Elizabeth Taylor
Town Planner
23 Vallely Street
FRESHWATER QLD 4880

03 November, 2017

My Ref: ET17-025
Council Ref: DA 17/0029

Chief Executive Officer
Mareeba Shire Council
PO Box 154
MAREEBA QLD 4880

ATTENTION: Mr Carl Ewin

Dear Sir,

RE: RESPONSE TO COUNCIL INFORMATION REQUEST, MCU APPLICATION – AIR SERVICES (PRIVATE AIRSTRIP) ON LOT 1 RP746336 AT 343 FANTIN ROAD KOAH.

Outlined below is a complete response to Council's Amended Acknowledgement Notice dated 30 June, 2017.

For ease of reference the two (2) issues are reproduced below, followed by a response.

Issue 1: Flight Activity Controls

Although it is acknowledged that other private airstrips exist and operate within the Shire with limited controls on flight activity, these airstrips are generally located in more sparsely populated areas. Given the number of dwellings in the vicinity of the subject site, Council officers are unlikely to support the proposed air services use without some form of controls in place on flight activity (i.e. number of take-off/landings per day/week/year).

Please provide Council with further details of the desired flight activity sought by this application which can be quantified in the event that the application is approved by Council.

AND

Issue 2: Acoustic Assessment

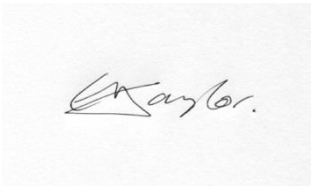
Please provide Council with an acoustic report prepared by an accredited acoustic engineer addressing the issue of potential noise nuisance to the residents in surrounding dwelling houses as a result of the proposed increased flight activity as well as measures to prevent such nuisance.

Response

Please find attached at Appendix 1 an Acoustics Report prepared by Dedicated Acoustics and dated 03 November, 2017 which addresses both issues outlined above.

Please be advised that the Public Notification of the application will commence shortly.

Yours faithfully,



Elizabeth Taylor
Town Planner

APPENDIX: 1

Brisbane
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NOISE IMPACT ASSESSMENT

MATERIAL CHANGE OF USE – AIR SERVICES (PRIVATE AIRSTRIP

343 Fantin Road, Koah QLD 4881
(Lot 1 on RP746336)

Document Control Page

Document Title: A168 – 343 Fantin Rd Koah – Noise Impact Assessment (Rev 3)

Date: 3rd November 2017

Prepared by: Craig O'Sullivan, BEng (Mech) MAAS

Reviewed by: Craig O'Sullivan, BEng (Mech) MAAS

Revision History

Date	Revision	Description	Authorised	
			Name/Position	Signature
30/09/2017	0	Internal review	Craig O'Sullivan Director	
30/10/2017	1	Revised issue	Craig O'Sullivan Director	
31/10/2017	2	Revised issue	Craig O'Sullivan Director	
3/11/2017	3	Revised issue	Craig O'Sullivan Director	

Dedicated Acoustics: Noise Impact Assessment

Contents

EXECUTIVE SUMMARY

This report details a noise impact assessment undertaken for a Material Change of Use – Air Services (Private Airstrip) at 343 Fantin Road, Koah QLD 4881 (Lot 1 on RP746336).

The subject site is located at 343 Fantin Road, Koah; and is currently occupied by a large shed and an air-strip. The subject site and the majority of the surrounding land is zoned Rural, with a pocket of Rural Residential and Low Density Residential zoned land to the west and north west.

The airstrip has an existing approval for a total of 52 landings and take-offs per year with potential hours of operation limited to 7:00 am to 6:00 pm. The proponent wishes to increase the allowable usage to 365 landings and take-offs per year with hours of operation limited to 7:00 am to 6:00 pm.

The airstrip will be generally used by the following 3 planes which are owned by the proponent:

- Replica Supermarine Spitfire;
- Cessna 172 Skyhawk; and,
- Glassair Sportsman 2+2.

On occasion the airstrip may be utilised by aircraft other than those above, however they are expected to be of a similar size to these with similar levels of noise emission. Use of the site will be limited to take-off and departures only. Circuit training or prolonged usage of aircraft in the area is not proposed.

Context on the acceptability of the airstrip and surrounding land uses have been drawn from a review of:

- Mareeba Shire Planning Scheme 2016;
- Australian Standard AS 2021:2015 Acoustics – Aircraft Noise Intrusion – Building Siting and Construction; and,
- Annoyance from Transportation Noise: Relationships with Exposure Metrics DNL and DENL and Their Confidence Intervals.

Anticipated noise levels are considered to be ‘acceptable’ under AS 2021 (i.e. there is usually no need for the building construction to provide protection specifically against aircraft noise). However some annoyance is expected from use of the airstrip based on an average usage of 1 flight per day (i.e. 1 take off movement, 1 overflight, and 1 arrival movement per day), which correlates with 365 flights per

year. These levels of annoyance are relatively minor and limited to sparsely populated areas. Furthermore the noise source is limited to day time hours, short in duration and affected parties are provided with substantial respite from this intrusion. It is anticipated that the real impacts to affected residents will be limited to short duration speech interference.

