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Table of Contents

SUMMARY ..... i  
1 INTRODUCTION ..... 1  
2 SITE DESCRIPTION ..... 2  
3 METHODOLOGY ..... 3  
4 NIRV RECOMMENDED NOISE LEVELS ..... 5  
5 NOISE IMPACT PREDICTION ..... 6  
6 COMPLIANCE RESULTS ..... 10  
7 DISCUSSION ..... 11  
APPENDIX I - ZONING MAP ..... 12  
APPENDIX II - Motorcycle Noise Data ..... 13  
APPENDIX III - Glossary of Terms ..... 14

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Report By: William Dalmau, Senior Acoustic Consultant

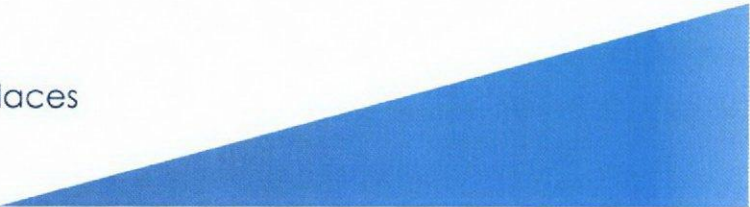
Reviewed By: Adrian Pinto, Acoustic Consultant

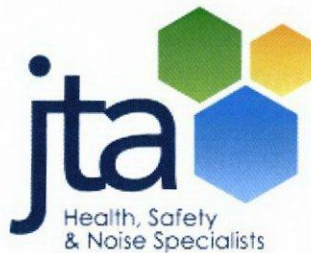


ENVIRONMENTAL NOISE ASSESSMENT  
LEONGATHA SOUTH



Creating safe, healthy + productive workplaces





Environmental Noise Study  
Proposed Off-road Motorcycle Track

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## SUMMARY

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An off-road motorcycle track has been proposed at a lot of land located at 85 Merricks Track, Leongatha South. As part of due diligence, residents located in the areas surrounding the proposed track wish to understand the noise impact that the operation of the motorcycle track will have on noise sensitive receivers in the local area.

An Environmental Noise Assessment was performed by JTA Health, Safety & Noise Specialists in accordance with the requirements of the State Environmental Protection Policy N-1 (Control of Noise from Commerce, Industry and Trade) (SEPP N-1) and EPA publication 1411 Noise from Industry in Regional Victoria (NIRV).

The nearest noise sensitive receivers to the proposed event were identified and NIRV Recommended Noise Levels determined from the noise criteria for the event. A noise model was developed to predict the effective noise levels of the event at noise sensitive receivers under worst case conditions.

The results of the assessment indicated the following:

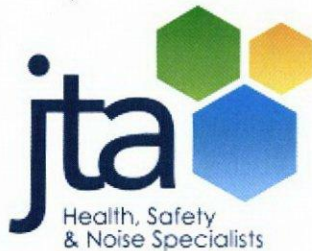
- Non-compliance with the NIRV day noise limits is predicted at R1, R21, R22, R23 and R29
- Non-compliance with the NIRV evening noise limits is predicted at R1, R3, R4, R17, R19, R21, R22, R23 and R29. Marginal compliance is predicted at R2, R5, R6 and R13.

The proposed motorcycle tracks' effective noise level incorporates an adjustment for both tonal and impulsiveness characteristics of the predicted noise level in accordance with SEPP N-1 methodology. It cannot be certain via prediction whether these adjusts are required as they are determined subjectively in the field at noise sensitive locations. Extraneous noise sources in the area may be of sufficient noise level or character as to remove the need for the adjustments at noise sensitive receiver locations.

As the assessment was modelled to represent worst-case conditions and the inclusion of the SEPP N-1 adjustments, the effective noise level may be considered conservative.

Of note, evening time noise limits apply to weekend days of the following times:

- Saturdays – 1pm till 10pm
- Sundays – 7am till 10pm



Environmental Noise Study  
Proposed Off-road Motorcycle Track

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## 1 INTRODUCTION

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An off-road motorcycle track has been proposed at a lot of land located at 85 Merricks Track, Leongatha South. As part of due diligence, residents located in the areas surrounding the proposed track wish to understand the noise impact that the operation of the motorcycle track will have on noise sensitive receivers in the local area. JTA Health, Safety & Noise Specialists was commissioned by Peter Lyon to perform an environmental noise study of the proposed motorcycle track.

The Environmental Noise Assessment was performed in accordance with the requirements of EPA publication 1411 Noise from Industry in Regional Victoria (NIRV).

