COMMUNITY AVIATION ALLIANCE AUSTRALIA

Joint submission to the *Future of Australia's Aviation Sector – Flying to Recovery* Review: Addendum

The case for an 'Australian Community and Aviation Safeguarding Framework'

Endorsed by:

- Brisbane Flight Path Community Alliance (QLD)
- Dingley Village Community Association (Vic)
- East Melbourne Group (Vic)
- Flight Path Forum (Qld)
- Hume Residents Airport Action Group (Vic)
- Melbourne Airport Community Action Group (Vic)
- Moorabbin Airport Residents Association (Vic)
- Residents Against Western Sydney Airport (NSW)
- Southeast Coast Lifestyle Association (Tas)

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Summary

We are an Australia-wide coalition of diverse community advocacy groups, collectively known as **Community Aviation Alliance Australia (CAAA)**. Our shared aim is to ensure that the impact of the aviation industry on Australian communities is given appropriate consideration in overall aviation policy, regulation, flight path design, and airport development.

This submission was originally prepared in response to the Departmental review into how well the National Airport Safeguarding Framework (NASF) has met its objective to:

> *improve community amenity by minimising noise-sensitive developments near airports and to improve safety outcomes by ensuring aviation safety requirements are recognised in land-use planning decisions.*

However our concerns challenge the fundamental principles of the NASF and we feel they would be more appropriately addressed as part of the Department's review on the Future of Australia's Aviation Sector (FAAS). As such, this paper should be considered as an Addendum to our earlier submission to the FAAS review.

The document highlights our concerns about the disproportionate burden placed on communities closest to airports, which are currently forded to bear the costs of airport safeguarding, both in real financial terms and in terms of health and amenity, for the benefit of the broader community and economy.

With reference to recent examples from major Australian airports, our submission highlights that:

- the current safeguarding framework places the burden of safeguarding airports – vital state and national assets – on the communities adjacent to them through the cost of noise insulation for their homes, loss of certain developmental rights over their land, and the negative health and educational impacts of chronic aircraft noise and particulate pollution exposure
- the increase in the number of residents affected by aircraft noise is largely due to the expansion in airport noise contours rather than increased residential development near airports; in other words it is the result of airports encroaching on communities, not communities on airports
- the noise problem is much more extensive and damaging than has been understood to date, including adverse effects of community health, education and wellbeing
- the impacts of aircraft noise go well beyond mere 'annoyance' - it is time to shift our thinking toward the educational and physical and mental health effects of chronic aircraft noise exposure on people and communities and the economic costs associated with them.

To address these issues, we propose a revised safeguarding policy and legislative framework that *places the burden of safeguarding more equitably on those who benefit most from airport operations*: the aviation industry itself, all levels of government, and the broader community.

In brief, we propose a new safeguarding framework for the aviation sector which constrains operations at any given airport sufficiently to preserve the health and well-being of existing communities and shifts the costs of safeguarding away from affected communities to all the beneficiaries of aviation, to be embedded in legislation to ensure its principles are enforceable and enforced.

As is clear from the continued profitable operation of Sydney Airport, reasonable operational constraints are not be fatal or overly deleterious to the aviation industry, and *it is unreasonable and unethical to promote aviation expansion at the cost of community health, wellbeing, and achievement*.

We refer to our proposed safeguarding model as the **Australian Community and Aviation Safeguarding Framework (ACASF).** This is not an 'improved' version of the current NASF, but a new model which balances the benefits and costs of aviation amongst all stakeholders, not just airports. Our submission describes the features and benefits of an ACASF and why it is necessary.

Recommendations

Recommendation 1:

Recommendation 1: Our ACASF would reform the current CACG model to a community-led model, which sets the CACG agenda in consultation with representatives of the aviation sector and government. The model would be funded to provide affected residents and the broader community with similar access to airport operators and the aviation sector. Terms of reference would oblige the aviation sector and all levels of government to share the burden of airport safeguarding equitably among those who derive direct and indirect benefits, as well as those who suffer the harmful effects.

Recommendation 2: An ACASF would address existing encroachment using two regulatory tools:

1. The capacity of every federally-regulated airport would be declared by the Minister for Infrastructure, Transport and Regional Development, as provided for in section 195 of the *Airports Act 1996 (Cth)*, following consultation with State and local governments and with particular reference to community health and wellbeing. This would prevent further encroachment of aircraft noise contours into existing communities and to facilitate orderly planning for current and future airports as well as population growth and demographic changes in the future.

2. A levy would be imposed on aviation operators to share the burden of safeguarding more equitably, the proceeds of which to be distributed as follows:
   - First, directly to affected residents to compensate them for soundproofing, loss of amenity, and loss of development rights; and
   - Second, to local councils to invest in the amenity of affected communities in ways that may compensate for the loss of amenity due to noise exposure and air pollution. Council planners could explore and invest in innovative noise mitigation strategies that could include sound absorbing cladding, building materials, landscaping and planting; or features such as green walls.

Recommendation 3: An ACASF would immediately survey community attitudes toward aircraft noise, as called for by Dr Hede and MAESSAC. The survey would be undertaken every five years to provide contemporary data to underpin airport operations, development and safeguarding. The survey should reflect attitudes toward the levels of aircraft noise exposure expected after the sector recovers from the effects of COVID-19, rather than the current unusually low levels at many Australian airports.

Recommendation 4: An ACASF would include longitudinal studies of health and educational outcomes for communities affected by aircraft noise exposure to underpin forward planning and guide the distribution of monies raised via levies to ensure they are targeted at addressing the negative impacts of the aviation industry

Recommendation 5: An ACASF would include air quality monitoring at all Australian airports, with results made public to inform health studies and future planning.

Recommendation 6: An ACASF would use 'number above' contours, rather than ANEF contours, to be generated as outlined in Attachment 1.

Recommendation 7: An ACASF would incorporate accurate noise monitoring at all Australian airports, based on the locations of flightpaths and aircraft noise complaints and accurately representing the extent of aircraft noise exposure on the ground, to verify forecasts and underpin planning controls and levy distribution, with the and results and methodology made fully public.

Recommendation 8: An ACASF would immediately review AS 2021 to ensure:

- It achieves the target noise reduction
- It is compatible with adequate protection against aerosol and airborne transmission of pathogens

Recommendation 9: An ACASF would provide an easily accessible, well-illustrated standardised format for communicating noise impacts to current and prospective residents of affected communities. This would be developed in consultation with a cross-section of community members; and would include objective data on health and educational impacts, to be produced or robustly reviewed by an independent authority.

Recommendation 10: An ACASF must facilitate rigorous and easily monitored accountability of all aviation sector partners, including airports, airlines, AA, and all levels of government.

Recommendation 11: An ACASF would include guidelines for the aviation industry to implement changes to address the threat climate change poses to aviation and vice versa.

1.0 History and purpose of the NASF

Tension between the aviation industry and the communities it affects has existed since the first commercial airfields were established, originating with the failure to understand the full scale of aircraft noise and compounded by failure to anticipate the increase in noise brought on by the jet age, and failure to implement a safeguarding framework expediently.

Ultimately, these failings led to operational constraints and levies being applied at Sydney Kingsford Smith and Adelaide Airports (for example) and in 2012 the introduction of the NASF, along with building standards laid out in AS2021 2015,[1] to protect Australia's other airports from a similar fate.

"Of all the varieties of modern pollution, noise is the most insidious."

Robert Lacey, Historian

Guideline A of the NASF, Measures for Managing Impacts of Aircraft Noise, sits under the International Civil Aviation Organisation 'Balanced Approach to Aircraft Noise Management', and purports an approach that better meets the needs of the aviation industry and community impacts by its operation: that is, to strike the balance between safeguarding important national and state assets and the rights, health, and wellbeing of affected communities.

It is reasonable to expect that safeguarding measures such as these are effective, not only to protect the benefits of aviation but also because they impose numerous externalised costs on individuals, governments, and taxpayers, including but not limited to:

- the financial burden it places on property owners in the vicinity of airports for sound-proofing
- the amenity costs for loss of enjoyment of outdoor spaces and activities
- the health and educational costs associated with chronic exposure to aircraft noise and emissions
- the costs of investigations by Airservices Australia and the Aircraft Noise Ombudsman into aircraft noise complaints and their handling
- the costs of the Senate Inquiry into the Planning, Construction and Management of the Western Sydney Airport Project
- the costs to state and local governments of assessing planning and building permit applications on a case-by-case basis where the proposals fall wholly or partially within published aircraft noise contours.

Yet many of the stakeholders who are affected by the NASF do not perceive it to be effective. For example, in their submission to the Melbourne Airport Environs Safeguarding

[1] AS 2021 Acoustics – Aircraft Noise – Building siting and Construction, Standards Australia, SAI Global

Standing Advisory Committee,[2] the owners of Melbourne Airport, Australia Pacific Airports Corporation (APAC), acknowledge that the framework has failed in its purpose, saying,

> *What should have provided additional weight in terms of safeguarding the airport and ensuring 24/7 operations, has not actually had that effect and results in continued poor planning decisions around the airport.*

We share their concerns.

Despite a complex regulatory framework distributed across at least eight Acts of Parliament,[3] along with the regulations and legislative instruments associated with each of them and a labyrinth of guidelines, planning policies and overlays to protect aviation operations, tensions between the aviation sector and communities remain.

[2] Australia Pacific Airports Melbourne, Submission 23 to the National Airport Safeguarding Advisory Group *National Airport Safeguarding Framework Review* (22 Novermber 2019) <https://www.infrastructure.gov.au/aviation/environmental/airport_safeguarding/public-consultation-national-airports-safeguarding-framework-submissions.aspx s>.

[3] *Airports Act 1996 (*Cth); *Airservices Act 1995* (Cth); *Aircraft Noise Levy Collection Act 1995* (Cth); *Civil Aviation Act 1988* (Cth); *Damage by Aircraft Act 1999* (Cth); *Sydney Airport Demand Management Act 1997* (Cth); *Environment Protection and Biodiversity Conservation Act 1999* (CTH).

2.0 Aircraft noise: the primary risk to aviation operations

***Noise**: n **1** a sound, esp a loud or unpleasant or undesired one**; noise pollution** harmful or annoying noise. (*Australian Concise Oxford Dictionary)

The primary concern for communities affected by aviation operations is the impact of chronic aircraft noise exposure on physical and mental health, education, and amenity. In this section, we outline the broad range of issues stemming from aircraft noise, including:

- the current international and national frameworks for managing aircraft noise
- the reason increasing numbers of homes and community facilities are affected despite the framework
- how aircraft noise is measured
- the real impacts of aircraft noise on communities.

To address this concern and to protect the contribution the aviation sector makes to the global economy and human culture, the International Civil Aviation Organisation (ICAO) adopted the 'Balanced Approach to Aircraft Noise Management' in 2011. The approach consists of four elements:

1. reduction of noise at the source
2. land use management
3. noise abatement operational procedures
4. operating restrictions.[4]

We now briefly discuss how this approach is currently applied in Australia.

2.1 The 'balanced approach' to aircraft noise management in Australia

In Australia, **Reduction of noise at the source** is implemented via the certification of specific aircraft models to operate within Australian air space. Certification is based on aircraft noise measurements taken at specific standardised reference points using standardised operational procedures (**Figure 1**).

As far as we can ascertain, no effort is undertaken by Airservices Australia (AA) to ensure that aircraft continue to comply with these standards under operational conditions, despite the fact that it is not uncommon for aircraft to deviate from standard operational procedures used to establish noise compliance.

For example, while one recommended standard procedure is to use a constant angle of descent, which would result in all aircraft being at the same altitude at a specified point on the approach path, AA data shows a wide range of altitudes for aircraft as they pass noise

[4] ICAO, 'Aircraft Noise', *Environment Protection* (Web Page, 6 September 2021) <https://www.icao.int/environmental-protection/Pages/noise.aspx>

monitoring units.[5] Based on this, it is reasonable to conclude aircraft engines do not necessarily perform the same way in day-to-day operations as they do during the certification process.

Importantly, where an aircraft manufacturer is subject to strict design requirements, they may attest that their aircraft comply with these standards.[6] Recent scandals suggest this may be a naïve policy.[7] The efficacy of this measure is therefore questionable. Nevertheless, this process may have been helpful in driving the aviation industry toward quieter aircraft overall.

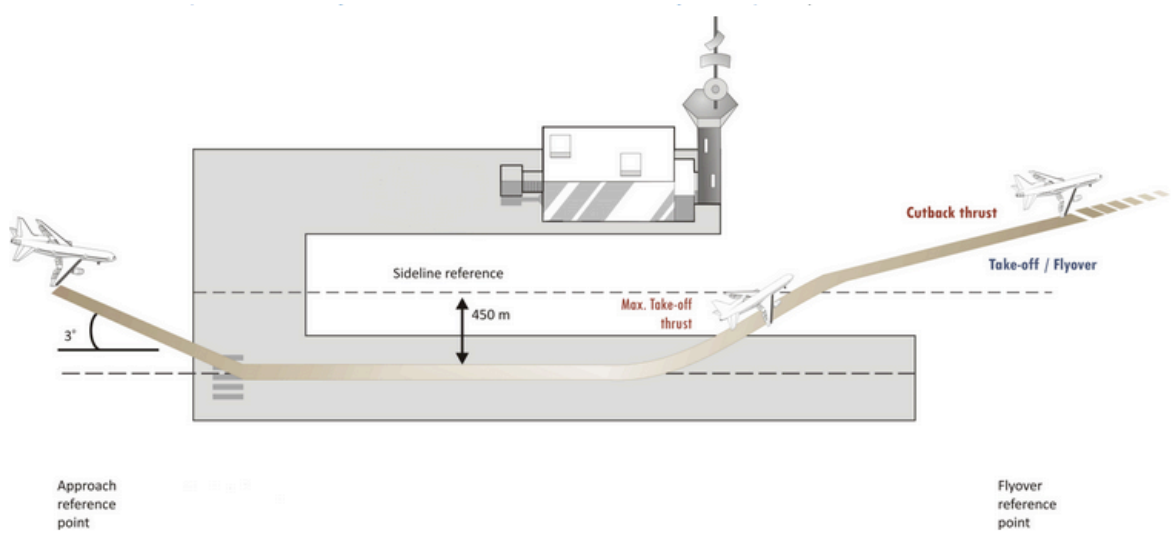

Figure 1: Aircraft noise reference measurements certification points.
From <https://www.icao.int/environmental-protection/Pages/Reduction-of-Noise-at-Source.aspx>

Noise abatement operational procedures are *entirely voluntary* at most, if not all, Australian airports. Governments should not lose sight of the fact that there is no statutory protection for communities from aircraft noise under any Commonwealth or State. For example, the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) is devoid of any such protection, likewise the *Environment Protection Act 1970* (Vic). All other sources of noise pollution, including traffic, rail, neighbour, and industrial, are covered by Commonwealth or State legislation, which includes a right of redress. In effect the only protection communities and individual residents currently have from aircraft noise is

[5] Airservices Australia, 'Monitoring Aircraft Noise' (Web Page, 6 September 2021) <https://www.airservicesaustralia.com/community/environment/aircraft-noise/monitoring-aircraft-noise/>;.

[6] Westlaw AU, *The Laws of Australia,* (online at 2 September 2021) 34 Transport, '34.2 Aviation' [34.2.1960]

[7] See for example Russell Hotten, 'Volkswagen: The scandal explained', *BBC News* (online, 10 September 2021) < https://www.bbc.com/news/business-34324772>; Kathryn Diss, 'Troubled 737 MAX Boeing airplane had at least 13 other safety incidents, ex-employee says.' *ABC News* (Web Page, 15 February 2020) < **https://www.abc.net.au/news/2020-02-15/ex-boeing-manager-says-one-in-25-737-max-had-safety-incident/11957634>**

through sound land-use planning by State and Local Governments. Hence, a revised NASF must fully address these urgent needs.