Community reaction to aircraft noise is generally based on an energy average, whereby they respond to loudness and frequency of occurrence in a similar manner (i.e. a loud infrequent noise is comparable moderate sound with a higher frequency of occurring), which forms the basis of the ANEF calculations. On this basis it is considered reasonable for the proponent to refrain from flying on some days and use these saved flights to facilitate multiple flights on a single day. We recommend a limit of 6 flights per day (i.e. 6 departure movements and 6 arrival movements) to avoid excessive concentration of use on a single day.

Use of the surrounding area by aircraft should be limited to those necessary for departure and landing. Flight tracks should seek to avoid direct overflight of dwellings where possible.

1. INTRODUCTION

This report details a noise impact assessment undertaken for a Material Change of Use – Air Services (Private Airstrip) at 343 Fantin Road, Koah QLD 4881 (Lot 1 on RP746336).

1.1 DESCRIPTION OF SITE AND SURROUNDS

The subject site is located at 343 Fantin Road, Koah; and is currently occupied by a large shed and an air-strip. The subject site and the majority of the surrounding land is zoned Rural, with a pocket of Rural Residential and Low Density Residential zoned land to the west and north west.

An aerial photograph of the development site and surrounds is shown in **Figure 1.1**.

Figure 1.1: Aerial photograph of the development site and surrounds (Google Earth)

1.2 PROPOSED OPERATON

We understand that approval has been given for a total of 52 landings and take-offs per year with potential hours of operation limited to 7:00 am to 6:00 pm. The proponent wishes to increase the allowable usage to 365 landings and take-offs per year with hours of operation limited to 7:00 am to 6:00 pm.

The airstrip will be generally used by the following 3 planes which are owned by the proponent:

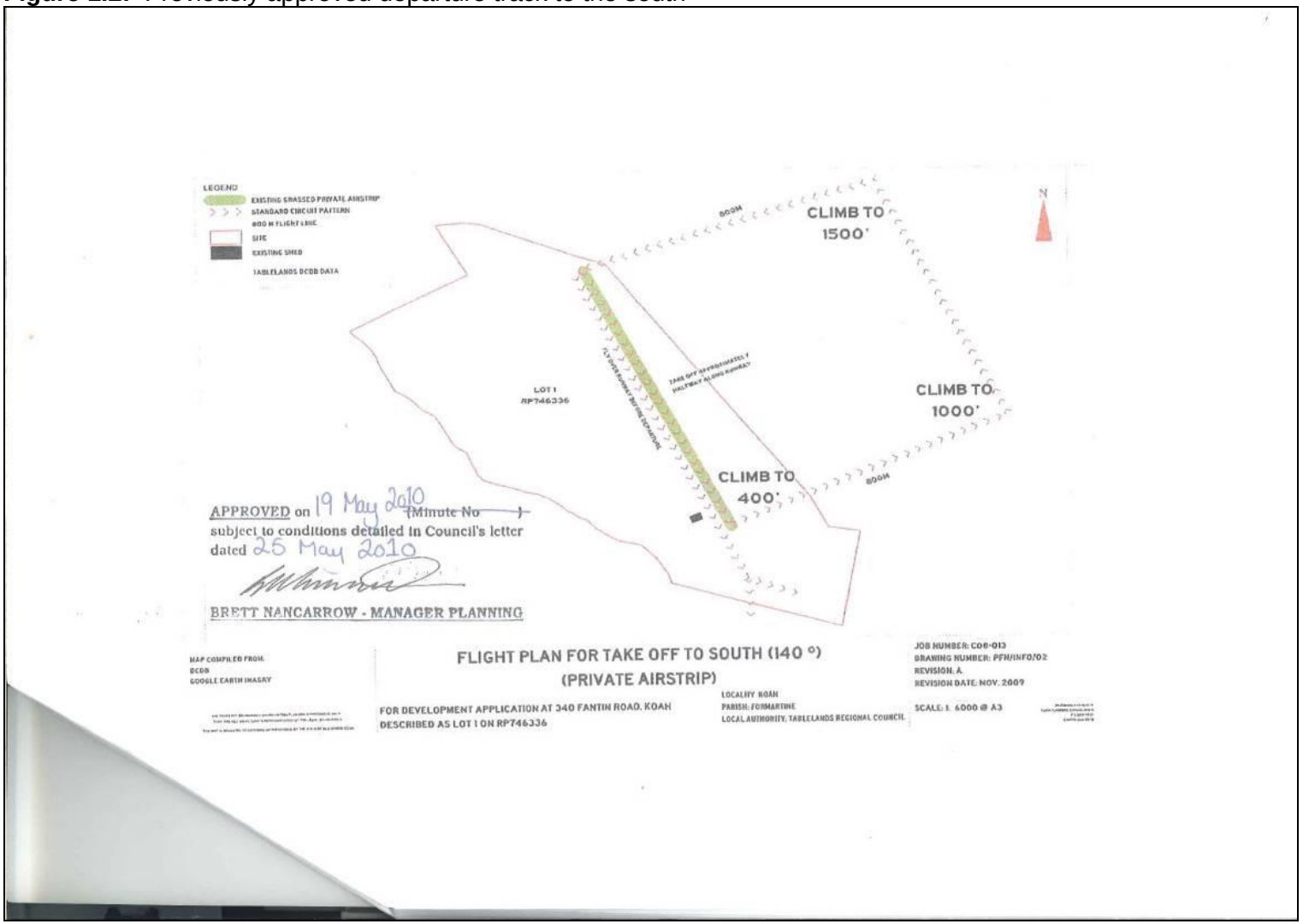
- Replica Supermarine Spitfire;
- Cessna 172 Skyhawk; and,
- Glassair Sportsman 2+2.