The Environmental Noise Assessment included the following:

1. Determination of noise generating and noise receiving Zoning Levels.
2. Calculation of the Recommended Noise Levels for the relevant noise sensitive locations in accordance with the requirements of the NIRV document.
3. Prediction of the Effective Noise Levels associated with the motorcycle track operation with consideration of the track layout, estimated number of vehicle in attendance, and maximum number of motorcycles competing at any time.
4. Comparison of Effective Noise Levels with Recommended Noise Levels to determine compliance with the requirements of the NIRV document.
5. Preparation of a report detailing the conditions of the assessment, the results of the assessment, a comparison with the relevant Recommended Noise Levels and, where required, recommendations to assist in meeting with the requirements of the NIRV document guidelines.

A zoning map for the area is attached in Appendix I.

A glossary of terminology used in this report is detailing in Appendix III.

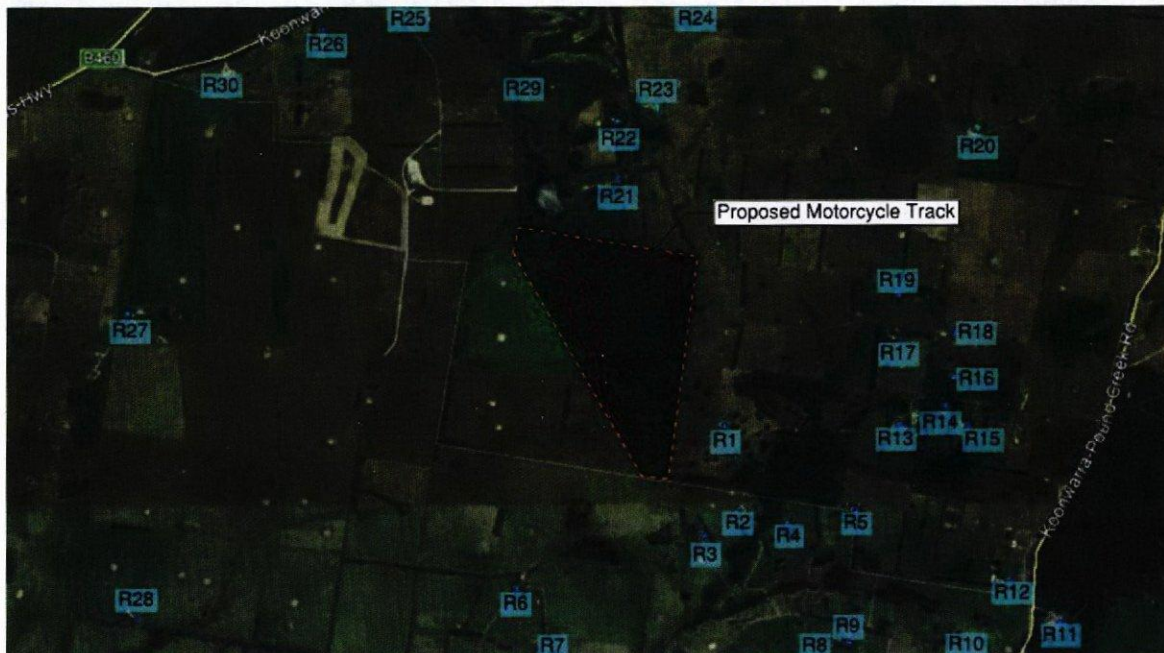


## Environmental Noise Study Proposed Off-road Motorcycle Track

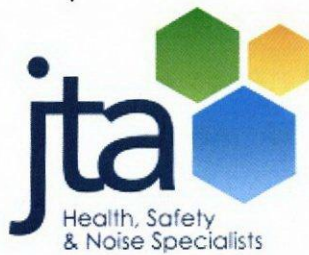
### 2 SITE DESCRIPTION

The operation of the track will involve high noise levels from motocross and adventure motorbikes competing around a track that consists of small straights and many intricate turns. The application for the motorcycle track has stated an average of approximately 250 riders will utilise the track per day of use. For the purposes of this assessment it has been assumed motorcycles will leave in small groups at the north east section of the track and depart in a staggered duration, with an expected course time of 18 minutes. This will result in a maximum of approximately 50 bikes on the course at any one time and is considered a worst-case scenario. The track is proposed to be used for 8 hours, JTA has interpreted this as operating between 7:30am and 4pm.

Figure 2.1 below details the proposed track, nearest noise sensitive receivers (NSRs) and the surrounding environment. NSRs have been designated numbers from 1 to 30 for the purposes of identifying the noise levels of the motorcycle activity at their locations.