Operating restrictions, though popular with communities, have so far been strongly resisted by all other stakeholders, including airports, airlines and all levels of government, for all airports except Sydney Kingsford Smith. Thus, the 'heavy lifting' in terms of achieving a 'balanced approach' in Australia falls entirely on **land use management**. The NASF seeks to address this, however it has so far proven ineffective for reasons outlined below.

Land use management in Australia follows guidelines laid out in AS 2021:2015 Acoustics – Aircraft Noise Intrusion – Building Siting and Construction (AS 2021). AS 2021 sets out land uses that are acceptable in areas exposed to varying levels of aircraft noise (**Table 1**).

Building type	ANEF zone site		
	Acceptable	Conditional	Unacceptable
House, home unit, flat, caravan park	Less than 20 ANEF (Note 1)	20 to 25 ANEF (Note 2)	Greater than 25 ANEF
Hotel, motel, hostel	Less than 25 ANEF	25 to 30 ANEF	Greater than 30 ANEF
Hostel, school, university	Less than 20 ANEF (Note 1)	20 to 25 ANEF (Note 2)	Greater than 25 ANEF
Hospital, nursing home	Less than 20 ANEF (Note 1)	20 to 25 ANEF	Greater than 25 ANEF
Public building	Less than 20 ANEF (Note 1)	20 to 30 ANEF	Greater than 30 ANEF
Commercial building	Less than 25 ANEF	25 to 35 ANEF	Greater than 35 ANEF
Light industrial	Less than 30 ANEF	30 to 40 ANEF	Greater than 40 ANEF
Other industrial	Acceptable in all ANEF zones		

Table 1: building site acceptability based on ANEF zones
From Melbourne Airport Master Plan 2018

According to this standard, the 20-25 ANEF zone is conditionally acceptable for dwellings and schools and the 25-30 ANEF zone is unacceptable for either.

The condition on which dwellings are acceptable within the 20-25 ANEF zone requires that they must comply with the building standards set out in AS 2021. At the time the NASF was introduced, all existing homes around Melbourne Airport were 'deemed to comply'[8] provided they were constructed of standard building materials. Our research demonstrates that this was and is not the case.[9]

This is also very likely to be true for homes near other Australian airports that were built before AS 2021 was introduced. Hence, reliance on AS 2021 is largely ineffective as only newly built or extensively renovated homes will comply with the standard, leaving residents of communities developed before it was introduced with homes that are no longer acceptable for occupation. Furthermore, the standard imposes unreasonable costs on residents.

Applying land use management strategies is only effective where there is not already a conflict between an airport and nearby residential communities. This is reflected in the ICAO recommendations:

> *The Assembly… 3. Urges States, **where the opportunity still exists*** to minimize aircraft noise problems through preventive measures, to:*
>
> *a) locate new airports at an appropriate place, such as away from noise-sensitive areas;*

[8] Department of Sustainability and the Environment, *Melbourne Airport Environs Strategy Plan*, September 2003, 14.

[9] Melbourne Airport Community Action Group, Submission No 20 to the Melbourne Airport Environs Safeguarding Standing Advisory Committee (MAESSAC) *Issues and Options Paper* (22 June 2021) p 4.

*b) **take the appropriate measures so that land-use planning is taken fully into account at the initial stage** of any new airport or **of development at an existing airport**;*

c) define zones around airports associated with different noise levels taking into account population levels and growth as well as forecasts of traffic growth and establish criteria for the appropriate use of such land, taking account of ICAO guidance;

d) enact legislation, establish guidance or other appropriate means to achieve compliance with those criteria for land use;

e) ensure that reader-friendly information on aircraft operations and their environmental effects is available to communities near airports;[10] **emphasis added*

For the majority Australian airports, there is relatively little scope for effective land use management to reduce the number of people exposed to aircraft noise as residential development has already occurred in close proximity to airport boundaries.

Where greenfield sites remain, land use planning may still be able to play a meaningful role in safeguarding, but only where aircraft movements can be ***and are*** directed away from communities and over the greenfield sites. There is no binding obligation on the aviation industry to ensure this is the case.

As airports tend to be located close to populated areas and often within growth corridors, maintaining greenfield sites poses challenges to state and local planning frameworks and will leave gaps in demand for certain infrastructure that may make it less cost-effective to deliver. Airports also rely on a local workforce for themselves and their industry partners, and therefore benefit from proximity to residential communities.

There is another, more significant but poorly understood, obstacle to effective airport safeguarding through sound land use management. To understand this, it is imperative to examine the disconnect between the perception and reality of encroachment in relation to airports and communities.

2.2 Perception vs reality: pinpointing the source of encroachment

Encroach v. ***1*** *Intrude, esp on another's territory or rights. 2. Advance gradually beyond due limits.* (Australian Concise Oxford Dictionary)

As reflected in the statement above from APAC, it is generally accepted that poor planning decisions are responsible for the increasing number of residents, schools and other sensitive facilities exposed to unacceptable levels of aircraft noise. This has led to the mistaken

[10] *Consolidated statement of continuing ICAO policies and practices related to environmental protection – general provisions, noise and local air quality ICAO resolutions adopted by the assembly*, ICAO Res A39-1, (Oct 2016).

conviction that imposing tighter controls on planning decisions can make a significant contribution to airport safeguarding.

It is true that sensitive land uses continue to be approved in existing communities affected by aircraft noise. However, since airport privatisation the most significant increases in the number of people exposed to aircraft noise have been the result of the ever-expanding intrusion of the aircraft noise contours over pre-existing communities, not the result of poor planning decisions by state and local governments.

This has occurred because the misleadingly termed 'ultimate capacity' of existing airports has increased. As a direct result, many pre-existing residential areas are now within noise contours that are considered unacceptable for residential uses – a problem created by airport expansion and airline activity, not poor land-use planning.

Taking Melbourne Airport as an example, much of the land where communities are now alleged to encroach on the airport was committed to residential development before the airport was built.[11] By the time the proposed third and fourth runways were added to the plans, areas directly under flight paths were already built up residential areas, and subsequent changes to runways in 1989, 1990 and 2001 likewise resulted in flightpaths directed over pre-existing homes and schools.[12]

When the 'hashtag' runway configuration for Melbourne Airport was adopted in 1990, the community was assured that only 253 dwellings would fall within the 25 ANEF contour at the airport's ultimate capacity of 320 thousand aircraft movements per year.[13] By the 2018 Master Plan,[14] this had increased almost six-fold to 1,419 dwellings, one school, and 26 community centres in the municipality of Brimbank alone.[15]

"One day humanity will fight with noise the way it once did with cholera or the plague."

Robert Koch, discoverer of the causative agents of tuberculosis, cholera and anthrax

We have been unable to obtain similar data for the other local government areas with land that falls within these noise contours, but estimate close to a thousand more homes in Hume have similarly been engulfed in expanding noise contours. This increase is perhaps unsurprising given the new long-range capacity forecast of roughly 453 thousand aircraft movements per year,[16] and will likely grow further if the

[11] Dames and Moore, *Melbourne Airport Strategy Environmental Impact Statement Supplement*, September 1990, p72: "some areas, particularly to the south and east of the new airport, had been committed to residential development before it was known that they might be detrimentally affected by aircraft noise."

[12] Appendix 1.

[13] Dames and Moore, *Melbourne Airport Strategy Environmental Impact Statement Supplement*, September 1990.

[14] Australia Pacific Airports Melbourne, *Melbourne Airport Master Plan 2018* ('*2018 Master Plan*'), p 113.

[15] Appendix 2

[16] *2018 Master Plan*, n14, p76 and p111.

airport reaches the most recently suggested 'ultimate' capacity of 573 thousand movements.[17]

In Brisbane, many thousands of homes and over fifty schools are affected by noise from the new runway. While no home or school has been constructed outside of a residential zone, aircraft noise has been redirected over homes and schools that were not built to withstand it, again underscoring the fact that airports encroach on existing communities rather than communities encroaching on airports. Thus, planning decisions made in good faith decades ago now leave residents with homes under flight paths they could not have anticipated and should not have been allowed.

Furthermore, the NASF distinguishes between land that has already been zoned for noise-sensitive uses and land that has not. It specifically allows for in-fill and increasing density within existing communities that are now affected by aircraft noise pollution. To do otherwise would starve established communities of services and amenity, as well as denying them the ability to adapt to changing demographics.

During recent MAESSAC panel hearings to review the Melbourne Airport Environs Overlay, expert witnesses who appeared on behalf of APAM admitted under cross-examination that if planning approval for a development is refused on the grounds that it could not offer sufficient amenity, this would in effect mean any existing homes or facilities exposed to the same levels of aircraft noise are no longer fit for purpose.

Another expert witness, appearing on behalf of a real estate developer, stated under cross-examination that it is 'not reasonable' to expect to enjoy the use of your back garden if you live close to an airport. We question whether it can ever be unreasonable to expect to enjoy normal residential uses in a pre-existing residential zone. Residents have a right to expect that their amenity and house values will be protected by the state. *If a residential zone can be rendered uninhabitable after the fact, planning frameworks and zoning are devoid of meaning or purpose and legitimacy.*

There is no ongoing statutory, regulatory, or voluntary provision in place and effective to compensate existing residents whose homes, due to airport expansion, are no longer fit for purpose because they do not comply with AS 2021.

The net impact of the NASF is that state and local planning authorities are forced to balance the conflicting demands of population growth and community needs against the desires of the profit-oriented aviation industry. What one party may consider a poor decision other parties may welcome as necessary and just. It is an unenviable position, and one that is too easily open to criticism from all sides.

The upshot is that residents are forced to sacrifice both indoor and outdoor amenity - and cover the costs of soundproofing if they can afford it. It is important to keep in mind that the supply of housing is finite and not everyone can afford to choose where to live. As long as there are homes near airports, new building approvals to meet the needs of those communities are inevitable.

[17] Lyell Strambi interview, *Mornings with Virginia Triolli*, (774 ABC Radio, 16 October 2019).

This demonstrates that it is airports that intrude on the rights and territory of communities as aircraft noise contours advance beyond due limits, rather than communities encroaching on airports' rights or property.

How, then, can adequate safeguarding measures be implemented for airports that are already compromised by poor airport siting decisions?

2.3 Airport safeguarding: what is it and who bears the cost?

> ***Safeguard*** v. tr *guard or protect (rights, etc.) by a precaution or stipulation.* Australian Concise Oxford Dictionary

To understand properly how to develop a robust and effective safeguarding strategy, Community Aviation Alliance Australia members have sought a clear understanding of what a safeguarded airport looks like. During recent Panel Hearings for the Melbourne Airport Environs Safeguarding Standing Advisory Committee (MAESSAC), some of our members were able to put the question to experts who testified before the Panel.

One expert appearing on behalf of APAM suggested this is an airport that does not suffer 'residential encroachment' into the ANEF contours and that does comply with the NASF. The NASF doesn't impose any obligations on airports with respect to aircraft noise, so we assume by that he means one where local planning decisions comply with the NASF and where houses have not encroached into the ANEF contours.

As the NASF allows for infill and increasing density, the only applicable planning decisions would be the rezoning of greenfield sites adjacent to airports, and we are not aware of any airports where this has occurred since the introduction of the NASF. It would appear, then, that a better description of a safeguarded airport would be one where 'residential encroachment' into newly expanded ANEF contours had not already occurred when the framework was introduced. The only airport we are aware of that fits this description is Avalon Airport in Victoria.

A second measure of safeguarding put forward was the number of aircraft noise complaints Airservcies receives in relation to a particular airport, however no one was able to identify when the 'tipping point' would be reached based on this criterion. This is therefore not a useful metric from a safeguarding framework perspective as there is no way to define the target.

An acoustics expert appearing on behalf of APAM, suggested that good community consultation and a good relationship between an airport and the surrounding communities can reduce noise complaints and therefore contribute to safeguarding, however the participants were again unable to identify a persuasive example of where this has worked in Australia.

More importantly, the expert mentioned that there are a number of factors that influence complaint behaviour, among them sudden changes in aircraft noise exposure and the affluence of the affected communities. People of low socio-economic status don't tend to complain, while those of higher socio-economic standing do.[18] Taken at its most cynical, this

[18] M Maziul, R F S Job, J Vogt, 'Complaint data as an index of annoyance--theoretical and methodological issues' (2005) 7(28), *Noise Health* 17, 22.

suggests a safeguarded airport is one surrounded by communities of low socio-economic standing, as long as they remain so. It goes without saying that a safeguarding framework designed to ensure this would be unconscionable.

It should be borne in mind that many communities subject to long term impacts of aircraft noise have been complaining about such noise for many years to no avail. As such many members of those communities no longer lodge complaints because of the futility of it, having been told by NCIS or AA there is nothing that can or will be done to alleviate their concerns. As stated by AA

> *noise monitoring is not undertaken to determine compliance with aircraft noise regulations – **there are no Australian regulations which specify a maximum, allowed level of aircraft noise within the community**.*[19]

In a submission to MAESSAC, Hume City Council said

> *the Advisory Committee are recommended to recognise that landowners in Hume's green wedge are protecting assets for the benefit of all Victorians but are currently burdened in doing this by the current green wedge controls.*[20]

We submit that in fact all residents whose health, education, amenity and property rights are compromised, without consent, by aviation operations at Australian airports are protecting assets for the benefit of all Australians; and are burdened in doing this through the health, educational, amenity and other consequences of chronic aircraft noise pollution exposure as well as the imposition of soundproofing their homes at their own expense. *In effect, airlines and airports are increasing their profits by externalising the human, social and financial costs of their operations to communities.*

We further submit that local and state planning authorities are burdened by the conflicting demands to safeguard airports on the one hand and to provide housing and amenity to communities on the other. It is not at all clear to us what, if any, contributions the aviation industry makes to safeguarding its own interests, nor what contributions the Commonwealth Government makes despite owning and leasing these national assets.

This begs the question what is being safeguarded from whom, and is the correct balance being struck? *It appears the rights of airport operators and their industry partners are effectively safeguarded* – evidenced by the continued profitability of all and unconstrained operations of most Australian airports – *while the rights of communities impacted by aviation operations are not.*

This imposition is typically defended on the basis of the important role aviation plays in the economy as well as the lives of everyday Australian's and the small number of people and

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[19] Airservices Australia, 'Monitoring Aircraft Noise' (Web Page, 6 September 2021) <https://www.airservicesaustralia.com/community/environment/aircraft-noise/monitoring-aircraft-noise/>; emphasis added.

[20] Hume City Council, Submission no 16 to Melbourne Airport Environs Safeguarding Standing Advisory Committee, *Part B* (2 October 2020) [79].

properties affected. Again, we question whether the right balance has been struck and reiterate the fact that not everyone can afford to choose where to live.

2.4 The scale of the noise problem

It is widely accepted that only a relatively small proportion of people are annoyed by aircraft noise. We challenge that view. This graph taken from the National Acoustic Laboratories Report 88[21] (the NAL Report, **Figure 1**) clearly shows that at 20 ANEF, 45% percent of people are moderately to seriously annoyed by aircraft noise, increasing to 67% at 30 ANEF.

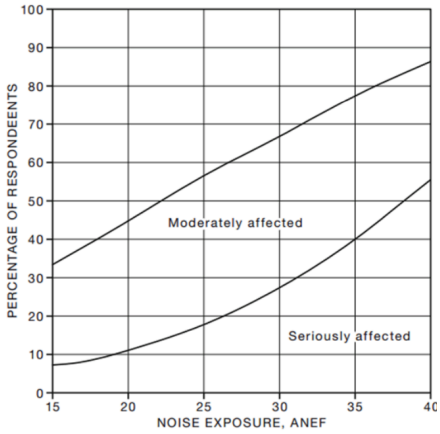


Figure 1. Adapted from NAL Report 88.