On occasion the airstrip may be utilised by aircraft other than those above, however they are expected to be of a similar size to these with similar levels of noise emission. These occasions may also involve multiple aircraft movements in a single day.

Use of the site will be limited to take-off and departures only. Circuit training or prolonged usage of aircraft in the area is not proposed.

The typical usage of the site is for departure to the south east and arrival from the north. The previously approved flight track for departure to the south is shown in **Figure 1.2**.

Figure 1.2: Previously approved departure track to the south



2. CRITERIA

2.1 MAREEBA SHIRE PLANNING SCHEME 2016 – RURAL ZONE CODE

The Mareeba Shire Planning Scheme 2016 – Rural Zone Code provides the following assessment criteria for amenity –

> *PO6 – Performance Outcome*
>
> *Development must not detract from the amenity of the local area, having regard to:*
>
> *a) noise.*
>
> *AO6 – Acceptable Outcome*
>
> *No acceptable outcome is provided,*

Amenity typically describes desirable features of a place and as such is a highly subjective term which can be interpreted differently depending on one's viewpoint regarding environmental qualities. Under the Mareeba Shire Planning Scheme rural areas are intended to support rural activities and land uses of a varying scale, which typically involve noise generation over a range of levels (e.g. tractors and other machinery, processing equipment, and airstrips – which are considered to be a specific outcome for rural areas under the planning scheme). As such we do not consider that protection of amenity requires maintenance of a pristine acoustic environment, and that some impacts are tolerable within a rural environment.

The proposed development involves noise emission from aircraft, which is expected to occur for short durations on a daily basis during day time hours only. The anticipated impacts are expected to be limited to speech interference for very short periods and no sleep disturbance impacts are anticipated, along with some potential for annoyance depending on the recipients view towards neighbours and aviation activities.

Guidance on potential annoyance from the proposed use of airstrip has been drawn from Australian Standard AS2021:2015 – *Acoustics – Aircraft noise intrusion – Building siting and construction* as well as studies quantifying annoyance from transport noise in relation to the level of noise exposure; which are described in the following sections.

We note that aircraft noise is specifically excluded from the Environmental Protection Act 1994 and its subordinate legislation including the Environmental Protection (Noise) Policy 2008.

2.2 AS 2021:2015 – AIRCRAFT NOISE INTRUSION – BUILDING SITING AND CONSTRUCTION

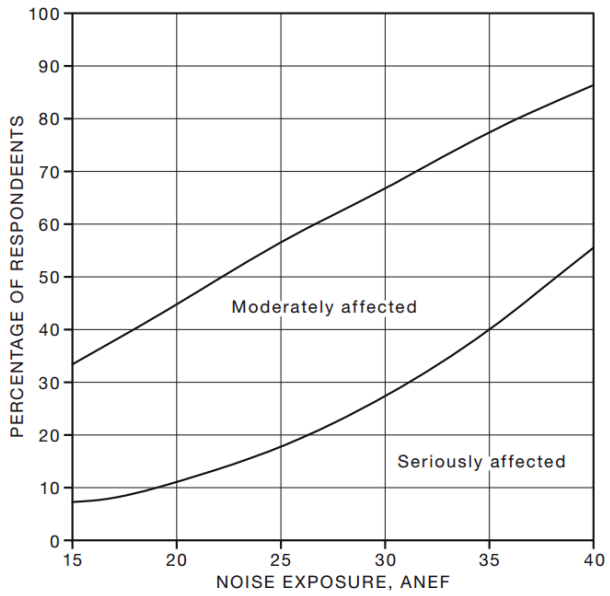
Australian Standard AS 2021:2015 – *Aircraft Noise Intrusion – Building Siting and Construction* (AS 2021) is commonly used in land planning, and the siting and construction of buildings in the vicinity of airports. Its objective is to provide guidance to regional and local authorities, organisations, communities and others associated with urban and regional planning and building development on the siting and construction of new buildings against aircraft noise intrusion and on the acoustical adequacy of existing buildings in areas near aerodromes. The standard is not intended to be applied for the purposes of assessing the effects of noise from aircraft and is been incorporated within this assessment to be provide context on the potential impacts of an increase to usage of the airstrip.

The standard is typically used in conjunction with and Australian Noise Exposure Forecast (ANEF) chart to determine:

(a) Whether the extent of aircraft noise intrusion makes building sites 'acceptable', 'unacceptable' or 'conditionally acceptable' for the types of activity to be, or being undertaken;
(b) For 'conditionally acceptable' sites, the extent of noise reduction required to provide acceptable noise levels indoors for the types of activity to be, or being, undertaken; and
(c) The type of building construction necessary to provide a given noise reduction, provided that external windows and doors are closed.