**Figure 2.1 – Proposed event site and surrounding environment**



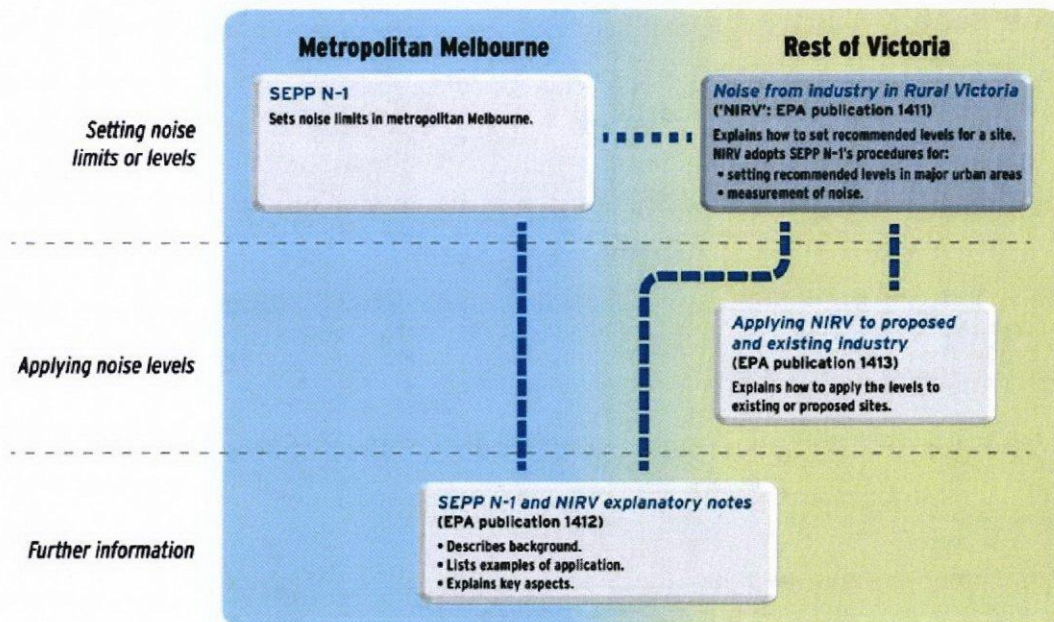
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Proposed Off-road Motorcycle Track

**3 METHODOLOGY**

The township of Leongatha South is located outside the boundary of metropolitan Melbourne in terms of assessing whether a SEPP N-1 or NIRV assessment approach should be adopted. As Leongatha South is outside metropolitan Melbourne, it currently falls under NIRV.

**3.1 EPA Guidelines & Publications**

The Environmental Protection Authority sets policies, regulations and guidance to assist with preventing and controlling excessive noise within Metropolitan and Regional Victoria. Figure 3.1 below illustrates the EPA publications and their uses.

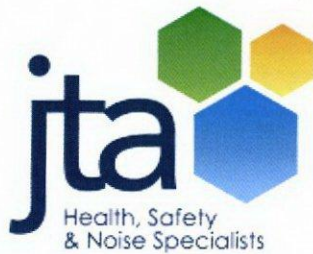


**Figure 3.1 – EPA publications covering noise levels and limits in Victoria**

\*Figure taken from EPA Publication 1412 – SEPP N-1 and NIRV explanatory notes.

Both SEPP N1 and NIRV use the time periods tabulated in Table 3.1 below.

Period	Parameters		
	Monday to Friday	Saturday	Sunday
<b>Day:</b>	0700 – 1800	0700 - 1300	-
<b>Evening:</b>	1800 – 2200	1300 - 1800	0700 - 1800
<b>Night:</b>	2200 - 0700	2200 - 0700	2200 - 0700



## Environmental Noise Study Proposed Off-road Motorcycle Track

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### **3.2 State Environmental Protection Policy No.N-1**

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The goal of SEPP (Control of Noise from Commerce, Industry and Trade) No. N-1 is to protect people from commercial, industrial and trade noise that may affect the beneficial use of noise sensitive areas, which include normal domestic and recreational activities, including in particular, sleep in the night period.

SEPP N-1 prescribes noise limits for commercial, industrial and trade, and provides details on noise measurement procedures, including the measurement of background levels and adjustments to effective noise levels.

Noise Limits are based on the combination of the Background Level, the land use zoning and the time period being measured. The Influencing Factor and Noise Limits were calculated using local zoning information (Appendix I – Zoning Map).

The Background Noise Levels and Noise Level from a facility are measured at a point within a "Noise Sensitive Area", usually the nearest residence or a site of complaint. The noise level is adjusted where necessary for factors that increase the annoyance of the noise such as tone, intermittency, and impulsive components. The final level is the Effective Noise Level, and is compared with the Noise Limit to determine compliance.

### **3.3 Noise from Industry in Regional Victoria (NIRV)**

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EPA Publication 1411 – Noise from Industry in Regional Victoria (NIRV) provides the methods and procedures for setting noise limits for industry in regional Victoria. They provide a balance between protecting community wellbeing and amenity near industrial premises and supporting the social and economic value of industry in regional Victoria.