Overall, a majority of residents within the 20-25 and 25-30 ANEF contours are moderately to seriously affected by aircraft noise. ANEF This study was conducted in 1982, when overflights were infrequent compared to today. Now, at many Australian airports there are many hours during which aircraft noise is virtually or entirely continuous, much like traffic noise on a busy road. Even where there are pauses between overflights, there may not be a single hour in the day with no aircraft movements and no events above 70dBA.

For example, AA's noise data for Melbourne Airport,[22] or this graph taken from the 2013 Melbourne Airport Draft Master Plan, showing the distribution of aircraft movements throughout the day (**Figure 2**)[23]

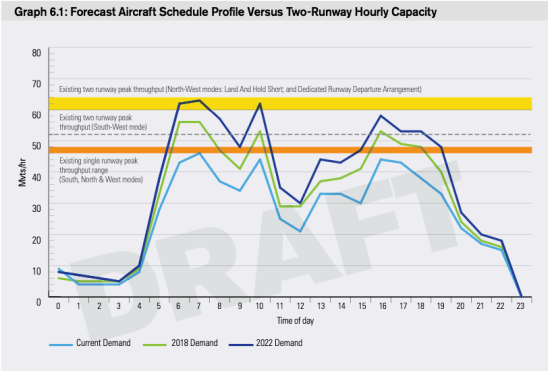


Figure 2: 2013 Melbourne Airport Master Plan, (draft), page 79

Both show that there is no time of day when more than half of residents within these contours are not exposed to a noise source they find moderately to seriously annoying. This occurs at least once every half hour during the night, and at intervals of less than five minutes during much of the day.

According to the 2016 census, average Australian household size in greater capital cities is 2.6 people.[24] Referring again to the NAL Report graph (**Figure 1**), it can be seen that within

[21] AJ Hede and RB Bullen, 1982, *Aircraft Noise in Australia: A Survey of Community Reaction, National Acoustic Laboratories Report No. 88*, Australian Government Publishing Service, Canberra.

[22] Airservices Australia, 'Noise Monitoring', *Melbourne Airport*, (Web Page), 25 June 2021 < http://aircraftnoiseinfo.emsbk.com/melbourne/noise-monitoring/>

[23] Australia Pacific Airports Melbourne, *Melbourne Airport Master Plan 2013*, p79.

[24] .idcommunity < https://profile.id.com.au/australia/household-size>

the 20-25 ANEF contour ~52% of people are at least moderately annoyed by aircraft noise pollution. This means that at least half the households[25] within the 20-25 ANEF contour, and up to 100%,[26] will have at least one member who is at least moderately annoyed. Anywhere between 14-36% of households will have at least one member who is seriously annoyed.

Within 25-30 ANEF contour, 32-83% of households will have one member who is seriously annoyed, and 72-100% will have one member who is moderately annoyed.

It should be no surprise that a significant proportion of noise complaints come from outside the 20 ANEF contour.[27]

Noise level		15-20 ANEF	20-25 ANEF	25-30 ANEF	30-35 ANEF
Seriously affected	% of individuals	9%	15%	23%	33%
	% of homes	9-23.4%	15-39%	23-59.8%	33-85.8%
Moderately affected	% of individuals	35%	37%	39%	40%
	% of homes	35-91%	37-96.2%	39-100%	40-100%
Total affected	% of individuals	44%	52%	62%	77%
	% of homes	44-100%	52-100%	62-100%	77-100%
Total unaffected	% of individuals	66%	48%	38%	23%
	% of homes	0-66%	0-48%	1598	0-23%

Table 1. Estimated percent of households with at least one member moderately to seriously affected within 15-35 ANEF, calculated by multiplying the percent of individuals moderately or seriously affected by aircraft noise by the average household size of 2.6. As can be seen, even in the 15-20 ANEF contour, it is possible all households, and probable that more than half, will have at least one member who is at least moderately affected by the level of aircraft noise exposure.

Between 15-20 ANEF, ~44% of residents are at least moderately annoyed, ~9% seriously so, by aircraft noise, and the number of households within this contour is likely to be significantly higher than within the 20-25 and 25-30 ANEF contours combined. Overall, somewhere between 44-100% of households will have at least one person who is at least moderately annoyed. These data are summarised in **Table 1**.

Looking at these data from the perspective of a prospective homeowner, what they show is that at most 23% of families would be comfortable living anywhere within the 15 ANEF contour or higher. Viewed from this angle, it suggests anywhere above 15 ANEF should be deemed uninhabitable.

While utilising the N contour with ANEF does assist communities to gain a better understanding of noise impacts on them it is still unlikely to be a reliable contemporary measure and readily understandable by communities. The NAL study, the origin of the ANEF, is based on a survey conducted in 1980, some 41 years ago.

Since then, aviation technology has changed radically, the range of noise and its intensity that communities are now subjected to has altered drastically and, therefore, community's reaction, resilience and acceptance of noise in 2021 is almost certainly significantly different to that of 1980.

[25] If all members of a household are either sensitive or not sensitive to aircraft noise.

[26] If households contain a mix of sensitive and non-sensitive members.

[27] Many noise complaints come from outside the 20 ANEF.

Professor Hede, a recognised expert in noise response and the co-designer of the ANEF states:

> *It is not clear how best to design aircraft noise information which is both engaging and explanatory for residents. For example, consider the case of Australia's standard on aircraft noise which states that a 20 ANEF exposure level is 'acceptable' for siting residential buildings thereby implying that residents should not be 'annoyed/affected' by noise below that level.*
>
> *Both the community and public officials in Australia seem to be unaware that at the supposedly 'acceptable' exposure level of 20 ANEF, the only authoritative and internationally accepted national survey of aircraft noise in Australia (Hede & Bullen, 1982) indicates that a large proportion of the population find such exposure 'unacceptable', specifically, that 11% are 'seriously affected' by the noise and 22% are 'moderately affected'*[28].

Professor Hede further states:

> *Independent reviewers concluded that between ANIS in 1982 and SoNA in 2014 respondents were found to be more sensitive to aircraft noise and that this was a "robust outcome of the study and can be relied upon". If such a situation exists in Australia, it would mean that the dose-response curve from the NAL study in 1980 and applied in the Australian Standard and elsewhere, could be seriously inaccurate when used for noise impact assessment and land-use planning. There's only one way to determine whether this is the case, that is, via an updated survey.*[29]

Clearly there is a compelling case for a thorough and in-depth review of the NASF, the use of ANEF contours as a measurement tool, and AS 2021 to refine these tools and metrics to standards appropriate for the 2020s and beyond and to reflect best practice technology use and current community standards.

2.5 Perception vs reality: the health and educational impacts of aircraft noise exposure

It is important to note that, while Guideline A of the NASF was intended to address to the perception of aircraft noise 'annoyance', since 2012 evidence has continued to mount that aircraft noise pollution is linked to increases in the rate of long-term physical and mental illnesses including diabetes, heart disease, anxiety and depression.

[28] Ibid 5

[29] Andrew J Hede, 'Review of International Research on Community Reaction to Aircraft Noise: Report 2: Socio-Acoustic Research in the UK', (2018) *Commissioned by the Sydney Airport Community Forum (SACF)*, 5.

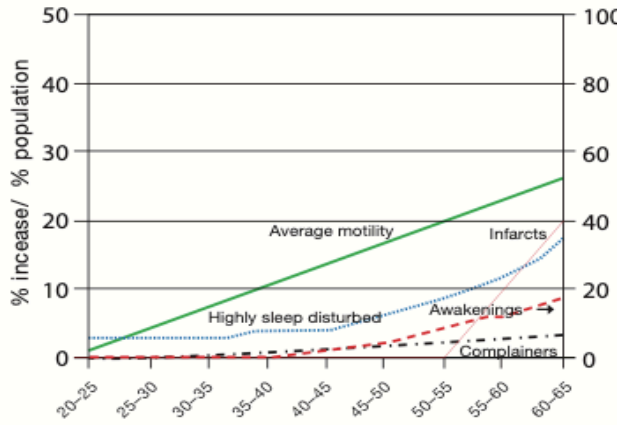
There is also unequivocal evidence that aircraft noise exposure affects children's learning and cognitive function.[30] While this has not been studied in adults, it seems likely it has the same effect regardless of age. More recently, there are studies showing a significant increase in the likelihood of cardiovascular death within two hours of a night-time overflight, and that night-time noise contributes to low sperm counts .[31] Each of these impacts comes at an economic cost, and these costs are now be calculated in some jurisdictions overseas and should be here, too.[32]

The current understanding is that annoyance as well as sleep disruption may underpin these health and cognitive effects, though as we discuss below it is not clear that a person must be aware of annoyance for them to suffer the health and educational deficits caused by aircraft noise exposure.

It is clear from the literature that the harmful effects of aircraft noise are not felt exclusively by those who are aware of being annoyed. Indeed, a 2002 report for the European Commission indicates far fewer people complain about air traffic noise than suffer sleep disturbance as a result of it (**Figure 3**).[33]

Furthermore, detailed sleep studies show quite

Fig. 5.2
Effects of aircraft noise at night*



Source: European Commission, 2002 a

** Average motility and infarcts are expressed in percent increase (compared to baseline number, of highly sleep disturbed people is expressed as percent of the population; complainers are ex percent of the neighbourhood population; awakenings are expressed in number of additional per year.*

Figure 3. Taken from European Commission (2002a). *Position paper on dose–response relationships between transportation noise and annoyance.*

[30] For example, James Lees, Cait Hewitt and Tim Johnson, 'Aircraft Noise and Public Health: the evidence is loud and clear,' *Report commissioned by HACAN and the Aviation Environment Federation* (January 2016); Mathias Basner, et al, 'Auditory and non-auditory effects of noise on health', (2014) 383(9925) *Lancet*; Mathias Basner, et al, 'Aviation Noise Impacts: State of the Science' (2017) 19(87) *Noise Health* 41; V Sparrow, T Gjestlund, R Guski, 'Aviation Noise Impacts White Paper, State of the Science 2019: Aviation Noise Impacts' in *Destination Green: The Next Chapter* (International Civil Aviation Administration) 44; Thomas Münzel et al, 'Effects of noise on vascular function, oxidative stress, and inflammation' (2017) 38(37) *European Heart Journal* 2838; Jünge Beutel, et al, 'Noise Annoyance Is Associated with Depression and Anxiety in the General Population - The Contribution of Aircraft Noise' (2016) *PLOS ONE* DOI:10.1371/journal.pone.0155357; Jangu Bantavala,Martin Peachy, and Thomas Münzel, '*The harms to health caused by aviation noise require urgent action*' (2019) *BMJ* DOI.org/10.1136/bmj.15329; C Clark, et al, A meta-analysis of the association of aircraft noise at school on children's reading comprehension and psychological health for use in health impact assessment, *Journal of Environmental Psychology* (2021), doi: https://doi.org/10.1016/j.jenvp.2021.101646.

[31] Apolline Saucy, et al 'Does night-time aircraft noise trigger mortality? A case-crossover study on 24 886 cardiovascular deaths', (2021) 42, *European Heart Journal*, 835-843; Seung-ah Choe, et al, 'Nighttime environmental noise and semen quality: A single fertility center cohort study', (2020) *PLOS One* <https://doi.org/10.1371/journal.pone.0240689>

[32] James Lees, n29, 43.

[33] European Commission, *Position paper on dose–response relationships between transportation noise and annoyance*, 20 February 2002.

clearly that people suffer many 'micro-awakenings' due to night-time aircraft noise.

Under the current arrangements little if any real cognisance is taken of the cumulative health impacts of aircraft noise on the broader population. Annoyance factors are the main drivers of the ANEF and yet numerous studies have shown there is considerable long lasting detrimental impacts such as, hypertension, cardiovascular disease, sleep deprivation related illness and impacts on the learning abilities and health of children. One such study conducted by Dr Charlotte Clark, Barts & the London School of Medicine, Queen Mary University of London in 2015 for the UK Airports Commission concluded**,**

> *"The health effects of environmental noise are diverse, serious, and because of widespread exposure, very prevalent (Basner et al, 2014). For populations around airports, aircraft noise exposure can be chronic. Evidence is increasing to support preventive measures such as insulation, policy, guidelines, & limit values.* ***Efforts to reduce exposure should primarily*** *reduce annoyance,* ***improve learning environments for children, and lower the prevalence of cardiovascular risk factors and cardiovascular disease*** *(Basner et al, 2014)."*[34]

It is past time to replace subjective measures of annoyance with objective measure of the well-documented impacts of chronic aircraft noise exposure on health and educational outcomes. These, too, are not restricted to only those who are aware of being annoyed or woken by aircraft noise suffering from these effects.

2.6 The need for objective impact data

Although the threat aircraft noise annoyance poses to the aviation industry has been recognised for some time and there appears to be broad consensus that change is needed, little meaningful progress has been made toward it. This may in part be due to a misplaced hope that it would resolve itself with the introduction of quieter aircraft. However, these minor gains have been more than offset by the increase in the number of aircraft movements residents are daily exposed to in a day.

Many Australian communities experience nine hours or more per day of almost continuous aircraft noise, with as little as two to five minutes between overflights for weeks, if not months, on end, with flights continuing throughout the remaining fifteen hours, albeit at a reduced frequency. This is the equivalent of having lawnmowers running outside the window all day and intermittently in the evening and throughout the night.

This very significant noise burden is often seemingly downplayed and deflected through the use of language that describes 'perceived noise annoyance' and 'sensitive individuals', rather than focussing on objective measures such as health and educational impacts.

As we have shown, the widely accepted narrative that residential communities are encroaching on airports inverts the facts. The narrative that only a small proportion of the population is sensitive to aircraft noise and the methodology used to forecast aircraft noise exposure are also deeply flawed. If airport safeguarding is to be effective, it must be based on accurate narratives and verifiable, and objective data.

[34] Dr Charlotte Clarke, 'Aircraft noise effects on health', Report for the UK Airports Commission, May 2015, 27.

3.0 Other risks to aviation operations

In addition to the effects of aircraft noise we have identified four other growing threats to the Australian aviation sector that a new regulatory framework must address:

- the failure to engage adequately and meaningfully with affected communities
- the failure to account for both the costs and the benefits of aviation operations
- air pollution and
- climate change.

An effective Aviation Safeguarding Framework should include mitigation of these risks.

3.1 Inadequate and disingenuous community engagement

In this submission, we have highlighted for the first time that the net impact of the NASF has been to place a disproportionate burden on communities closest to airports as they bear the costs of airport safeguarding, both in real financial terms and in terms of educational delay, health, amenity, and the loss of lifetime opportunity that may directly result from these factors, for the benefit of the broader community and economy.

We have also shown that there has been no meaningful progress toward addressing this and the tension it causes between the aviation sector and the communities it affects. This is not unique to Australia.

There are numerous community groups around the world opposing airport expansion, two of the best know being the No3rdRunway Coalition in the UK,[35] opposing a third runway at Heathrow, and SchipholWatch in the Netherlands, who have been opposing expansion of Schiphol Airport for thirty years.[36] There are also at least seventeen such groups in Australia.[37] A recent thesis on the relationship between Schiphol Airport and the communities it affects describes a long-standing deadlock and a strong conviction within the community that the airport operators and Dutch Government are deliberately misleading the community.[38]

This situation seems to be echoed in Australia. For example, Melbourne Airport is often held up as an example of the first planned airport deliberately located in a 'green field' site away from urban development specifically to avoid the noise complaints that plagued Essendon and SKS Airport in the 1950s. Hansard reveals that not only was Keilor populated long before the site in Tullamarine was chosen, but planning was already under way for further residential communities to the east of the new airport site. Concern for 'the lives, rights and

[35] <https://www.no3rdrunwaycoalition.co.uk/>.