The ANEF is a single number index for predicting the cumulative exposure to aircraft noise in communities near aerodromes during a specified time period (normally 1 year). The calculation of this index includes aircraft noise levels as well as the frequency and timing of operations. This index is useful for rating the compatibility of differing land uses in relation to aircraft noise. **Figure 2.1** shows the dose/response relationship between aircraft noise and community reaction which was derived from the National Acoustics Laboratories Report 88, which was used in the determination of the ANEF system.

Figure 2.1: Relationship between aircraft noise and community response



NOTE: This graph was derived from the National Acoustic Laboratories Report No. 88.

Under AS2021 dwellings are considered: ‘acceptable‘ with less than 20 ANEF, ‘conditionally acceptable’ between 20 to 25 ANEF, and ‘unacceptable’ in areas greater than 25 ANEF. If a location is classified as ‘acceptable’, there is usually no need for the building construction to provide protection specifically against aircraft noise. However this does not mean that aircraft noise will not be unnoticeable.

Calculation of ANEF contours is based on forecast involves averaging yearly movements on an average day. This ANEF ‘average day’ is not a specific day, but is generally calculated as the number of annual movements divided by 365.

The ANEF is calculated from the following equation:

$$ANEF_{ij} = EPNdB_{ij} + 10\log_{10}(Nd + 4N_n) - 88$$

Where

$ANEF_{ij}$ = noise exposure due to aircraft type i on flight path j

$EPNdB_{ij}$ = noise level of aircraft type i on flight path j

N_d, N_n = number of flights during the day and night respectively, of aircraft type i and flight path j

The total ANEF is the logarithmic sum of all individual noise exposures produced by each aircraft type operating on each flight path for a design average day.

AS 2021 also provides guidance on the acceptability of sites for dwellings, based on aircraft noise levels, which is suitable where aircraft usage is limited to a small number of civil, non-jet aircraft movements; as shown in **Table 2.1**.

Table 2.1: Site acceptability for dwellings based on aircraft noise levels

Average Number of Flights Per Day[1]	Aircraft Noise Level Expected at Site, dB(A)		
	Acceptable	**Conditionally Acceptable**	**Unacceptable**
> 30	< 70	70-75	> 75
15-30	< 80	80-85	> 85
< 15	< 90	90-95	> 95

1. Each night time flight is to count as 4 operations

2.3 ANNOYANCE FROM TRANSPORTATION NOISE: RELATIONSHIPS WITH EXPOSURE METRICS DNL AND DENL AND THEIR CONFIDENCE INTERVALS

Relationships between annoyance and aircraft noise exposure levels have been drawn from the peer reviewed paper *Annoyance from Transportation Noise: Relationships with Exposure Metrics DNL and DENL and Their Confidence Intervals (Miedema & Oushoorn, 2001)* and are summarised as:

- Percentage Little-Annoyed

  $\%LA = -5.741 \times 10^{-4}(DNL-32)^3 + 2.863 \times 10^{-2}(DNL-32)^2 + 1.912(DNL-32)$

- Percentage Annoyed

  $\%A = 1.460 \times 10^{-5}(DNL-37)^3 + 1.511 \times 10^{-2}(DNL-37)^2 + 1.346(DNL-37)$

- Percentage Highly-Annoyed

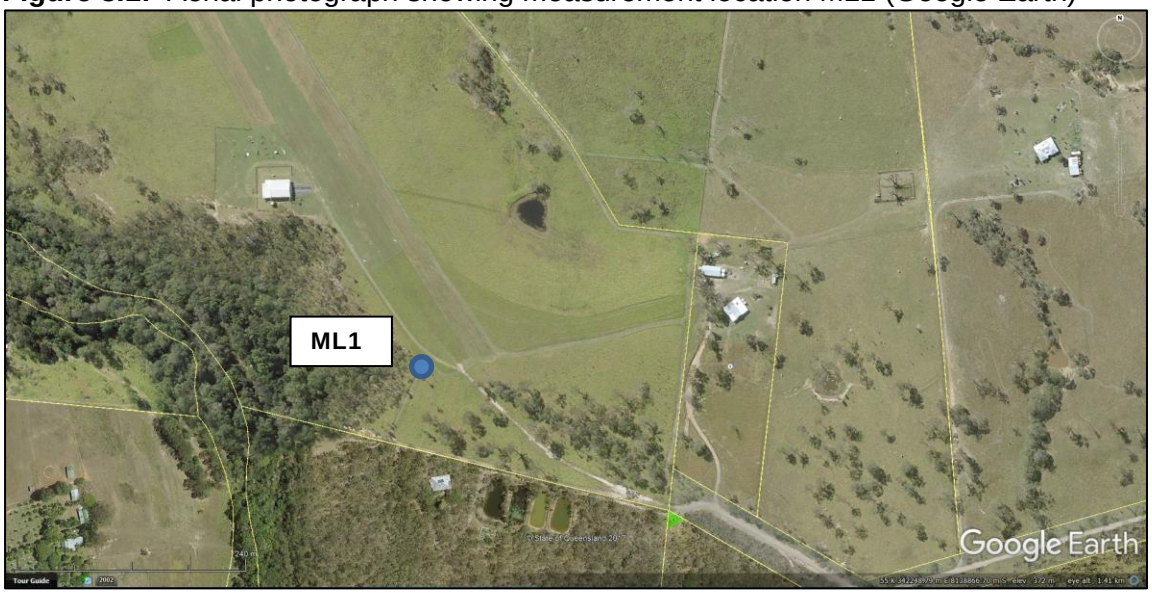
  $\%HA = -1.395 \times 10^{-4}(DNL-42)^3 + 4.081 \times 10^{-2}(DNL-42)^2 + 0.342(DNL-42)$