These guidelines apply in all Victorian Locations outside of the SEPP N-1 area.

NIRV uses two approaches to setting recommended noise limits, depending on where the industry is located:

- In larger cities at the urban fringe of Melbourne (NIRV 'major urban areas') NIRV uses the procedures set out in SEPP N-1 to set recommended levels.
- In 'rural areas' including small towns, NIRV has a separate procedure for setting recommended levels. When using this procedure, noise limits are determined based on limits provided in Table 1 of the NIRV.

In order to determine the applicable noise limits for the industry under assessment, the land use zones must be determined for the 'generating zone' and the 'receiving zone' using the local planning scheme relevant to the area.

Adjustments are then made to the determined noise limits based on distance between the source and receiver. The adjusted levels are compared to the base noise limits for each time period (day, evening and night) and the greater of the two is adopted.



## Environmental Noise Study Proposed Off-road Motorcycle Track

A background noise level assessment is then performed in 'background-relevant areas' to account for any major background noise contributors such as freeways or highways. The noise limits are then compared to the background noise level checks adopting the following for each period:

**Day** – the greater of:

- The distance adjusted level or base noise level.
- The background level plus 8dB.

**Evening** – the greater of:

- The distance adjusted level or base noise level.
- The evening background level plus 5dB.

**Night** – the greater of:

- The distance adjusted level or base noise level.
- The night background level plus 5dB.

To determine the existing noise levels emitted by the industry under assessment, the noise emissions are measured in accordance with the procedures of SEPP N-1.

#### 4 NIRV RECOMMENDED NOISE LEVELS

The local area around noise sensitive receiver locations has been determined to be unlikely to be background affected due to the isolation from any main roads.

NIRV zoning and Recommended Noise Levels for the nearest noise sensitive receivers are presented in Table 4.1 below.

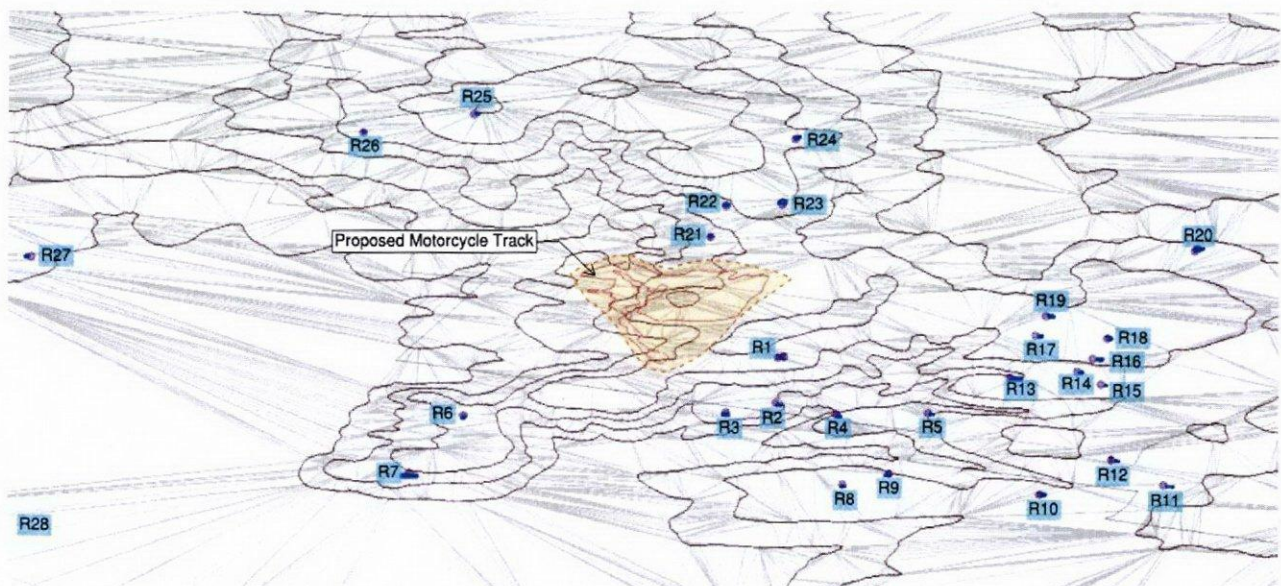
Location	Generating Zone	Receiving Zone	Distance Between Zones	Period	Background Noise Level dB(A)	Distance Adjusted Zoning Level	Recommended Noise Level dB(A)
R1 to R30	Farming Zone - FZ	Farming Zone - FZ	0m	Day	-1	46	46
R1 to R30	Farming Zone - FZ	Farming Zone - FZ	0m	Evening	-1	41	41
R1 to R30	Farming Zone - FZ	Farming Zone - FZ	0m	Night	-1	36	36

1- Local area not background noise affected.