[36] < https://schipholwatch.nl/>; < https://schipholwatch.nl/>

37 Brisbane Flight Path Community Alliance, 'Friends of BFPCA', https://bfpca.org.au/friends/

[38] Rachelle Verdel, 'In the Shadow of the Corporate State: An ethnographic study of the shifting dynamics of the corporate state in the vicinity of Schiphol Airport (the Netherlands) through the exploration of counter-citizenship', (Master's Thesis, Utrecht University, August 2021), Ch 3, (Verdel).

freedoms of the people living in the area' went unheeded,[39] and only 5,000 acres, instead of the recommended 10,000, were purchased for the airport.[40]

This was compounded by ongoing confusion over exactly what the plans were for the Tullamarine site, with assurances that it would simply be to replace Essendon, and not to cater to the new, larger and noisier 707 jets that were too big for the runways at Essendon.[41] There were also assurances that a site at Laverton was still being considered and no decision had yet been made,[42] and that 'unrestrained and unrestricted use' was not the plan.[43] To add to the confusion, the Commonwealth was deliberately vague about the runway plans for the new Melbourne Airport lest developers and landowners attempt to profiteer.[44] It is possible this obfuscation, coupled with the fact that areas immediately adjacent to the site had already been rezoned for residential development and the work was already under way, contributed to the immediate 'encroachment' of residential development. [45] It is also possible that the composition of the working group tasked with selecting the site - four civic authorities and sixteen representatives of the aviation sector, but no community representatives or advocates[46] – contributed to the conflict between Melbourne Airport and its least powerful but most numerous neighbours – the local residents - that persists to this day.

Further vigorous debate took place when the runway at the newly opened Tullamarine Airport almost immediately had to be lengthened to accommodate the even larger and louder 747 jets,[47] and again when a decision was made to relocate the planned second north/south runway such that communities that already existed at that time, and still do, would be affected by the noise.[48]

A report on Sydney Airport from 1995 is also pertinent. Hansard documents allegations of a conspiracy between the then Civil Aviation Authority and the Federal Airports Corporation to deceive the residents of Sydney about the true extent of the noise from the third runway

[39] Reginald Pollard, 'Melbourne Airport' (Speech, Commonwealth House of Representatives, 20 August 1958).

[40] Ibid.

[41] Ibid.

[42] Ibid, Mr Stokes.

[43] Commonwealth, *Parliamentary Debates*, House of Representatives, 26 August 1970, Mr Kelly, MP.

[44] Pollard (n 5).

[45] The inverted commas represent the misuse of the word in this context: according to the *Australian Concise Oxford Dictionary*, encroach means '*intrude, esp on another's territory or rights*; or '*advance gradually beyond due limits'*. It is not clear any home is located within an airport estate or outside of a residential zone, where they belong.

[46] Pollard, Reginald, 'Melbourne Airport' (Speech, Commonwealth House of Representatives, 20 August 1958)

[47] Commonwealth, *Parliamentary Debates*, House of Representatives, 26 August 1970, Mr Keith Johnson, MP; Mr Charles Jones, MP; Mr Lionel Brown, MP; Dr Cass, MP.

[48] Dames and Moore, *Melbourne Airport Strategy Environmental Impact Statement Supplement*, September 1990, p72.

at SKS.[49] This ultimately led to a Senate Inquiry into noise, and the report 'Falling on Deaf Ears?'.[50]

The title of the report seems to be as prescient as it is descriptive. In 2010, in response to the 2009 Aviation White Paper and continued community anger, an Aircraft Noise Ombudsman (AN0) was introduced to investigate the handling of noise complaints.[51] Since 2010 the ANO has investigated 1119 noise complaints (a tiny proportion of the total), of

	Complaints	Deferred	No change possible	Changes resulting from complaints	Referred to AA	Outside scope/other
2011	100	40	28	5	10	9
2012	109		58	8	10	12
2013	88		60	21	No data	No data
2014	106		64	11	No data	No data
2015	244		56	2	181	3
2016	255		116	4	128	6
2017	114		67	3	48	1
2018	103		41	24	35	4
Total	1119		490	78	411	34
Percent			**43%**	**7%**	**37%**	**3%**

Table 1. Percent of ANO investigations leading to a change. Data is compiled from ANO Annual Reports, which can be found at https://ano.gov.au/reportsstats/.

which only 7% resulted in a change to flightpaths or operations (**Table 2**). We have been unable to locate any follow-up investigations to measure the efficacy of these changes, thus it is not clear whether they effected meaningful change or simply fulfilled a statutory requirement.

The ANO has also conducted seven major investigations into noise complaints in Sydney and Parafield (2012); Perth (2015); Hobart (2018); Sunshine Coast (2020); East Melbourne and Brisbane (2021).[52] Each investigation found that communities were misled about the amount and/or location of aircraft noise expected from new runways or changes to flight paths. No meaningful change has resulted from any of them.

The White Paper also gave rise to Community Aviation Consultation Groups (CACGs) to improve the relationship between airports and local communities.[53] CACGs are made up of a combination of aviation sector representatives, government officials and community representatives selected by the airports. Perhaps unsurprisingly, they do not seem to have brought about the anticipated improvements in community relations. For example, scandalous revelations of land purchase deals for Western Sydney Airport (WSA), and an

[49] Commonwealth, *Parliamentary Debates*, House of Representatives, 7 June 1995, 1414, Mr Leo McLeay.

[50] Falling on Deaf Ears? Report of the Senate Select Committee on Aircraft Noise in Sydney, Commonwealth of Australia, Canberra, 1995.

[51] Department of Infrastructure, Regional Development and Local Government, *National Aviation Policy White Paper: Flight Path to the Future*, 2009, 27.

[52] Reports on these investigations can be found at https://ano.gov.au/reportsstats/.

[53] *White Paper* (n 15) 11.

independent noise study for Western Sydney Airport commissioned by Blacktown City Council (the 'Ancich Report') that revealed noise levels could be up to four times the forecast,[54] have led to another Senate Inquiry into the planning of WSA but still no indication of meaningful change.[55] The existence of at least seventeen Australian community groups with a focus on aircraft noise is also indicative of continued widespread community discontent over the impacts of aviation operations.[56] The findings of the Ancich Report may go some way to explaining the continued adverse reaction from communities.

Despite regularly asserting that community opposition, as expressed through noise complaints, poses a significant threat to individual airports, the aviation sector has demonstrated little interest in engaging, or willingness to engage, productively and meaningfully with community groups to safeguard their own future. A recent Masters Degree thesis in the Netherlands has exposed the way Schiphol Airport has instead actively crafted a narrative to establish and perpetuate conflict between different segments of the community to marginalise the voices of those most affected by the harms associated with their operations, and use techniques such as inclusionary control and innovation talk to suppress opposition. Our shared experience and research suggest similar tactics have been used, whether knowingly or inadvertently, in Australia.

Similarly, no level of government has shown a genuine commitment to protecting the interests of these communities. Not only are members of communities under flight paths the only experts on the human impact of aviation operations, but they are the only party that has shown a willingness to work productively and respectfully with opposing interests.

There is a clear and pressing need to replace the current model of community engagement with one that is immune to both perceived and actual manipulation by vested interests; that is community-centred and community-driven; that obliges the aviation sector and all levels of government to engage in genuine consultation **and agreement**; and that gives the community equal standing to all other interests and brings the balance to the 'balanced' approach.

3.2 Balancing the benefits of aviation against the costs

Forecasts of the economic benefits of the aviation to tourism, states, the country are derived from airport Master Plans and are based on passenger forecasts and statements of economic benefit provided by the proponent, with no requirement for independent peer review.

To our knowledge, there has been no independent assessment of the economic benefits of the aviation sector to Australia, and we have been unable to locate a study that weighs them against the costs of the health and educational impacts and lost opportunity they

[54] AJ Hede and RB Bullen, 1982, *Aircraft Noise in Australia: A Survey of Community Reaction, National Acoustic Laboratories Report No. 88*, Australian Government Publishing Service, Canberra.

[55] The planning, construction and management of the Western Sydney Airport project, <https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Finance_and_Public_Administration/WesternSydneyAirport>.

[56] Brisbane Flight Path Community Alliance, 'Friends of BFPCA', https://bfpca.org.au/friends/.

cause to affected residents. Nor are the costs of traffic congestion or the many enquiries, reports, and investigations into the aviation sector factored in. Surely it is incumbent upon Governments to have an independent assessment.

In the UK it is estimated the total health costs from aircraft noise could be as high as £258mil per year. It would also be necessary to add to that the costs of educational delay not only in terms of school fees and taxpayer funding for schools but also in terms of tutoring and loss of income and opportunity for those whose study is affected by aircraft noise. Furthermore, the effects of aircraft noise on learning and cognitive function have only been studied in children – there is no evidence they would not also manifest in adults, yet another cost to the economy.

According to the Bureau of Infrastructure, Transport and Regional Economics the avoidable costs of traffic congestion in Melbourne alone will reach roughly $8 billion a year by 2030.[57] Combining that with the costs to taxpayers of providing the infrastructure required to service Melbourne Airport's expansion amounts to a substantial economic burden. For example, the Melbourne Airport Rail Link will cost $15bn. This must again be combined with the same costs at all other Australian airports.

Clearly, even without the devastating impact of COVID-19 the aviation sector is a substantial drain on the public purse. It is not only prudent to ensure these investments are giving the best return on investment of these public funds, but in fact unethical not to do so. Thus, there is an urgent need to develop and implement a system for monetising the costs of aviation and ensuring the forecast economic benefits stand up to independent scrutiny and cannot be better realised via other means.

3.3 Particulates and human health

Over the past few years, the health impacts of ultrafine particles have begun to be understood. In particular, recent studies have examined the role of aviation in the level of airborne particulates and the implications for the health of the local communities.[58] In addition to passenger aviation operations, airports are freight hubs attracting significant heavy vehicle traffic as well as the many cars, buses and taxis transporting passengers and employees to and from airports. As such, airports create a concentration of polluting activities. Members of the community are increasingly concerned about the potential links to asthma and other chronic health problems.

"Pollution should never be the price of prosperity."

Al Gore

[57] BITRE, 'Traffic and congestion cost trends for Australian capital cities ', *bitre*, (Web Page, 23 February 2022) **https://www.bitre.gov.au/sites/default/files/is_074.pdf.**

[58] Karie Riley, Rich Cook, Edward Carr and Bryan Manning, 'A Systematic Review of The Impact of Commercial Aircraft Activity on Air Quality Near Airports', (2021) 11 *City and Environment Interactions*; Rui-Wen He, Miriam E Gerlofs-Nijland, John Boere, Paul Fokkens, Daan Leseman, Nicole A H Janssen, Flemming R Cassee, 'Comparative toxicity of ultrafine particles around a major airport in human bronchial epithelial (Calu-3) cell model at the air–liquid interface', (2020) 68:104950 *Toxicology in vitro*.

3.4 Ineffective communication of health and education impacts

Information provided to communities on aircraft noise is produced by airport operators in airport Master Plans, EISs, and other publications. The formats used vary between airports, but are uniformly difficult for non-experts to understand and lack data on health and educational impacts. To gain community trust, this information must ideally be independently produced or, failing that, at a minimum subject to independent verification. We have recently obtained a copy of AS 2021 Handbook Acoustics—Guidance on producing information on aircraft noise. This provides a useful starting point, but further work is required to develop effective tools for communicating about aircraft noise in a way that is meaningful to communities. In particular, highly technical noise forecasting data that communities have found misleading even when it is strictly accurate should be replaced with clear information about how the noise exposure at a given location correlates with the noise levels known to have health and educational impacts on communities. We would welcome the opportunity to engage further on this issue.

"Unnecessary noise is the most cruel abuse of care which can be inflicted on either the sick or the well."

Florence Nightingale

3.5 Climate change and aviation

Communities are increasingly aware of, and concerned by, the disproportionate impact of the aviation sector on climate change, which is arguably the greatest threat to both human society and, paradoxically, the future of aviation. Global heating risks to the safety, efficiency and operational integrity of flight operations at airports include those from sea level rise and storm surges, and from extreme land temperatures. They also include those from the actual continued operation of flights.

4. Regulatory tools for an effective safeguarding framework

We suggest that an effective safeguarding framework should include three regulatory tools: airport capacity caps and noise levies, and a community engagement process with a statutory obligation to protect communities. Both of these measures have been successfully deployed at individual airports, and could be more widely used without the need for major legislative change. In addition,

4.1 Comprehensive reform to community engagement

As highlighted in section 3.1, the community has either been wholly excluded from consultation, or brought too late into a process with no statutory obligation to affect meaningful reform and in which the community voice is overwhelmed by a much larger presence of other vested interests. Despite several attempts at reform through the introduction of the ANO and CACGs, among things, there has been no real and productive change to the engagement between airports or Airservices and the community.

We have not yet identified a robust model for genuine engagement between the community and the aviation sector, but propose that the Department of Infrastructure work expeditiously and purposefully with community representatives to reform the current CACG process so that it is fully transparent and truly represents community views, in particular identifying the impacts on communities, including traffic congestion, land values, infrastructure impediments, aircraft noise, and both the economic benefits and costs. It must be adequately funded to allow it the same access to affected residents and the broader community enjoyed by airport operators and the aviation sector, and guided by terms of reference that enforce an obligation on the aviation sector and all levels of government to share the burden of airport safeguarding equitably among those who derive direct and indirect benefits, not just on those who suffer the harmful effects.

4.2 Capacity caps for all airports

It is clear that the absence of statutory capacity caps for airports undermines land-use planning. Without them, there is no reference point to inform infrastructure planning or decisions for future land-use. As a result, it falls to planning authorities (local and state government), and ultimately the Minister, to impose development constraints to obviate future detrimental impacts on new communities

A major consequence of this is that state and local authorities cannot ensure they meet housing targets and provide services and amenities to existing and future communities without further compromising airport safeguarding because:

- growth in capacity exposes new communities to harmful levels of aircraft noise, thus it is not clear where it is safe to allow development
- there is no clearly defined ‘tipping point’ beyond which it is accepted that safeguarding no longer exists, thus it is not clear whether current levels of residential development have not already exceeded what will be acceptable when an airport reaches its

'ultimate capacity'.

At present, while state-level authorities can have input to airport planning processes, they have no formal mechanism in the process for determining capacity and operational matters, which in turn translate to land-use and community impacts. Essentially the states are left in a position where they respond to Federal level decisions by restricting or regulating development in areas expected to be subject to noise impacts.

While there have been instances where the states have been lax in this responsibility, allowing development creep into noise sensitive areas as a result of airport expansion, this should not be seen as a one-sided failure. For example, new technologies enabling an increase of flights within the same infrastructure - particularly runways - leads to expanded noise contours over areas that have already been approved, and often already developed, for noise-sensitive uses.

Under the current NASF it is impossible for state planning authorities to anticipate these impacts resulting from increased airport capacity (what might be described as 'impact creep') because there are no statutory operational capacity limits for airports.

The 'ultimate capacities' of airports will continue to grow as technology evolves, meaning the noise footprints over existing communities will continue to expand. For example, at Melbourne Airport there was once a binding agreement to protect communities east and south of Melbourne Airport. This was superseded by the 2003 Master Plan without the significance of this being made clear to residents and communities affected.

As such there should be a clearly defined operational capacity for each airport. This will not only facilitate sound land use planning, but also orderly planning for the development new airports as existing airports approach capacity, to be sited in locations appropriate for the population growth projections and geographical distribution in the future. As a corollary, the associated land use planning schemes should be in place to ensure adequate buffer zones to protect residential and community living and provide transport infrastructure to the area.