The Day-Night Level (DNL) is the average levels during day, evening and night time periods with a 10 dB penalty for noise occurring during the night.

3. BACKGROUND NOISE SURVEY

An on-site survey was conducted between 30th August and 1st September 2017. The measurement location (ML1) was located positioned towards the south of the property as shown in **Figure 3.1**. The measured levels are considered free field.

Figure 3.1: Aerial photograph showing measurement location ML1 (Google Earth)



All instrumentation used in this assessment holds a current calibration certificate from a certified NATA calibration laboratory. The following instruments were used to measure the ambient noise levels-

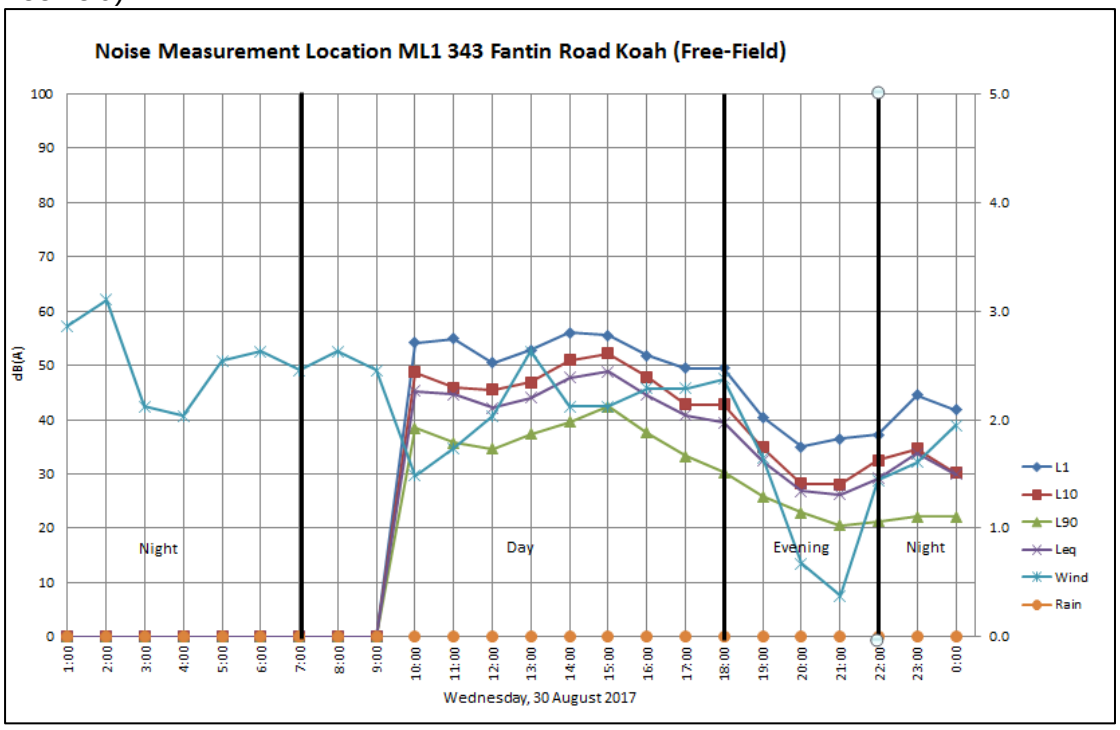
- Rion NL-21 sound level meter
- Castle GA607 calibrator