## 5 NOISE IMPACT PREDICTION

The prediction of the motorcycle track generated noise levels at the noise sensitive receivers has been completed by utilising the ISO 9613-2 1996 algorithms. Noise source data was obtained for off-road type motorbike exhaust operating under different conditions.

Noise modelling can be a powerful tool in assessing noise from noise sources in a complex environment. The proposed track location has a large variance in topography in a relatively small area with regard to noise sensitive receivers, and a complex track structure. Noise modelling can accurately determine what the noise impact will be on the surrounding environment and how the noise environment will change when problem noise sources are controlled. Figure 5.1 below details the model and the topography of the local area.



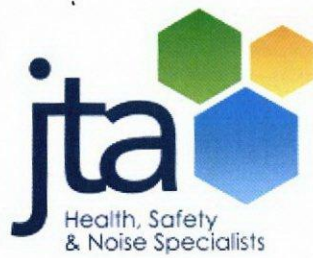
**Figure 5.1 – Noise model and topography of local area**

Noise modelling of the proposed track and the surrounding environment has been prepared by utilising SoundPLAN software to determine the noise impact the event will have on nearby noise sensitive receivers. The model utilises the ISO 9613-2 1996 calculation method for noise prediction.

To represent the noise levels generated from the event under worst-case conditions, the noise model was prepared with 50 motorcycles distributed throughout the course under a variety of operating conditions, i.e. Full load when travelling up hill, intermittently on throttle when in intricate components, light on the throttle in hairpins, etc. Modelled noise levels are based upon typical aftermarket exhaust noise levels. Figure 5.2 on the following page details how motorbikes on the proposed motorcycle track have typically been distributed, with 2 or 3 motorbikes modelled on each section of the track. Additionally, the noise attenuation due to foliage has also been considered.

Appendix II provides motorcycle sound power noise data.





Environmental Noise Study  
Proposed Off-road Motorcycle Track



Figure 5.2 – Proposed Track Motorcycle Noise Distribution

**5.1 Predicted NIRV Effective Noise Levels**

Predicted NIRV Effective Noise Levels are presented in Table 5.1 below. Due to the nature of motorcycles at the proposed track it is expected both a minor tonal and impulsiveness penalty may be applicable in accordance with SEPP N-1.

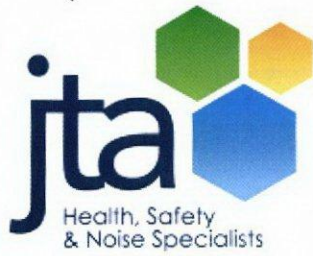
Table 5.1 – Predicted NIRV Effective Noise Levels			
Location	Modelled Noise Level dB(A)	SEPP N-1 Adjustment (Tonal & Impulsive)	Effective Noise Level dB(A)
R1	44	4	48
R2	37	4	41
R3	39	4	43
R4	38	4	42
R5	37	4	41
R6	37	4	41
R7	30	4	34