The Federal Minister for Infrastructure, Transport, Regional Development and Communications must work with State and local governments to establish the basis upon which statutory capacity will be determined. That is, considering the economics of the airport and surrounding area services including impact on demand for handling aircraft movements and associated costs, airport land use and neighbouring land development impact, terminals and Aviation support facilities development, infrastructure development on airport land and adjacent, (roads, public transport etc) centrality of airport to population (current and emerging) requiring air services etc , environmental strategy, including environmental considerations such as pollution, aircraft and road transport noise, and all other impacts of all federally regulated airports, as provided for in Section 195, Division 4 of the *Airports Act 1996*.

This should be completed expeditiously and based on fit-for-purpose noise and land planning tools that are transparent and accessible to communities and based on actual, not predicted noise exposure and the known and suspected health and educational impacts of chronic aircraft noise and air pollution exposure.

Establishing the ultimate operational capacity establishes

- the ultimate noise footprint thereby providing certainty for
    - state and local planning authorities;
    - existing and future residents affected by flight paths and flight frequency; and
    - the airport operators
- the timeline for expanding other and/or developing a new airport to meet projected demand based on location of the projected population and demand for air services.

4.3 Levies for airports where communities cannot be adequately protected by capacity caps alone

Where aviation operations cannot be maintained profitably without risking community health and safety, compensation must be provided for those communities adversely affected by aircraft noise through the Commonwealth's *Levy Collection Act 1995* and *Aircraft Noise Levy Regulations.* These statutes were put in place for the explicit purpose of compensating residents affected by aircraft noise in the case of:

i. Sydney in 1995 to ameliorate the impact of aircraft noise from the 3rd runway
ii. Adelaide in 2000 for its extensions; and
iii. Badgery's Creek Airport in NSW

The same remedy must be made available to residents in the vicinity of all airports and within noise contours associated with compromised health and educational outcomes once the true extent of these noise contours has been verified.

Implementing these two measures is the only way to provide the certainty all parties require in order to make sound decisions and ensure the planning framework will not come into conflict with future noise contours. It is an essential step to protect State and Local governments from the consequences of planning decisions made now and into the future, to protect residents from the harmful effects of chronic aircraft noise exposure, and to ensure that development of future transport infrastructure can be planned by the Commonwealth in an orderly fashion and delivered according to necessity. It is, therefore, the only way airport operations and communities can be effectively safeguarded.

5.0 Elements of an Australian Community and Aviation Safeguarding Framework

In this section, we will outline the features of a stronger, more equitable safeguarding framework we refer to as the **Australian Community and Aviation Safeguarding Framework (ACASF)**

5.1 Comprehensive reform to community engagement

Communities affected by aircraft noise bear the burden of safeguarding significant assets for their respective states and all Australians, and this cost should be recognised and compensated. The mechanism by which this is achieved should be developed in close and meaningful consultation with the existing community groups to ensure the expertise those with firsthand experience have is brought to bear.

In the absence of objective longitudinal health and life-outcome studies of communities affected by aircraft noise, the subjective experience and insight of residents are arguably the only reliable source of expert opinion on those impacts and how they can be adequately mitigated. The body of this submission, as a whole, articulates the case for this recommendation.

Our ACASF would give communities equal standing to all other interested parties in shaping, reviewing and amending the safeguarding framework and balancing community interests against those of all other parties to develop a framework that identifies and strikes the right balance between the competing interests of sustainable aviation and healthy, sustainable and liveable communities.

> **Recommendation 1**: An ACASF would reform the current CACG model to a community-led model, which sets the CAGC agenda in consultation with representatives of the aviation sector and government. The model would be funded to provide affected residents and the broader community with similar access to airport operators and the aviation sector. Terms of reference would oblige the aviation sector and all levels of government to share the burden of airport safeguarding more equitably among those who derive direct and indirect benefits, as well as those who suffer the harmful effects.

5.2 Remediation of existing and prevention of future encroachment, and an end to privatised profits and socialised costs

In future, the majority of new households exposed to aircraft noise will continue to be the result of expanded aviation operations and altered flight paths at *existing airports encroaching on existing communities*, rather than residential encroachment on existing airports or flight paths. If the balance sought in the 'balanced approach' is to be achieved, this understanding must be factored into a new safeguarding framework of the kind we propose.

In this context, the most significant barrier to effective long-term safeguarding of airports and aviation operations is the conflicting priorities of the aviation industry, state and local planning authorities, the needs of the wider community seeking aviation services (business and private) and the communities negatively affected by aircraft noise exposure. Airports and airlines will naturally work to maximise profit from existing assets; state and local governments are obliged to meet housing targets and provide services and amenity to existing communities; and affected residents are trapped in the middle. Where airport expansion, flight path changes, and aircraft operation modes are unrestrained, planners cannot make informed decisions about where to locate housing and amenity, nor residents about where to live.

In its current form, the NASF does not attempt to address noise impacts on existing communities. Instead, they seek to prevent rezoning of Greenfield sites and construction of additional housing, schools, childcare, aged care and other sensitive facilities within specified noise contours. A new Australian Community and Aviation Safeguarding Framework of the kind we propose would provide better protection for existing and future communities negatively impacted by aviation operations, and better visibility of their concerns, while also respecting the obligations of state and local authorities to provide housing and amenity in both new and existing communities – in other words, instead of focussing solely on safeguarding the aviation industry, a new framework would *balance the safeguarding of aviation with the safeguarding of communities*.

At the same time, there must be a shift away from burdening residents and state and local governments with the costs and responsibilities associated with airport safeguarding, and toward sharing these more equitably among those who reap the benefits while avoiding the costs:

- the aviation industry,
- all levels of government,
- the broader community.

It is ultimately the airlines that are responsible for the health, educational and environmental impacts of aviation operations, and they have the greatest capacity to adapt their operations to minimise these impacts. Despite this, no statutory or regulatory obligations currently fall on the airlines to limit or control their negative impact on communities and the environment, and, importantly, via their pilots, they have the authority to override the entirely voluntary noise abatement and noise sharing procedures in operation at some Australian airports.

Thus, to address the issue of encroachment, a new safeguarding framework would:

- Prevent or reduce aircraft noise encroachment into existing communities
- Share the burden of safeguarding more equitably among the beneficiaries of aviation operations

Recommendation 2: An ACASF would address existing encroachment using two regulatory tools:

3. The capacity of every federally-regulated airport would be declared by the Minister for Infrastructure, Transport and Regional Development, as provided for

in section 195 of the *Airports Act 1996 (Cth)*, following consultation with State and local governments. This would prevent further encroachment of aircraft noise contours into existing communities and to facilitate orderly planning for current and future airports as well as population growth and demographic changes in the future.

4. A levy would be imposed on aviation operators to share the burden of safeguarding more equitably, the proceeds of which to be distributed as follows:
   - First, directly to affected residents to compensate them for soundproofing, loss of amenity, and loss of development rights; and
   - Second, to local councils to invest in the amenity of affected communities in ways that may compensate for the loss of amenity due to noise exposure and air pollution. Council planners could explore and invest in innovative noise mitigation strategies that could include sound absorbing cladding, building materials, landscaping and planting; or features such as green walls.

5.3 Collection of objective data to underpin safeguarding

As discussed earlier, the Australian aviation sector's understanding of what equates to significant levels of aircraft noise is based on a single survey of community attitudes to aircraft noise conducted in 1982 – forty years ago. No other comprehensive survey has been conducted in Australia since then, although more recent studies overseas indicate community tolerance of aircraft noise has decreased over that past four decades[59].

This suggests the NAL Report underestimates the proportion of people who are moderately to seriously annoyed. Indeed, Professor Andrew Hede, co-author of the NAL Report, has called for an updated survey.[60] The Melbourne Airport Environs Safeguarding Standing Advisory Committee also expressed support for this in their recent Issues and Options paper.[61]

We consider it vital that such a survey be conducted by an independent consultant and regularly repeated at agreed timeframes as part of a new safeguarding framework. This would assist airport corporations in preparing their Master Plans and ensure that the framework keeps pace with community attitudes.

It is important to note that this survey *must accurately reflect attitudes toward the levels of aircraft noise exposure expected as we recover from the effects of COVID-19* on the aviation industry, rather than the current unusually low levels at many Australian airports. Based on current evidence, neither the ANEF nor the NASF are fit for purpose.

> **Recommendation 3**: An ACASF would immediately survey community attitudes toward aircraft noise, as called for by Dr Hede and MAESSAC. The survey should be

[59] Andrew J Hede, 'Review of International Research on Community Reaction to Aircraft Noise Report No.1: Overview of Aircraft Noise Metrics', (2018) *Commissioned by the Sydney Airport Community Forum (SACF)*.

[60] Ibid.

[61] MAESSAC Part B *Issues and Options Paper*, 23 April 2021.

undertaken every five years, to provide contemporary data to underpin airport operations, development and safeguarding.

Understanding of the objective effects of aircraft noise pollution has significantly increased in the past decades, and verified real-world studies and data analysis are now readily available to facilitate effective safeguarding. It is essential that we shift away from *outdated subjective* measures of annoyance to *updated objective* measures of the well-established human health and educational effects of chronic aircraft noise exposure.

There are significant and growing economic costs associated with these impacts. Models for monetising these costs to offset against the economic benefits of air transport exist, and these should be independently reviewed, verified and adapted to Australian settings [11].[62] In brief, thorough and independent benefit-cost analysis is essential for all future aviation industry expansion.

> **Recommendation 4**: An ACASF would include longitudinal studies of health and educational outcomes for communities affected by aircraft noise exposure to underpin forward planning and guide the distribution of monies raised via levies to ensure they are targeted at addressing the negative impacts of the aviation industry.

While aircraft noise has historically been the primary focus of community anger, there is also increasing awareness of the potentially very significant health threats posed by ultrafine particulates. Indeed, it is possible aviation operations cause more deaths among people on the ground than among passengers, due to the cumulative impacts of aircraft noise and particulates. It will therefore be important to monitor air quality around airports. This will be important for interpreting the health studies accurately.

> **Recommendation 5**: An ACASF would include air quality monitoring at all Australian airports, with results made public to inform health studies and future planning.

5.4 Selection of the right metric for forecasting and communicating aircraft noise impacts

Currently, land use management guidelines are based on ANEF contours. These are aircraft noise forecasts derived from modelling, rather than from real-world aircraft noise monitoring data. The bulk of the input data is provided by the proponent – the airport – including factors such as the mix and relative abundance of aircraft types, runway orientation and operation modes, and prospective flight paths. These assumptions are not subject to future confirmation, so when flight paths change, or airlines use different aircraft, this is not reflected in the ANEF contours.

[62] Karie Riley, n30

There are also additional assumptions built into the modelling software - for example that departing aircraft follow an angle of ascent of 6°, and arriving aircraft an angle of descent of 3°. However, in the real world there is significant variation in these angles - a fully loaded A380 simply cannot climb that steeply; aircraft, for whatever reason, simply don't hit the target altitude at the target site as they descend. These real-world deviations from the theoretical input change the loudness perceived on the ground in ways that modelling cannot capture but real-world noise monitoring and people on ground can.

Community members frequently observe that the level of aircraft noise predicted by the ANEF model for a new flight path or runway, is significantly lower than what they subsequently experience. There is also scientific evidence to suggest that ANEF forecasts do not to correlate with real-world noise monitoring. For example, we are aware of a recent Australian study, known as the 'Ancich report', which suggests the Environmental Impact Statement (EIS) for Western Sydney Airport (WSA) significantly underestimates the area that will be exposed to high levels of aircraft noise.[63]

This is consistent with data from the Explane app,[64] which indicates that areas close to Melbourne Airport that are not currently under any noise contour for the existing runway may be exposed to close to two hundred events above 70 dBA in a single day, and some to above 80 dBA (pre-COVID).[65] If verified by certified noise monitoring, this would more than double the area under the 25-30 ANEF contour for Melbourne Airport's existing north/south runway.

One possible reason many complaints originate from outside the 20 ANEF contour is that noise modelling has not accurately predicted actual noise levels in communities or how far the noise persists from the end of the runway. For example, the Ancich study found that a departing overflight that was forecast to drop below 70dBA after 5km from the end of the runway, according the WSA EIS, was still above that level at 19.8km. Crucially, the aircraft noise measurements captured in this study closely align with those captured by AA's aircraft noise monitoring. This clearly demonstrates that aircraft noise forecasts can deviate significantly from actual aircraft noise levels, and underscores the urgent need to verify noise forecasts through more extensive, longer-term independent noise monitoring at all Australian airports.

As ANEF contours are not readily verifiable, and are not easy for lay people to understand, we recommend that 'Number above' (N or Nxx) contours should be adopted for noise forecasts, planning purposes, and communicating noise information to current and prospective residents. **Attachment 1** outlines expert recommendations on how this should be implemented to ensure accuracy and ICAO compliance.

> **Recommendation 6**: An ACASF would use 'number above' contours, rather than ANEF contours, to be generated as outlined in Attachment 1.

[63] Dr Eric Ancich and Don Carter 'Assessment Of Measured Aircraft Noise Levels Under The Existing Flight Paths of Sydney Kingsford Smith Airport With Reference To Western Sydney Airport', *Report 9173.R1*, Submitted to Blacktown City Council, March 2019.

[64] Explane.org, *Aviation Noise Reports* (Web Page, 6 September 2021) < https://reports.explane.org/>

[65] Appendix 4

Recommendation 7: An ACASF would incorporate accurate noise monitoring at all Australian airports, based on the locations of flightpaths and aircraft noise complaints and accurately representing the extent of aircraft noise exposure on the ground, to verify forecasts and underpin planning controls, with the and results and methodology made fully public.

5.5 Reduction of noise impacts in homes and other buildings: safety and efficacy of AS 2021

The current NASF relies on *AS 2021:2015 Acoustics - Aircraft Noise Intrusion - Building Siting and Construction* for its effect. AS2021 is a non-enforceable construction industry-derived standard, developed from research conducted almost 50 years ago, when flight frequency and community tolerance were different and urban population density lower.

The standard is intended to reduce exterior noise levels to the recommended indoor levels, however there is no requirement to verify its effectiveness.

Implementation of AS 2021 on new builds or significant renovations or extensions not only places an unfair cost on home-owners, but may also leave current residents who bought home in good faith that were built before it was introduced with dead assets – homes they can't sell because no one will want to live in them. It is also concerning that because the supply of housing is finite, someone will have no choice but to live in these homes.

Consideration must be given to addressing the inequity of burdening residents with this expense to protect national assets for the benefit of the aviation industry and the broader community.

AS2021 should also be reviewed from a public health perspective, as the level of seal required to achieve the noise reduction may increase health risks associated with airborne diseases. In areas where it is not reasonable to expect to enjoy the use of your garden or, by extension, other outdoor areas, this is a significant concern, in particular at this time when COVID has highlighted the public health risks of airborne infection.

Anecdotally, many people feel the insulation still allows an unacceptable level of aircraft noise to penetrate into the home. A review is merited to determine whether this is because it doesn't achieve the target noise reductions, the external noise levels are higher than the forecasts suggest they will be, or the reduction is not sufficient for current levels of community tolerance of aircraft noise.

Compliance with AS 2021 is a significant financial burden to residents, and if it is not adequate it is a truly unconscionable imposition.

Recommendation 8: An ACASF would immediately review AS 2021 to ensure:

- It achieves the target noise reduction
- It is compatible with adequate protection against aerosol and airborne transmission of pathogens

5.6 Communicating aircraft noise impacts to communities

In addition to setting standards for siting and construction of buildings within aircraft noise zones, AS 2021 includes recommendations for communicating aircraft noise impact to communities. It is evident, however, that only those who have experienced chronic aircraft noise actually comprehend its effects. While the standard has many strengths, it would benefit from an overhaul and we would welcome the opportunity to engage further on this subject.

Information provided to communities on aircraft noise is produced by airport operators in airport Master Plans, EISs, and other publications. The formats used vary between airports but are uniformly difficult for non-experts to understand and lack data on health and educational impacts. To gain community trust, this information must ideally be independently produced or, failing that, at a minimum subject to independent verification. It must also be delivered directly to current and prospective residents of affected communities with regard to actual aircraft noise exposure whether the affected communities are within published airport noise contours or not. This may require surveying residents under flight paths some distance from the airport to ensure their noise exposure has been accurately accounted for.