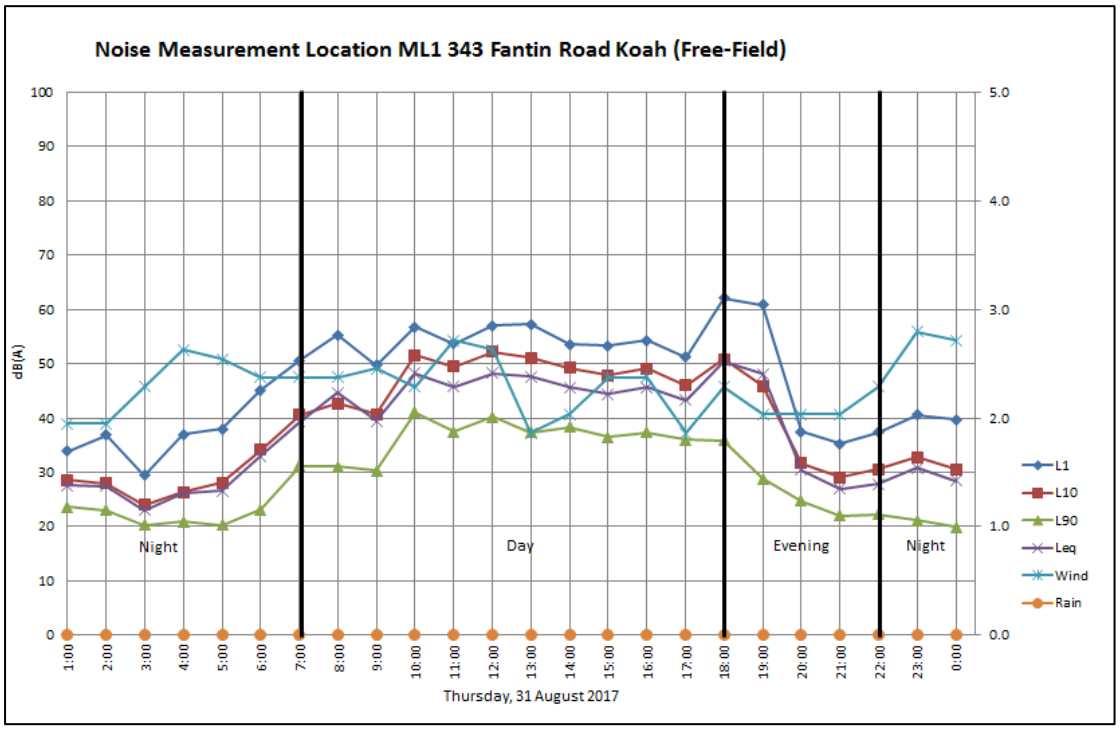
Ambient sound pressure levels were measured in accordance with Australian Standard AS1055.1:1997 – 'Acoustics-Description and measurement of environmental noise – Part 1: General procedures'. Ambient noise levels were recorded at continuous 15 minute intervals. Noise monitoring results are shown graphically in **Figure 2.2** and summarised in **Table 3.1**. Based on our observations the noise environment at the site is generally controlled by natural sounds (e.g. wind, bird and insect noise) as well as dog barks from the dwelling to the south of the site.

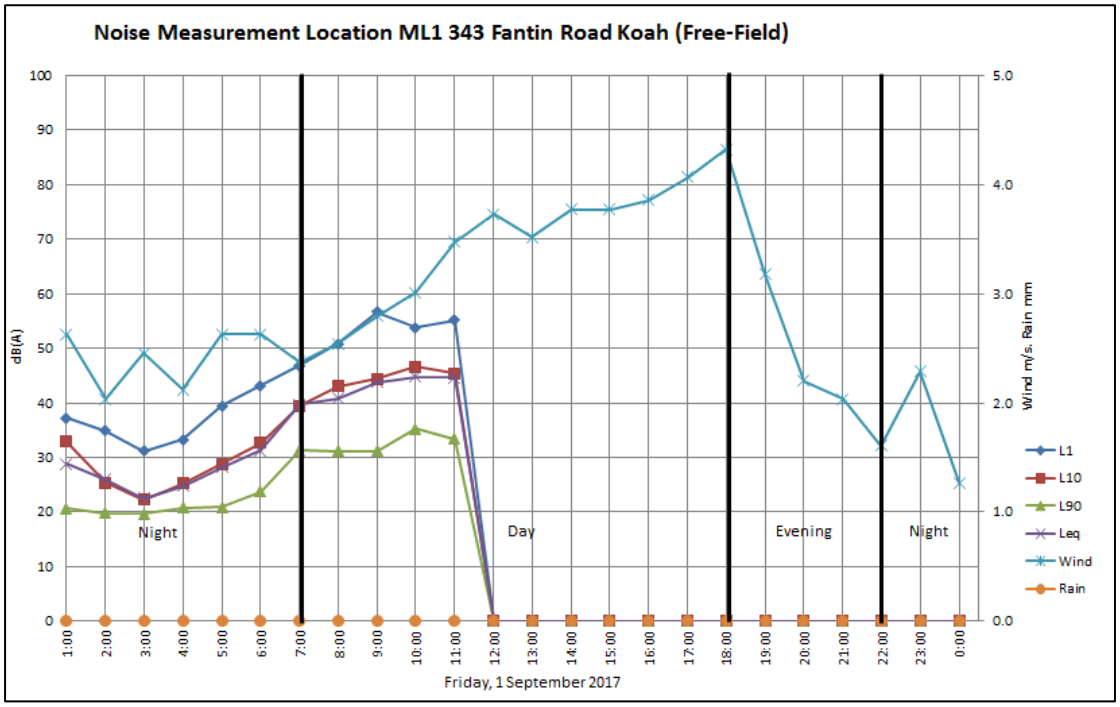
Table 3.1: Average ambient noise levels recorded at Location ML1, (levels in dB(A), free field)

Time	Measured Noise Level dB(A)				
	L_{A01}	L_{A10}	L_{A90}	L_{Aeq}	RBL
Day 7:00am to 6:00pm	53.8	47.2	36.0	44.7	30.3
Evening 6:00pm to 10:00pm	40.0	32.6	23.6	31.0	20.9
Night 10:00pm to 7:00am	39.1	30.3	22.5	29.3	20.1
Day Max 1-hr 7:00am to 6:00pm				49.6	
Night max 1-hr 10:00pm to 7:00am				39.5	
24 hour	46.0				36.6

Figure 3.2: Average ambient noise levels recorded at Location ML1, (levels in dB(A), free field)







Based on the background noise survey, the receiving environment can be considered to be very quiet and generally controlled by natural sounds.

