Reynolds

51 Silvergull Drive

BALLINA 2478 NSW