> **Recommendation 9:** An ACASF would provide an easily accessible, well-illustrated standardised format for communicating noise impacts to current and prospective residents of affected communities. This would be developed in consultation with a cross-section of community members and would include objective data on health and educational impacts, to be produced or robustly reviewed by an independent authority.

5.7 Holding all parties accountable for the impact on communities

Airport operators and Airservices Australia are at the forefront of community engagement, but it is the airlines who are ultimately responsible for generating aircraft noise and emissions and federal, state and local governments who are responsible for drafting, enacting and implementing the policies that have externalised costs of airport safeguarding to residents and communities. If an effective solution is to be found, all parties must be held to account for their role in implementing it faithfully.

Recommendation 10: An ACASF must facilitate rigorous and easily monitored accountability of all aviation sector partners, including airports, airlines, AA, and all levels of government.

5.8 Recognition of the threat climate change poses to aviation

Communities are increasingly aware of, and concerned by, the disproportionate impact of the aviation sector on climate change, arguably the greatest threat to both human society and, paradoxically, the future of aviation. Global heating risks to the safety, efficiency and operational integrity of flight operations at airports include those from sea level rise and

storm surges, and from extreme land temperatures. They also include those from the continued operation of flights.

The threats to the aviation sector posed by climate change should be recognised in a new safeguarding framework.

> **Recommendation 11:** An ACASF would include guidelines for the aviation industry to implement changes to address the threat climate change poses to aviation and vice versa.

6.0 Attachment: Choosing an accurate and verifiable noise metric for forecasting and monitoring aircraft noise impacts

SUPPLEMENTARY SUBMISSION BY MELBOURNE AIRPORT COMMUNITY ACTION GROUP TO THE NATIONAL AIRPORTS SAFEGUARDING FRAMEWORK – IMPLEMENTATION REVIEW

Terms of Reference

The National Airports Safeguarding Framework (NASF) seeks to improve community amenity by minimising noise-sensitive developments near airports and to improve safety outcomes by ensuring aviation safety requirements are recognised in land-use planning decisions. Airports are important national, state, territory and regional infrastructure assets; and contribute significantly to national, state and territory economies. Strategic helicopter landing sites are also of critical need in the provision of identified services.

On behalf of the National Airports Safeguarding Advisory Group (NASAG), the Federal Department of Infrastructure, Transport, Cities and Regional Development will undertake a review to evaluate how well the NASF has met its objective to: "improve community amenity by minimising noise-sensitive developments near airports and to improve safety outcomes by ensuring aviation safety requirements are recognised in land-use planning decisions." This review of implementation across all jurisdictions will involve consultation with members of NASAG, industry and community stakeholders. The Review will consider progress with implementation of NASF in terms of:

- *whether the NASF has been/is being embedded in legislation/regulations?*
- *whether the NASF is reflected in policy, guidance and any other planning advice?*
- *what impediments (if any) have there been to full implementation?*
- *the level of awareness, consideration and use of the NASF principles and Guidelines A to I by relevant government agencies, public and private airport operators;*
- *the level of industry and community stakeholder awareness and familiarity with the NASF framework and guidelines; and*
- *any specific case studies to illustrate the impact of NASF on land use planning decisions.*

The Review report will put forward recommendations, as required, on measures which could enhance further implementation.

The Review will commence on 2 September 2019; with a draft report planned to be provided to NASAG members for consideration by 31 January 2020; and subsequently a final report being presented to the Transport and Infrastructure Senior Officials Committee in the first half of 2020.

(N.B. It is understood, however, that the reporting timeline shown above has been materially affected by the nationwide impact of COVID-19 and the final report may now be delayed until 2022)

GUIDELINE A: MEASURES FOR MANAGING IMPACTS OF AIRCRAFT NOISE

Limitations of the ANEF metric

The ANEF is a noise exposure metric, using a calculation based on the noise level, duration, how often and when aircraft operations occur. This includes adjustments for aircraft events that occur at night (i.e. additional sensitivities at this time). The metric is based on the effective perceived noise level (EPNL) metric which also considers any annoying tonal characteristics typical of the aircraft. Every aircraft noise metric calculation (such as EPNL) is subject to a degree of uncertainty due to factors such as variations in aircraft flight paths, pilot operating techniques, and the effect of meteorological conditions on noise propagation and may be considered here as ± 3 dB.

Section 4.2(i) of the MAESSAC Options Paper [1] notes the following:

The ANEF does not readily translate to an understandable noise level in decibels – the standard measure for how 'loud' something is.

It should be noted, however, that the ANEF metric is solely intended to be used to inform land use planning decisions, and is not intended to provide information to the community regarding aircraft noise levels. Unfortunately, this is frequently the result.

It is also important to be aware that AS 2021 highlights that the prediction of the 20 ANEF contour is subject to a degree of uncertainty. The Foreward to AS 2021:2015 offers the following caution:

Exposure prediction below 25 ANEF may be significantly inaccurate, and therefore caution should be exercised in the evaluation of locations outside the 25 ANEF contour. In addition, the extent of noise reduction required for a building may depend in part on the amount of noise from sources other than aircraft. Because of these factors and of the special acoustic requirements of certain types of building, it will sometimes be necessary to undertake supplementary noise measurements so that a sufficiently representative prediction of the noise exposure at the site under evaluation can be obtained. This is also true for aerodromes at which a significant number of training circuits occur.

[1] Standing Advisory Committee Report pursuant to section 151 of the PE Act Melbourne Airport Environs Safeguarding Issues and Options Paper 23 April 2021.

Appendix A expands on the discussion, noting that variation in aircraft operations and weather conditions contribute to the uncertainty in calculating the 20 ANEF contour:

It is to be stressed, however, that the actual location of the 20 ANEF contour is difficult to define accurately, because of variations in aircraft flight paths, pilot operating techniques, and the effect of meteorological conditions on noise propagation. For that reason, the 20 ANEF contour is shown as a broken line on ANEF charts.

Note 1 to Table 2.1 *Building site acceptability based on ANEF zones* also highlights the uncertainty in the location of the 20 ANEF contour:

The actual location of the 20 ANEF contour is difficult to define accurately, mainly because of variation in aircraft flight paths. Because of this, the procedure of Clause 2.3. 2 [determination of noise attenuation requirements of buildings in 'conditionally acceptable' zones] *may be followed for building sites outside but near to the 20 ANEF contour.*

This statement and the following statement from Section 2.1.1 confirms that the assessment procedure for building sound insulation can be followed at sites beyond 20 ANEF contours:

If the building site is outside the 20 ANEF contour (i.e. less than 20 ANEF)*, noise from sources other than aircraft may dominate; therefore, there is usually no need to proceed further in this Standard as the construction of the building need not specifically be designed to provide protection against aircraft noise intrusion. Nevertheless, if it is desired that premises be insulated against aircraft noise, the procedures of this Standard may be followed.*

Model Calibration

The Attachment to Guideline A notes that:

Experience has shown a range of problems with relying solely on the ANEF as a noise information tool as there are limitations in using the ANEF to describe aircraft noise exposure to laypeople.

And adds that:

While the populations with the highest aircraft noise exposure often live within the 20 ANEF contour, experience shows the majority of noise complaints that are received come from residents living outside the 20 ANEF contour (i.e. less than 20 ANEF)*. Traditionally the residents of these areas have been given little information on aircraft noise through the ANEF system other than that the area is considered 'acceptable' for housing. Some people living outside the 20 ANEF contour* (i.e. less than 20 ANEF) *have been given an expectation of receiving little or indeed no aircraft noise and as a consequence find the levels of noise actually experienced to be unacceptable.*

These comments, when taken with the advice in AS 2021:2015 that the actual location of the 20 ANEF contour is difficult to define accurately, confirm the problematic nature of the 20 ANEF contour and the almost religious reliance on this metric as an indicator of likely adverse community reaction to aircraft over-flight noise.

Model calibration, using measurement data, has traditionally been used to address similar problems.

However, as Section 4.2(i) of the MAESSAC Issues and Options Paper [1] notes:

The ANEF does not readily translate to an understandable noise level in decibels – the standard measure for how 'loud' something is.

Thus, it is clear that model calibration (using measurement data) is not a viable option to validate ANEF contours. In other forms of environmental noise assessment, the standard national [2] and international practice has been to measure the existing acoustic amenity (commonly referred to as the background noise level) and to compare this with the intruding noise level resulting from the factory, power station, motorway etc. development. It should be noted that the use of AS 1055 has been cited by Airservices Australia [3-5] in relation to the measurement of aircraft over-flight noise (see Note to Glossary of Terms).

However, this practice is eminently suitable for the calibration (validation) of the various Nxx metrics (see following discussion).

The Nxx Metric (N70, N65, N60 and N60 Night)

Information on the number of noise events is termed the 'Number Above' noise metric. In Australia, this is commonly called the N70 (or N65 or N60) where N70 is the number of aircraft noise events louder than 70 dBA. Thus, residents can be informed in a way that is more intuitive. In other words, how many "noisy" events will be experienced within the illustrated zone? Such 70 dBA events have often been used to categorise an event as 'noisy' as these correspond to an approximate 60 dBA noise level indoors, which can disturb conversation or other indoor activities such as watching television.

The information is presented in terms of a number of descriptors, and is intended to provide sufficient detail to allow members of the public to understand for themselves the likely impact of the noise.

2. [2] Australian Standard 1055.1–2018 "Acoustics – Description and measurement of environmental noise".
3. [3] Short Term Monitoring Program, Lindfield NSW Report, Airservices Australia, March 2014.
4. [4] Short Term Monitoring Program , Tarragindi QLD Report. Airservices Australia, August 2013.
5. [5] Short Term Monitoring Program, North Ryde NSW Report, *Airservices Australia*, May 2013.

The most commonly-used noise descriptor in this system is N70 – the number of aircraft noise events per day exceeding 70 dBA. (A-weighted decibels (dBA) are an expression of the relative loudness of sounds in air as perceived by the human ear.) A noise level of 70 dBA outside a building would generally result in an internal noise level of approximately 60 dBA, if windows are open to a normal extent. This noise level is sufficient to disturb conversation, in that a speaker would generally be forced to raise their voice to be understood.

An internal noise level of approximately 60 dBA (from an aircraft over-flight) is likely to also cause some words to be missed in conversation or from a television or radio program. N70 values indicate the number of times per day when such events would occur.

Whilst this approach has considerable merit, it is potentially flawed as there is currently no standardised approach for determining the number of aircraft noise events per day exceeding 70 dBA (for, say, the N70 metric). There is also no standardised approach for determining the

acceptability of particular Nxx levels in assessing adverse community reaction. Historically, different approaches appear to have been used.

In the EIS for Western Sydney Airport [6], the following procedure is shown for producing N70 contours:

For each aircraft type, each track and (for departures) each possible stage length, custom-designed software was used to control INM's operation, calculating noise levels at each point on a grid of size 185 m by 185 m, covering the area of interest. The unit that was calculated is LAmax – the maximum noise level during the overflight in dBA, which is used in calculating N70 and similar units. The results from this calculation form the 'library of noise levels' referred to in Figure 2-2.

For N70 and similar units, this library is then interrogated to determine the number of events at each grid point exceeding the relevant LAmax threshold, and the results used to produce contours using standard procedures.

Whilst the process outlined above may be appropriate, the INM Users Guide [7] (see Section 2.1.3, Sub-paragraph 3) advises that "...*INM is not designed for single-event noise prediction, but rather for estimating long-term average noise levels using average input data...*" Accordingly, the true value of such contours in informing the community as to the full extent of any adverse noise impact may be significantly understated.

[6] WSA EIS, Appendix E-1 of Wilkinson Murray Report No. 14168 Version E, "Aircraft Overflight Noise", August, 2016.

[7] Integrated Noise Model (INM) Version 7.0 User's Guide, *Report No. FAA-AEE-07-04*, U.S. Department of Transportation, Federal Aviation Administration, Office of Environment and Energy, Washington DC, 2007.

In a letter to the Department of Infrastructure, Transport, Regional Development and Communications dated 17 December 2019, Rob Bullen Consulting advised that:

"This leaves point 2, which is related to the meaning of the maximum noise level descriptor identified as LAmax in the EIS. I can confirm that in this EIS and others, maximum noise levels are described in terms of an average of maximum noise levels from a specific aircraft type performing a specific operation, and not by the highest maximum level that would be measured during any such operation. A remaining question is whether wording in the EIS made this sufficiently clear. The EIS indicates (Section 10.5.3):

Single-event noise contours depict the maximum (LAmax) noise levels resulting from a single operation of a specific aircraft type on all applicable arrival or departure flight paths.

This is ***admittedly unclear*** (emphasis added) *– single operations by a specific aircraft type will result in a range of maximum noise levels, and exactly how this range is "depicted" is not stated"*

It is noted that this correspondence was subsequently released following an FOI application by an unidentified person (see Department of Infrastructure, Transport, Regional Development and Communications FOI Disclosure Log for 11 June 2020: FOI 20-125-documents-redacted.pdf).

The statement by Rob Bullen Consulting that "*...single operations by a specific aircraft type will result in a range of maximum noise levels...*" is disputed. There will only be one maximum noise level that results from a single over-flight. This is best shown by Figure 1.

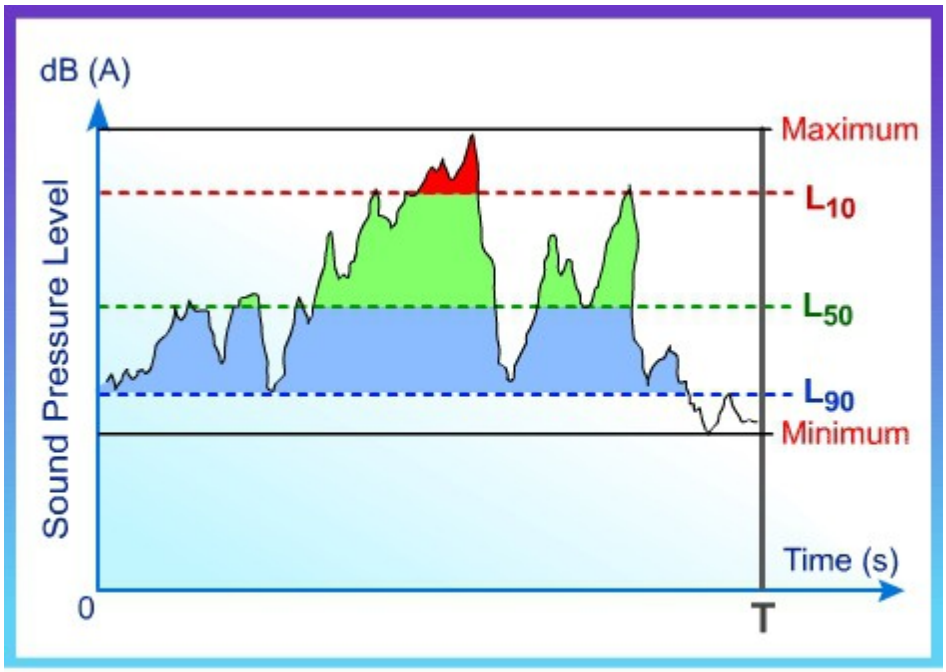


Figure 1. Short Term Noise Event (Over-flight or Pass-by)

In this figure, the true range of maxima is shown by the red shaded area. The horizontal dotted line described as L_{10} shows the average but not the highest individual value. That value is the true LAmax resulting from the over-flight (or similar event).