4. NOISE IMPACT ASSESSMENT

Noise measurements were taken for Glassair Sportsman 2+2, Replica Supermarine Spitfire, and a Cessna 172 Skyhawk undertaking departure, arrival, and overflight movements on Friday 20th October 2017. Departure movements were to the south, with aircraft crossing the airstrip from west to east before landing on the airstrip from the north. Weather during the measurements was occasionally cloudy, with wind varying between still conditions a gentle breeze. The noise background was generally controlled by wind in the trees and grass, along with occasional bird noise and dog barks; and generally varied between 35 and 45 dB(A).

The measurement locations are shown in **Figure 4.1**. Measurement results are shown in **Table 4.1**.

Table 4.1: Measured noise levels

Location	Aircraft	Time	Description	Measured Level, dB(A)			
				L_{Amax}	$L_{Aeq,T}$	Duration, T, seconds	SEL
ML2 – SW Receptor	Glass Air	13:57	Take Off	86.4	77.8	23	91.4
		14:02	Overflight	61.9	54.9	55	72.3
	Spitfire	15:08	Take Off	85.9	75.9	24	89.7
		15:15	Overflight	56.7	51.3	38	67.1
	Cessna	15:55	Take Off	74.3	66.4	35	81.8
		15:59	Overflight	50.0	46.0	47	62.7
	Commercial Jet	15:10	Overflight	60.2	55.2	45	71.7
ML3 – SE Receptor	Glass Air	13:57	Take Off	73.7	65.2	37	80.9
		14:02	Overflight	60.4	53.9	42	70.1
	Spitfire	15:08	Take Off	80.1	70.7	30	85.4
		15:15	Overflight	62.2	53.0	43	69.4
	Cessna	15:55	Take Off	65.9	59.3	38	75.1
		16:00	Overflight	56.9	47.4	19	60.2
	Commercial Jet	15:10	Overflight	63.5	55.6	31	70.6
ML4 – NW Receptor	Glass Air	13:57	Take Off	69.6	63.6	27	78.0
		14:02	Overflight	58.7	58.7	35	68.3
		14:05	Landing	59.3	53.3	21	66.5

Location	Aircraft	Time	Description	Measured Level, dB(A)			
				L_{Amax}	$L_{Aeq,T}$	Duration, T, seconds	SEL
	Spitfire	15:08	Take Off	65.7	59.9	31	74.8
		15:15	Overflight	67.2	50.2	25	74.2
		15:17	Landing	69.8	60.2	28	74.7
	Cessna	15:54	Take Off	63.7	58.9	24	72.7
		15:59	Overflight	52.9	48.3	39	64.2
		16:02	Landing	50.2	47.8	49	64.7
	Commercial Jet	15:10	Overflight	64.1	55.6	33	70.7

The Sound Exposure Level (SEL) is the equivalent sound pressure level for the measurement condensed into a 1 second period.

Daily emission to nearby receptors has been calculated to nearby receptors and is shown in **Table 4.2**. The estimate is based on:

- An average single take off, over flight and landing per day; occurring in day time hours only.
- An approximation of EPNdB = L_{Amax} + 13 dB as described in *Evaluation and Prediction of Airport Noise in Japan (Yoshioka, 2000)* to allow calculation of ANEF levels at measurement points.

Figure 4.1: Measurement locations for aircraft noise survey

Table 4.1: Calculated emission levels to receptors

Receptor	Aircraft	External Level		ANEF	Anticipated Annoyance		
		L_{Amax}	DNL		%Little Annoyed	%Annoyed	%Highly Annoyed
R2	Glassair	86.4	42	11	22	7	0
	Spitfire	85.9	40	11	18	5	0
	Cessna	74.3	32	0	1	0	0
R3	Glassair	73.7	32	0	0	0	0
	Spitfire	80.1	36	5	8	1	0
	Cessna	65.9	26	0	0	0	0
R4	Glassair	69.6	29	0	0	0	0
	Spitfire	65.7	30	0	0	0	0
	Cessna	63.7	24	0	0	0	0

We note that the measured maximum levels from aircraft movements are less than 90 dB(A) which are considered ‘acceptable’, under AS 2021, for dwellings in the vicinity of aerodromes with civilian non-jet aircraft, provided the average number of flights are less than 15 flights per day. The calculated ANEF levels also indicate that the nearby sensitive locations are considered ‘acceptable’ under AS 2021.