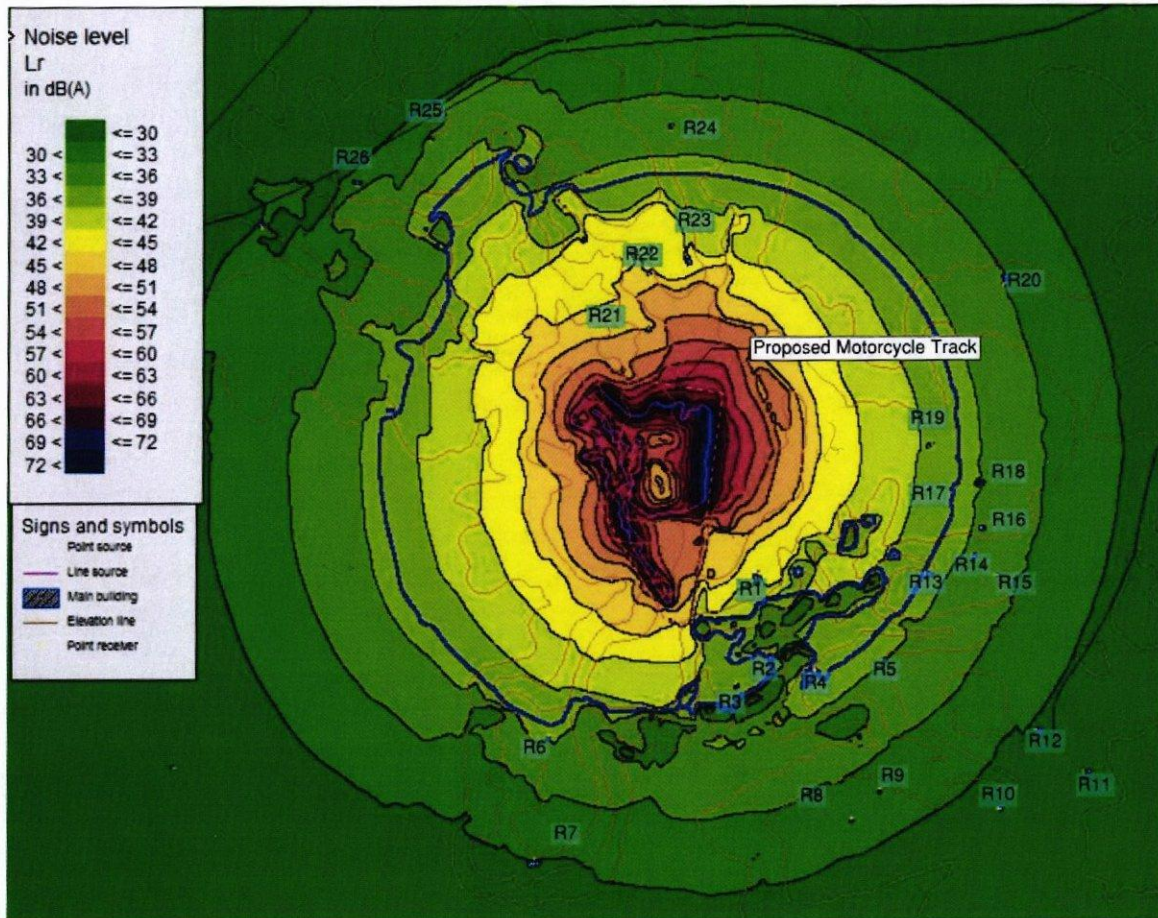
Environmental Noise Study  
Proposed Off-road Motorcycle Track

<b>Location</b>	<b>Modelled Noise Level dB(A)</b>	<b>SEPP N-1 Adjustment (Tonal &amp; Impulsive)</b>	<b>Effective Noise Level dB(A)</b>
<b>R8</b>	32	4	36
<b>R9</b>	32	4	36
<b>R10</b>	29	4	33
<b>R11</b>	28	4	32
<b>R12</b>	30	4	34
<b>R13</b>	37	4	41
<b>R14</b>	36	4	40
<b>R15</b>	35	4	39
<b>R16</b>	36	4	40
<b>R17</b>	39	4	43
<b>R18</b>	36	4	40
<b>R19</b>	39	4	43
<b>R20</b>	33	4	37
<b>R21</b>	49	4	53
<b>R22</b>	47	4	51
<b>R23</b>	45	4	49
<b>R24</b>	35	4	39
<b>R25</b>	35	4	39
<b>R26</b>	34	4	38
<b>R27</b>	29	4	33
<b>R28</b>	27	4	31
<b>R29</b>	45	4	49
<b>R30</b>	33	4	37

A noise contour map of the modelled noise output from the event is presented in Figure 5.3 on the following page. A limit line of has been included, highlighted in blue, to indicate where compliance with the NIRV evening criteria is achieved. The evening noise limit has been shown as it is anticipated most usage of the track will occur during weekends.



Environmental Noise Study  
Proposed Off-road Motorcycle Track



**Figure 5.3 – Noise Contour Map of Proposed Motorcycle Track**

It can be seen from the noise contour map that the uphill straight on the eastern section of the track generates the highest noise levels.

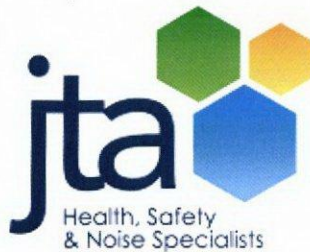


Environmental Noise Study  
Proposed Off-road Motorcycle Track

## 6 COMPLIANCE RESULTS

A comparison of the proposed motorcycle track effective noise levels with the NIRV recommended noise levels is presented in Table 6.1.