(N.B. The descriptor L_{10} (and L_{A10}) is simply engineering shorthand used to describe a noise level (in dBA) that is exceeded for 10% of the time. Similarly, L_{50}/L_{A50} is exceeded 50% of the time and L_{90}/L_{A90} is exceeded 90% of the time).

Before the development of digital sound level meters, many analogue sound level meters had a "Maximum" hold function where the meter displayed the single highest value during the measurement period. If more analysis was required, the meter could be connected to a paper chart recorder where all the galvanometer needle excursions would be displayed. This was the only way (at that time) that the standard environmental noise metrics such a L_{A10} and L_{A90} could be determined until Statistical Analysers were developed. With the chart recorder method, L_{A10} was taken as the average maxima of the needle swings and L_{A90} as the average minima of the needle swings. The above figure shows both these noise metrics.

The default modelling condition is that departing aircraft climb at an angle of ascent of 6°, and arriving aircraft use an angle of descent of 3° (commonly referred to as Continuous Descent Approach). However, not all airlines (or their pilots) operate their aircraft in an identical manner. Accordingly, there may be significant variation in these angles as some aircraft may not achieve the target altitudes as they ascend or descend.

Indeed, at Brisbane Airport, there is a Noise Abatement Departure Procedure that requires higher initial thrust settings to gain earlier climb and altitude due to leaving the wing flaps extended until 3000 ft. Airservices Australia has confirmed that it is regular practice for long-haul heavy aircraft to request cancellation of the Standard Instrument Departure (SID) procedure over the city, due to an inability to meet the current published climb gradients and/or speed requirements. It is believed that similar procedures and cancellation requests occur nationwide.

Single-Event Maximum Noise Level Contours

Single-event maximum noise level contours are often presented in EIS documentation for typical operations. Where used, maximum noise level contours are presented for each aircraft type and scenario. These plots are presented by operation (arrival and departure) in an effort to demonstrate the noise levels that are predicted for distinct operations. Such plots purport to show worst-case scenarios. However, if one looks at Page 36 of WSA EIS [6], there is advice that "*...Figure 3-1 shows single-event LAmax noise level contours for the* ***loudest noise event*** (emphasis added) *predicted to occur at the airport under this scenario – a 747 departure with INM stage length 5, corresponding to a departure for Singapore...*" If, as described, this is the loudest noise event predicted to occur at the airport under the given scenario, then it cannot be an average or the result of INM modelling due to the modelling limitations set out in the INM Users Guide [7] and for the reasons given above.

There is, currently, no Australian Standard or accepted Code-of-Practice for the production and presentation of single-event maximum noise level contours and it is left to the discretion of the acoustic consultant involved in the EIS or Airport Master Plan and their interpretation of the Terms of Reference provided by the Proponent. There is clear evidence of this discretionary practice with respect to Western Sydney Airport. In FOI-125 from the Department of Infrastructure, Transport, Regional Development and Communications FOI Disclosure Log for 11 June 2020, Dr Bullen advised the Department that an undisclosed and undocumented averaging process was used in the preparation of these single event noise contours.

Sections 2.1.7, 3.2, 4.2, Figure 3.1 and Figures 5.1 to 5.10 of the WSA EIS [6] purport to refer to single-event noise level contours even though the INM Users Guide [7] advises that it is not designed to produce such contours and, as a result, the community may have been misled as to the true worst-case scenario.

A significant issue for this Review to address is to determine the correct definition of LAmax. Some assistance in this regard is afforded by the Civil Air Navigation Services Organisation (2013) document entitled "*Considerations for Community Noise Interactions*".

In Appendix 1, Noise Metrics of that document, LAmax is defined as:

Maximum Noise Levels (LAmax, PNLmax). The noise level is assessed in terms of the ***instantaneous*** *(emphasis added) maximum sound level that is reached during an overflight.*

By letter dated 3 July 2020, Airservices Australia (ASA) advised that the definition of LAmax shown in the CANSO document is correct.

Accordingly, it is recommended that the Review adopt a definition of LAmax that is consistent with this 2013 CANSO definition and consider LAmax as an instantaneous value and not an average. This recommended definition should apply to both single- event maximum noise level contours and Nxx contours.

Australian Standard 2021:2015

The MAESSAC Interim Issues and Options Paper [1] identified many issues associated with this Standard with the most prominent for noise affected residents being the high cost to purchase a PDF copy from Standards Australia.

The biggest problem with AS 2021: 2015 appears to be in the way it is interpreted, particularly by urban planners. Emeritus Professor Andrew Hede is commonly regarded as the originator of the ANEF metric [8].

However, in [9] Prof. Hede notes that:

"The land-use planning application of the ANEF metric relates mainly to the Australian Standard on aircraft noise (ref., Standards Australia, AS2021, 2015). This standard lists the ANEF cut-offs approved for building siting. Specifically, the Standard provides a table prescribing that areas exposed to less than 20 ANEF are considered 'acceptable' for such listed building types as 'house', 'school', and 'hospital' (see Standards Australia, 2015, Table 2.1, p12).

This standard uses the term 'acceptable' only to mean acceptable for specified land uses (e.g., 'less than 20 ANEF' is rated as 'acceptable' for new residential development). However, public officials and community members often ***misinterpret this*** (emphasis added) *to mean that 'less than 20 ANEF' is an 'acceptable' amount of aircraft noise and by implication, that this amount of noise is 'insignificant' or 'negligible' not only for residential land use but also for 'permissible' human reaction".*

This is an area where the Review should approach Standards Australia to clarify the wording of the Standard (when next revised) to minimise or eliminate the risk of misinterpretation.

[8] [9]

Hede, AJ, & Bullen, RB. 1982, Aircraft Noise in Australia: A Survey of Community Reaction, National Acoustic Laboratories Report No. 88, Australian Government Publishing Service, Canberra.

Hede A. "Review of International Research on Community Reaction to Aircraft Noise Report No.1: Overview of Aircraft Noise Metrics, 2018" Commissioned by the Sydney Airport Community Forum (SACF).

CONCLUSION & RECOMMENDATIONS

Any form of engineering modelling should only be viewed as an approximation of reality as the model (by default) assumes theoretical operational parameters that may or may not apply universally. It is probably fair to say that no two airlines (or their pilots) operate their aircraft identically. Indeed, at Brisbane Airport, there is a Noise Abatement Departure Procedure that requires higher initial thrust settings to gain earlier climb and altitude due to leaving the wing flaps extended until 3000 ft. Airservices Australia has confirmed that it is regular practice for

long-haul heavy aircraft to request cancellation of the Standard Instrument Departure (SID) procedure over the city, due to an inability to meet the current published climb gradients and/or speed requirements. It is believed that similar procedures and cancellation requests occur nationwide.

It is noted that the Nxx metrics (N70, N65, N60 and N60 Night) are particularly susceptible to underestimation due to known limitations in the modelling software. As was shown, INM is not designed for single-event noise prediction, but rather for estimating long-term average noise levels using average input data. It is understood that the US Federal Aviation Administration (FAA) has recently superseded INM with the Aviation Environmental Design Tool (AEDT). It is further noted that the calculation and prediction algorithms relating to aircraft noise are understood to be equivalent in both calculation programs.

This submission strongly recommends that the Review adopts a definition of LAmax that is consistent with the 2013 CANSO definition and considers LAmax as an instantaneous value and not an average. All Nxx metrics (N70, N65, N60 and N60 Night) should therefore be derived from instantaneous (not average) LAmax values.

This recommended definition should apply equally to both single-event maximum noise level contours and Nxx metric contours.

Model calibration (validation) is strongly recommended. However, this practice is only practically suitable for the validation of the various Nxx metrics and single-event maximum noise level contours.

As there is, currently, no Australian Standard or accepted Code-of-Practice for the production and presentation of single-event maximum noise level contours and the various Nxx metrics, this Review could greatly assist in addressing this hiatus by promoting the development of a suitable industry wide Code-of-Practice.

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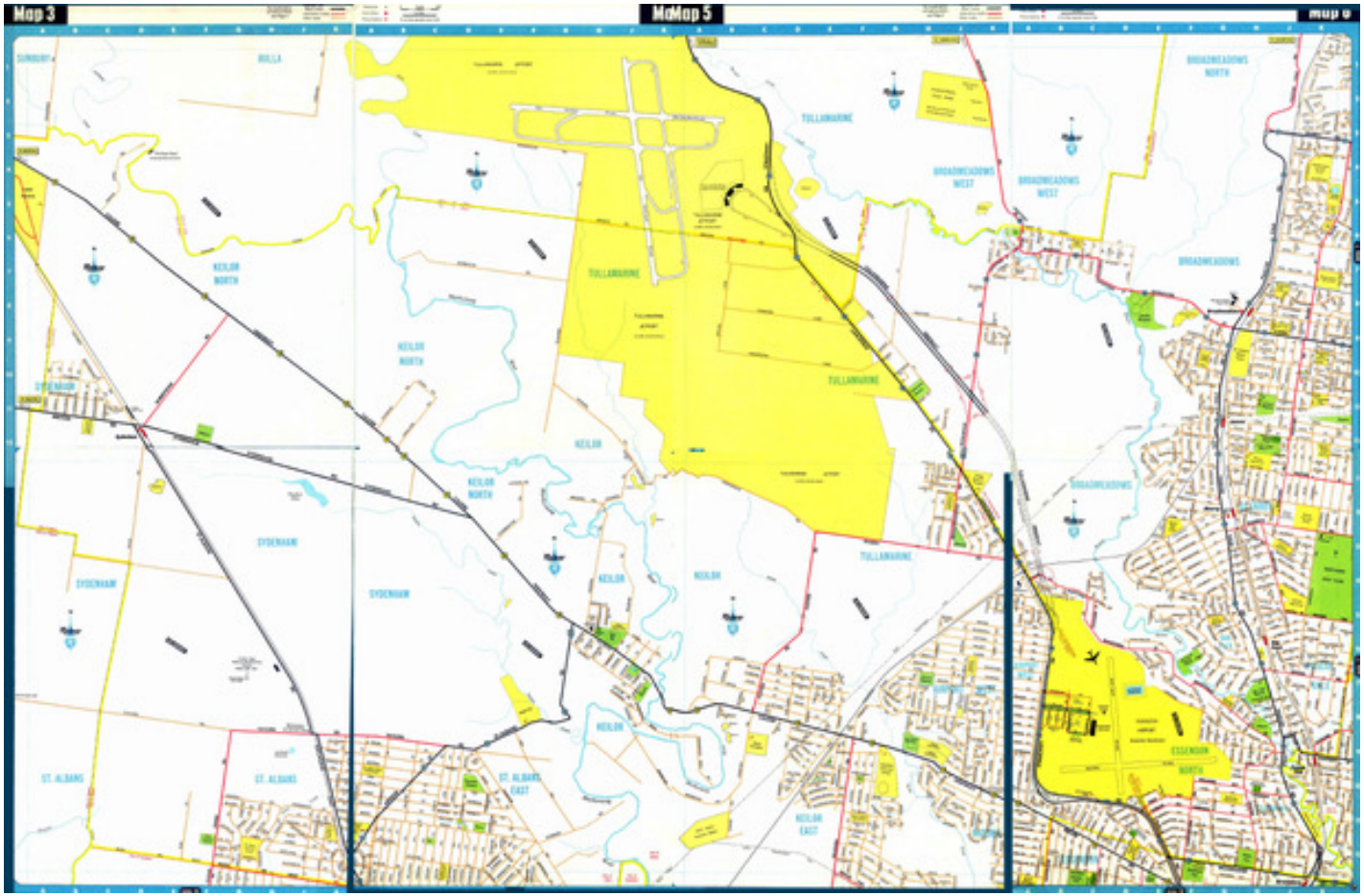
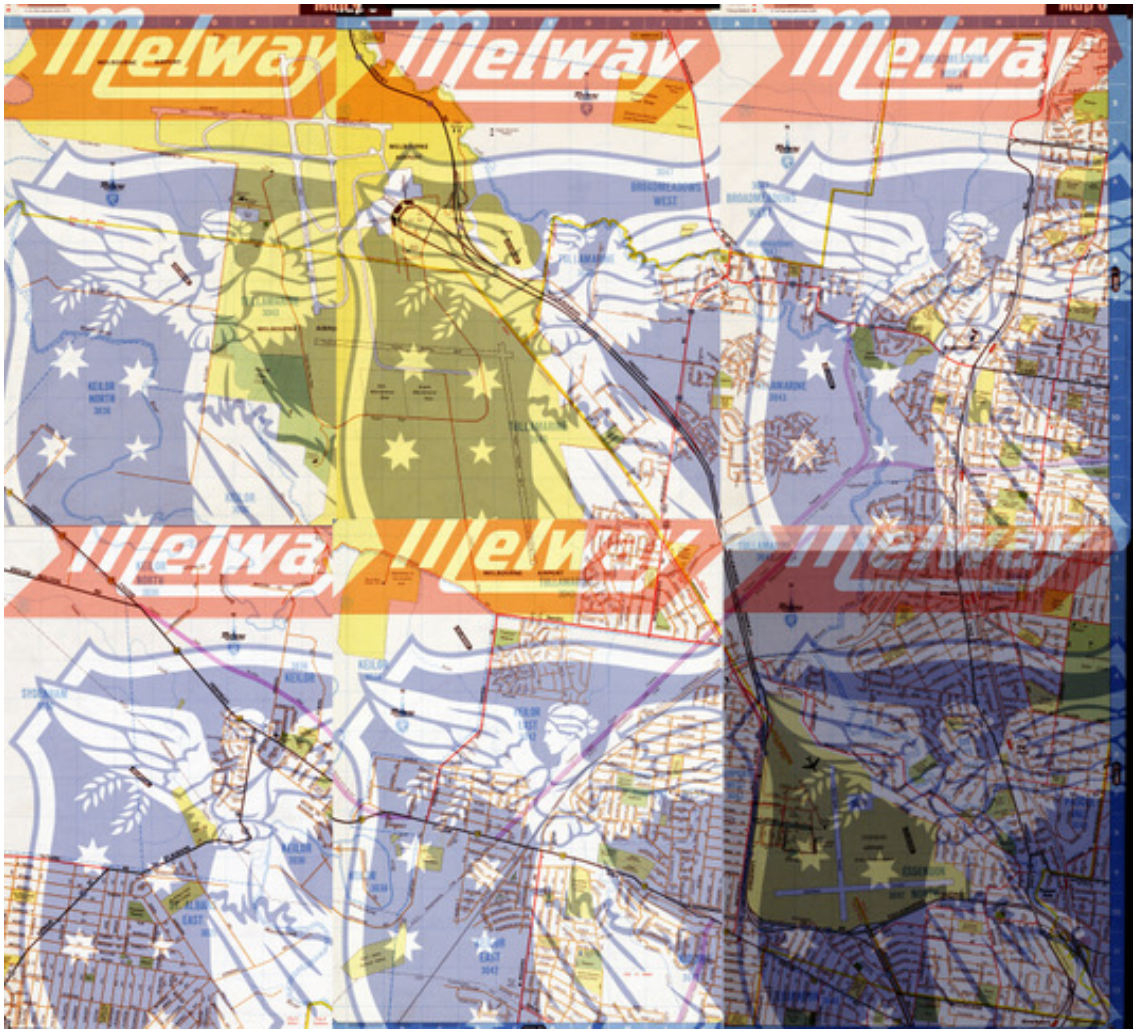
7.0 Appendices

Appendix 1: The evolution of Melbourne Airport runway plans

Melbourne Airport and surrounds, **1966 Melways**, maps 3-6, 13-17, showing two crossed runways and existing residential development.



Melbourne Airport and surrounds, **1970 Melways**, maps 3-6, 13-17, showing proposed location of third and fourth runways and existing residential development.



Melbourne Airport and surrounds, **1990 Melways**, maps 3-6, 13-17, showing an open hashtag runway configuration; the closed hashtag first appears in the 2001 Melways leading to the expansion of the 25-30 ANEF into Keilor Village and over Keilor Primary School. By 1990, the area to the south of the airport was already largely developed and noise corridors only existed for the original two runways.