Some annoyance is expected from use of the airstrip based on an average usage of 1 flight per day (i.e. 1 take off movement, 1 overflight, and 1 arrival movement per day), as shown in **Table 4.1**; which correlates with 365 flights per year. However these levels of annoyance are relatively minor and limited to sparsely populated areas. Furthermore the noise source is limited to day time hours, short in duration and affected parties are provided with substantial respite from this intrusion. It is anticipated that the real impacts to affected residents will be limited to short duration speech interference.

Community reaction to aircraft noise is generally based on an energy average, whereby they respond to loudness and frequency of occurrence in a similar manner (i.e. a loud infrequent noise is comparable moderate sound with a higher frequency of occurring), which forms the basis of the ANEF calculations. On this basis it is considered reasonable for the proponent to refrain from flying on some days and use these saved flights to facilitate multiple flights on a single day. We recommend a limit of 6 flights per day (i.e. 6 departure movements and 6 arrival movements) to avoid excessive concentration of use on a single day.

Use of the surrounding area by aircraft should be limited to those necessary for departure and landing. Flight tracks should seek to avoid direct overflight of dwellings where possible.

5. CONCLUSION AND RECOMMENDATIONS

This report details a noise impact assessment undertaken for a Material Change of Use – Air Services (Private Airstrip) at 343 Fantin Road, Koah QLD 4881 (Lot 1 on RP746336).

The subject site is located at 343 Fantin Road, Koah; and is currently occupied by a large shed and an air-strip. The subject site and the majority of the surrounding land is zoned Rural, with a pocket of Rural Residential and Low Density Residential zoned land to the west and north west.

The airstrip has an existing approval for approval has been given for a total of 52 landings and take-offs per year with potential hours of operation limited to 7:00 am to 6:00 pm. The proponent wishes to increase the allowable usage to 365 landings and take-offs per year with hours of operation limited to 7:00 am to 6:00 pm.

The airstrip will be generally used by the following 3 planes which are owned by the proponent:

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On occasion the airstrip may be utilised by aircraft other than those above, however they are expected to be of a similar size to these with similar levels of noise emission. Use of the site will be limited to take-off and departures only. Circuit training or prolonged usage of aircraft in the area is not proposed.

Anticipated noise levels are considered to be 'acceptable' under AS 2021 (i.e. there is usually no need for the building construction to provide protection specifically against aircraft noise). However some annoyance is expected from use of the airstrip based on an average usage of 1 flight per day (i.e. 1 take off movement, 1 overflight, and 1 arrival movement per day), which correlates with 365 flights per year. These levels of annoyance are relatively minor and limited to sparsely populated areas. Furthermore the noise source is limited to day time hours, short in duration and affected parties are provided with substantial respite from this intrusion. It is anticipated that the real impacts to affected residents will be limited to short duration speech interference.

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Use of the surrounding area by aircraft should be limited to those necessary for departure and landing. Flight tracks should seek to avoid direct overflight of dwellings where possible.

APPENDIX A – GLOSSARY OF ACOUSTIC TERMS

The following is a brief description of the technical terms used to describe traffic noise to assist in understanding the technical issues presented in this document.

Event maximum sound pressure level ($L_{A\%,adj,T}$), L_{01}
The L01 level is calculated as the noise level equalled and exceeded for 1% of the measurement time, for example 9 seconds in any 15 minute interval. L01 is an appropriate level to characterise single events, such as from impulsive or distinctive pass-by noise. In this Report, the measured L01 levels for day/evening/night are not averaged but are arranged from low to high in the relevant day/evening/night interval and the value that is found at the 90th percentile (L10 of L01 sample) in the interval is recorded as its "L01" level. The level can be adjusted for tonality or impulsiveness.

Average maximum sound pressure level ($L_{A\%,adj,T}$), L_{10}
The "L10" level is an indicator of "steady-state" noise or intrusive noise conditions from traffic, music and other relatively non-impulsive noise sources. The L10 level is calculated as the noise level equalled and exceeded for 10% the measurement time, for example 90 seconds in any 15 minute interval. The measured L10 time-intervals for day/evening/night are arithmetically averaged to present the "average maximum" levels of the environment for day/evening/night. The level can be adjusted for tonality or impulsiveness.

Background sound pressure level ($L_{A90,T}$), L_{90}
Commonly called the "L90" or "background" level and is an indicator of the quietest times of day, evening or night. The L90 level is calculated as the noise level equalled and exceeded for 90% the measurement time. The measured L90 time-intervals are arithmetically averaged to present the "average background" levels of the environment for day/evening/night. The level is recorded in the absence of any noise under investigation. The level is not adjusted for tonality or impulsiveness.

Equivalent Continuous or time average sound pressure level ($L_{Aeq,T}$), Leq
Commonly called the "Leq" level it is the logarithmic average noise level from all sources far and near. The maximum 1-hour levels within the day/evening/night time intervals are referenced for building design. The level can be adjusted for tonality.

Façade-adjusted level
A sound level that is measured at a distance of 1.0 metre from a wall or facade. The level is nominally 2.5 dB higher than the free-field level.

Free-field level
A sound level that is measured at a distance of more than 3.5 metres from a wall or facade.