Table 6.1 – NIRV Predicted Compliance			
Location	Modelled Noise Level dB(A)	NIRV Compliance?	
		Day Noise Limit 46 dB(A)	Evening Noise Limit 41 dB(A)
R1	48	No	No
R2	41	Yes	Marginal
R3	43	Yes	No
R4	42	Yes	No
R5	41	Yes	Marginal
R6	41	Yes	Marginal
R7	34	Yes	Yes
R8	36	Yes	Yes
R9	36	Yes	Yes
R10	33	Yes	Yes
R11	32	Yes	Yes
R12	34	Yes	Yes
R13	41	Yes	Marginal
R14	40	Yes	Yes
R15	39	Yes	Yes
R16	40	Yes	Yes
R17	43	Yes	No
R18	40	Yes	Yes
R19	43	Yes	No
R20	37	Yes	Yes
R21	53	No	No
R22	51	No	No
R23	49	No	No
R24	39	Yes	Yes
R25	39	Yes	Yes
R26	38	Yes	Yes
R27	33	Yes	Yes
R28	31	Yes	Yes



Environmental Noise Study  
Proposed Off-road Motorcycle Track

Location	Modelled Noise Level dB(A)	NIRV Compliance?	
		Day Noise Limit 46 dB(A)	Evening Noise Limit 41 dB(A)
<b>R29</b>	49	No	No
<b>R30</b>	37	Yes	Yes

The results indicate non-compliance with NIRV noise limits is predicted at R1, R21 and R22 during all time periods. Additionally non-compliance with the NIRV evening noise limits is predicted at R23. At many locations the motorcycle track is predicted to exceed the NIRV night time criteria if the track was to be used between 10pm and 7am.

## 7 DISCUSSION

The results of the assessment indicated the following:

- Non-compliance with the NIRV day noise limits is predicted at R1, R21, R22, R23 and R29
- Non-compliance with the NIRV evening noise limits is predicted at R1, R3, R4, R17, R19, R21, R22, R23 and R29. Marginal compliance is predicted at R2, R5, R6 and R13.

The proposed motorcycle tracks' effective noise level incorporates an adjustment for both tonal and impulsiveness characteristics of the predicted noise level in accordance with SEPP N-1 methodology. It cannot be certain via prediction whether these adjusts are required as they are determined subjectively in the field at noise sensitive locations. Extraneous noise sources in the area may be of sufficient noise level or character as to remove the need for the adjustments at noise sensitive receiver locations.

As the assessment was modelled to represent worst-case conditions and the inclusion of the SEPP N-1 adjustments, the effective noise level may be considered conservative.

Of note, evening time noise limits apply to weekend days of the following times:

- Saturdays – 1pm till 10pm
- Sundays – 7am till 10pm



**APPENDIX I - ZONING MAP**



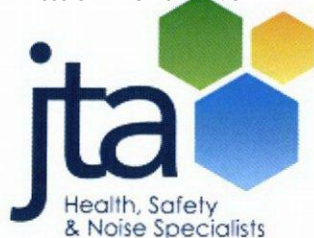
April 2018



Environmental Noise Study  
Proposed Off-road Motorcycle Track

#### APPENDIX II - Motorcycle Noise Data

Source	Lw	Frequency (HZ) / dB(Z)																							
		50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2,5k	3.15k	4k	5k	6.3k	8k	10k
Straight uphill	120	81	95	91	97	106	104	104	101	100	99	102	106	107	109	110	110	111	110	109	107	108	106	105	101
Accelerating up hill on curves	115	103	105	105	108	108	104	103	104	101	96	92	93	94	96	99	100	96	95	94	92	90	87	84	79
Hairpin curves	90	51	65	61	67	76	74	74	71	70	69	72	76	77	79	80	80	81	80	79	77	78	76	75	71
Downhill straight	97	58	72	68	74	83	81	80	77	76	75	79	82	83	86	87	87	87	86	85	84	85	83	82	78
Intricate low speed	90	51	65	61	67	76	74	74	71	70	69	72	76	77	79	80	80	81	80	79	77	78	76	75	71
Higher speed intricate	100	95	97	97	100	99	96	94	96	93	88	84	84	85	87	91	91	88	86	85	83	81	79	75	70

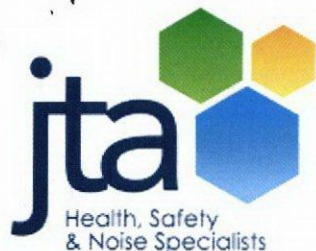


Environmental Noise Study  
Proposed Off-road Motorcycle Track

### APPENDIX III – Glossary of Terms

Term	Definition
<b>Background Noise</b>	Background noise is any <u>sound</u> other than the sound being monitored/assessed and is associated with that environment, being a composite of sounds from many sources, near and far.
<b>Extraneous Noise</b>	Extraneous noise is any noise which is not part of the noise being measured/assessed i.e. from the facility, premises or venue. Extraneous noise can include wind on vegetation or on the microphone, aircraft noise and wildlife.
<b>SEPP N-1</b>	<i>State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1)</i> . SEPP N-1 manages the impact of noise from commercial, industrial and trade premises on residential and other noise-sensitive uses in metropolitan Melbourne.  SEPP N1 prescribes noise limits for commercial, industrial and trade, and provides details on noise measurement procedures, including the measurement of background levels and adjustments to effective noise levels.
<b>NIRV</b>	<i>EPA Publication 1411 – Noise from Industry in Regional Victoria (NIRV)</i> provides the methods and procedures for setting recommended noise levels for industry in regional Victoria. They provide a balance between protecting community wellbeing and amenity near industrial premises and supporting the social and economic value of industry in regional Victoria.
<b>Noise Sensitive Receiver (NSR)</b>	A Noise Sensitive Receiver (NSR) is an identified location where sensitive personal and/or activity are located, usually a dwelling where people sleep.
<b>Effective Noise Level</b>	As defined by SEPP N-1 the Effective Noise Level is the level of noise emitted from the commercial, industrial or trade premises and adjusted if appropriate for character and duration.
<b>Octave &amp; 1/3 octave bands</b>	The spectrum of the sound split into distinct logarithmic frequencies in Hertz (HZ).
<b>Tonal Noise</b>	Tonal noise is defined as a significant variation between a 1/3 octave band relative to its adjacent bands. An example would be a whistle blowing, where a large portion of the sound energy is focused into a narrow part of the noise spectrum.
<b>Noise Limit</b>	The Noise Limit is defined by SEPP N-1 as the maximum effective noise level allowed at a measurement point at a Noise Sensitive Receiver location.
<b>Recommended Noise Level</b>	Recommended Noise Levels according to NIRV provide different degrees of amenity protection in different land-use zones. Overall, they balance the need for operation of industry with the protection of sensitive uses. The recommended levels promote normal domestic use of the home and sleep at night.
<b>Noise Logger</b>	A noise logger is a long term noise monitoring device deployed into the field where it can operate with no direct control from a user for a significant amount of time (4 days to 2 weeks to infinite).
<b>dB(A)</b>	An expression of the relative loudness of sounds in air as perceived by the human ear. In the A-weighted system, the decibel values of sounds at low frequencies are reduced, compared with unweighted decibels, in which no correction is made for audio frequency. A unit of acoustic measurement electronically weighted to approximate the sensitivity of human hearing to sound frequency.
<b>dB(C)</b>	The C scale is practically linear over several octaves and is thus suitable for subjective measurements only for very high sound levels. Measurements made on this scale are expressed as dB(C).
<b>dB(lin)</b>	dB(lin) or dB(Z) is an unweighted value of sound over a spectrum.





Environmental Noise Study  
Proposed Off-road Motorcycle Track

Term	Definition
<b>Decibel</b>	The decibel is a logarithmic unit, used for a wide variety of measurements in science and engineering. A unit of acoustic measurement. Measurements of power, pressure and intensity may be expressed in dB relative to standard reference levels.
<b>Impulse Noise</b>	Impulse noise is noise that consists of a distinct single pressure peak, a sequence of single peaks, a single burst with multiple pressure peaks or a sequence of such bursts. Impulse noise may be the only noise present or may be superimposed on a background of a continuous noise. Impulse noise presents an additional noise hazard in that, if the peak level is sufficiently high an instantaneous injury may result.
<b>L<sub>eq</sub></b>	Equivalent continuous sound pressure level. The sound pressure level of a continuous steady sound that has the same sound energy as the actual time-varying sound.
<b>L<sub>Max</sub></b>	The maximum sound pressure level (L <sub>Max</sub> ) is the highest sound pressure level measured over a given time constant or measurement period.
<b>L<sub>A10</sub></b>	The L <sub>A10</sub> dB or L <sub>10</sub> dB(A) is the A-weighted sound pressure level which exceeds for 10 percent of the time interval considered. i.e. the average of the noisiest 10 percent of measured values over a time period.
<b>L<sub>A90</sub></b>	The L <sub>A90</sub> dB or L <sub>90</sub> dB(A) is the A-weighted sound pressure level which is exceeded for 90 percent of the time interval considered. i.e. the average of the quietest 10 percent of measured values over a time period.
<b>Sound Pressure Level</b>	<p>A measurement of sound pressure, expressed in decibels, with respect to the threshold of hearing. The threshold of hearing is usually defined as 20 micropascals, which is assigned a value of 0 decibels.</p> <p>Ambient sound pressure level – The all encompassing sound/noise during typical operations within an environment e.g. workshop, office, factory floor</p> <p>Task specific sound pressure level measurements – generally performed at the operator position or a representative area of a piece of equipment.</p>
<b>Sound Power Level</b>	<p>The sound energy emitted by a sound source. i.e. where a sound wave energy is condensed to its point of origin.</p> <p>An example would be measuring a speaker at 10 metres is the sound pressure level, where if the sound wave sphere that is being generated by the speaker was shrunk back to the point of the speaker cone, that would be the sound power energy level.</p>