Appendix 2: Encroachment of aircraft noise into established communities surrounding Melbourne Airport

...provide the response below. ...weeks. We've not been able to collate this information

Question P44/2020

How many homes, schools, childcare centres and other buildings subject to AS 2021 are there under the 20-25 and 25-30 ANEF contours in both the 2003 and 2018 Melbourne Airport Master Plans?

Response

	2003 Master Plan			2018 Master Plan		
	20 ANEF	25 ANEF	30 ANEF	20 ANEF	25 ANEF	30 ANEF
Homes	3,469	1,146	n/a	4,308	1,402	17
Schools	3	0	n/a	2	1	0
Community Centres	32	8	n/a	8	26	0

The above information was prepared by Council's Asset and Property Services Department using Council's GIS system who advised the following:

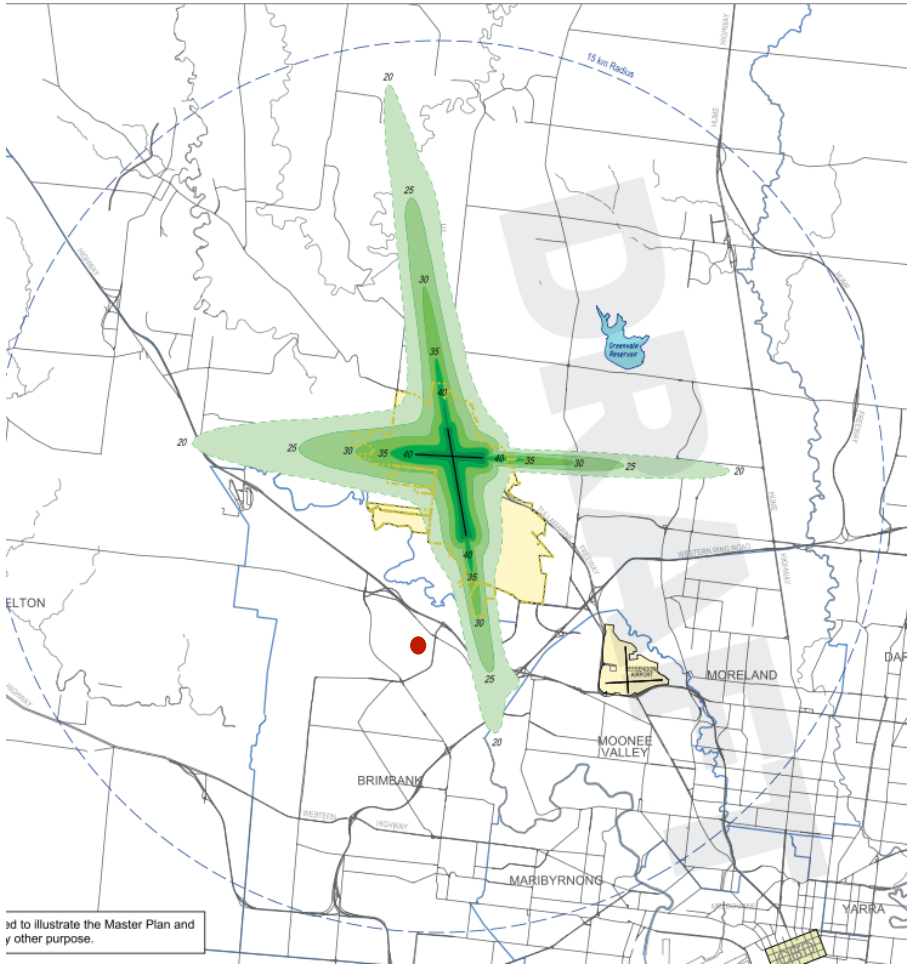
- There are no 30 ANEFs for 2003
- The numbers are an approximation and wholly contained within each ANEF (If any property (homes, schools and community facilities) straddle between ANEF's, they are counted twice.
- Community Facilities includes all public buildings such as libraries, community centres, scout halls and kindergartens.

Yours sincerely

Deans

anne Deans
nager City Strategy

Appendix 3: Explane data showing significant aircraft noise outside noise contours at Melbourne Airport



Adapted from Melbourne Airport DRAFT Master Plan 2003

NB: Noise contours are no longer available for the current runway pair via the Melbourne Airport Noise Tool.

The aircraft noise events on pp24-26 were captured using the Explane app in the Calder Rise Estate, indicated by the red dot. As can be seen, this area does not fall within noise contours for the current runway pair. There are caveats to these data:

- Not every overflight has been captured
- Not every capture includes the noise peak
- BUT the Explane app has not been robustly validated

The paucity of aircraft noise monitors around Melbourne Airport, and their concentration along arrivals rather than departures flightpaths,[19] means there are no Airservices data to compare to.

[19]Airservices Australia, n17

Date 1	Time Value	Date Value	Date Value 2	Combined Date - Time	City	Postal Code	Altitude	Noise Level	Distance	Vert. speed	Device	Call Sign	Model/Type	Owner	Part of Day	municipality Subdivision	myAlt	Average of myLat	planePositio nSource	Average of myLng
20191009	21:07:21	9/10/19	9/10/19	09/10/201	Melbourne	3036	609.6	70	1949	11.7	IOS	CCA166	A330 343E/A	Air China	Evening	Keilor	76	-37.72	0	144.82
20191026	22:25:05	26/10/19	26/10/19	26/10/201	Melbourne	3036	1600.2	70	7319	13.98	IOS	CSC602	A330 243/A3	Sichuan Airli	Evening	Keilor	76	-37.72	0	144.82
20191219	14:52:45	19/12/19	19/12/19	19/12/201	Melbourne	3036	1211.58	70	4061	7.48	IOS	FJI934	A330 243/A3	Fiji Airways	Day	Keilor	76	-37.72	0	144.82
20200113	9:03:18	13/1/20	13/1/20	13/01/202	Melbourne	3036	350.52	70	2653	-4.23	IOS	JST575	A320 232/A3	Jetstar Airwa	Day	Keilor	75	-37.72	0	144.82
20200101	0:49:28	1/1/20	1/1/20	01/01/202	Melbourne	3036	1242.06	70	4141	2.93	IOS	MAS128	A330 323E/A	Malaysia Airlines	Keilor	76	-37.72	0	144.82
20201128	21:06:02	28/11/20	28/11/20	28/11/202	Melbourne	3036	990.6	70	2114	-0.98	IOS	MAS129	A330 323E/A	Malaysia Air	Evening	Keilor	73	-37.72	0	144.82
20191023	18:04:51	23/10/19	23/10/19	23/10/201	Melbourne	3036	762	70	3643	6.5	IOS	PAC247	747 47UF/B7	Atlas Air	Day	Keilor	76	-37.72	0	144.82
20191119	20:05:08	19/11/19	19/11/19	19/11/201	Melbourne	3036	670.56	70	2363	5.2	IOS	QFA157	737NG 838/'	Qantas	Evening	Keilor	78	-37.72	0	144.82
20191216	13:12:04	16/12/19	16/12/19	16/12/201	Melbourne	3036	502.92	70	2355	8.45	IOS	QFA616	737NG 838/'	Qantas	Day	Keilor	73	-37.72	0	144.82
20191014	16:54:56	14/10/19	14/10/19	14/10/201	Melbourne	3036	3474.72	70	4051	-6.18	IOS	QFA772	737NG 838/'	Qantas	Day	Keilor	76	-37.72	0	144.82
20191119	19:55:40	19/11/19	19/11/19	19/11/201	Melbourne	3036	670.56	70	2234	8.78	IOS	QFA822	737NG 838/'	Qantas	Evening	Keilor	78	-37.72	0	144.82
20191122	15:17:24	22/11/19	22/11/19	22/11/201	Melbourne	3036	723.9	70	1453	10.08	IOS	RXA3268	340 B/SF34	Regional Exp	Day	Keilor	76	-37.72	0	144.82
20200108	19:07:33	8/1/20	8/1/20	08/01/202	Melbourne	3036	632.46	70	2133	6.83	IOS	RXA3579	340B/SF34	Regional Exp	Evening	Keilor	71	-37.72	0	144.82
20200531	8:12:38	31/5/20	31/5/20	31/05/202	Melbourne	3036	342.9	70	2198	-3.58	IOS	SIA7293	747 412F/B7	Singapore Ai	Day	Keilor	77	-37.72	0	144.82
20191216	12:47:06	16/12/19	16/12/19	16/12/201	Melbourne	3036	731.52	70	2323	6.18	IOS	VOZ1593	737NG 8FE/'	Virgin Austra	Day	Keilor	73	-37.72	0	144.82
20191011	19:06:19	11/10/19	11/10/19	11/10/201	Melbourne	3036	716.28	70	2553	8.78	IOS	VOZ241	A320 232/A3	Tigerair Aust	Evening	Keilor	77	-37.72	0	144.82
20191023	12:38:45	23/10/19	23/10/19	23/10/201	Melbourne	3036	960.12	70	3082	12.35	IOS	VOZ683	737NG 8FE/'	Virgin Austra	Day	Keilor	76	-37.72	0	144.82
20191015	19:20:41	15/10/19	15/10/19	15/10/201	Melbourne	3036	830.58	70	2117	13.66	IOS	VOZ883	737NG 8FE/'	Virgin Austra	Evening	Keilor	78	-37.72	0	144.82
20191103	16:48:44	3/11/19	3/11/19	03/11/201	Melbourne	3036	640.08	71	2421	4.55	IOS	TGG588	737NG 8FE/'	Tigerair Aust	Day	Keilor	73	-37.72	0	144.82
20191023	16:25:08	23/10/19	23/10/19	23/10/201	Melbourne	3036	525.78	71	2452	4.23	IOS	THA466	Airbus A350	Thai Airways	Day	Keilor	76	-37.72	0	144.82
20191119	22:49:38	19/11/19	19/11/19	19/11/201	Melbourne	3036	548.64	71	3554	2.93	IOS	UAE7DK	A380 861/A3	Emirates Air	Evening	Keilor	78	-37.72	0	144.82
20191009	17:45:32	9/10/19	9/10/19	09/10/201	Melbourne	3036	487.68	71	2520	7.48	IOS	VOZ239	737NG 8FE/'	Virgin Austra	Day	Keilor	77	-37.72	0	144.82
20191216	13:13:34	16/12/19	16/12/19	16/12/201	Melbourne	3036	449.58	72	2381	12.68	IOS	ANZ124	777 319ER/B	Air New Zea	Day	Keilor	73	-37.72	0	144.82
20200113	9:00:04	13/1/20	13/1/20	13/01/202	Melbourne	3036	2286	72	10917	1.3	IOS	BDOG396	208 B/C208	Wrightsair	Day	Keilor	75	-37.72	0	144.82
20191027	11:46:31	27/10/19	27/10/19	27/10/201	Melbourne	3036	784.86	72	2437	8.45	IOS	CBJ462	A330 243/A3	Capital Airline	Day	Keilor	76	-37.72	0	144.82
20191030	16:13:57	30/10/19	30/10/19	30/10/201	Melbourne	3036	533.4	72	2355	1.95	IOS	JST711	A320 232SL/	Jetstar Airwa	Day	Keilor	76	-37.72	0	144.82
20191216	13:26:56	16/12/19	16/12/19	16/12/201	Melbourne	3036	624.84	72	2305	8.45	IOS	JST713	A321 231/A3	Jetstar Airwa	Day	Keilor	73	-37.72	0	144.82
20191216	14:32:54	16/12/19	16/12/19	16/12/201	Melbourne	3036	746.76	72	2615	6.83	IOS	JST739	A320 232/A3	Jetstar Airwa	Day	Keilor	73	-37.72	0	144.82
20191030	10:29:23	30/10/19	30/10/19	30/10/201	Melbourne	3036	251.46	72	8027	-3.9	IOS	JST941	A320 232SL/	Jetstar Airwa	Day	Keilor	76	-37.72	0	144.82
20191212	20:25:28	12/12/19	12/12/19	12/12/201	Melbourne	3036	716.28	72	2492	9.43	IOS	QFA1017	737NG 838/'	Qantas	Evening	Keilor	75	-37.72	0	144.82
20191012	17:33:11	12/10/19	12/10/19	12/10/201	Melbourne	3036	594.36	72	2032	4.88	IOS	QFA37	A330-202/A3	Wells Fargo	Day	Keilor	77	-37.72	0	144.82
20191119	19:52:24	19/11/19	19/11/19	19/11/201	Melbourne	3036	594.36	72	2119	3.25	IOS	QFA464	A330-202/A3	Qantas Airw	Evening	Keilor	78	-37.72	0	144.82
20200331	19:15:10	31/3/20	31/3/20	31/03/202	Melbourne	3036	579.12	72	2111	4.88	IOS	QFA486	A330-202/A3	Sapphire Lea	Evening	Keilor	78	-37.72	0	144.82
20191129	15:37:02	29/11/19	29/11/19	29/11/201	Melbourne	3036	731.52	72	2837	5.53	IOS	QFA624	737NG 838/'	Qantas	Day	Keilor	68	-37.72	0	144.82
20191023	18:20:44	23/10/19	23/10/19	23/10/201	Melbourne	3036	617.22	72	2531	3.9	IOS	QFA632	737NG 838/'	Qantas	Day	Keilor	76	-37.72	0	144.82
20200316	20:50:30	16/3/20	16/3/20	16/03/202	Melbourne	3036	487.68	72	2344	3.58	IOS	QFA653	A330 303/A3	Qantas	Evening	Keilor	77	-37.72	0	144.82
20191011	19:00:53	11/10/19	11/10/19	11/10/201	Melbourne	3036	640.08	72	2267	4.55	IOS	QFA697	737NG 838/'	Qantas	Evening	Keilor	68	-37.72	0	144.82
20191119	13:35:54	19/11/19	19/11/19	19/11/201	Melbourne	3036	731.52	72	2685	10.4	IOS	QFA812	737NG 838/'	Qantas	Day	Keilor	76	-37.72	0	144.82
20191012	17:29:50	12/10/19	12/10/19	12/10/201	Melbourne	3036	563.88	72	2356	11.7	IOS	QFA834	737NG 838/'	Qantas	Day	Keilor	76	-37.72	0	144.82
20191015	19:18:02	15/10/19	15/10/19	15/10/201	Melbourne	3036	784.86	72	2224	6.18	IOS	QFA9	787 9/B789	Qantas	Evening	Keilor	78	-37.72	0	144.82
20191014	16:53:14	14/10/19	14/10/19	14/10/201	Melbourne	3036	655.32	72	2540	5.53	IOS	SIA228	777 312ER/B	Singapore Ai	Day	Keilor	76	-37.72	0	144.82
20191119	23:18:06	19/11/19	19/11/19	19/11/201	Melbourne	3036	502.92	72	2088	4.23	IOS	TGW025	787 8/B788	Scoot	Evening	Keilor	78	-37.72	0	144.82
20191117	10:45:53	17/11/19	17/11/19	17/11/201	Melbourne	3036	601.98	72	2464	6.18	IOS	VOZ185	737NG 8FE/'	Virgin Austra	Day	Keilor	76	-37.72	0	144.82
20191120	12:47:52	20/11/19	20/11/19	20/11/201	Melbourne	3036	548.64	72	2345	10.08	IOS	VOZ223	737-800/B73	Short Haul 2(	Day	Keilor	76	-37.72	0	144.82
20191212	19:56:29	12/12/19	12/12/19	12/12/201	Melbourne	3036	746.76	72	2555	7.15	IOS	VOZ351	737NG 81D/	Virgin Austra	Evening	Keilor	75	-37.72	0	144.82
20191012	13:17:28	12/10/19	12/10/19	12/10/201	Melbourne	3036	906.78	72	2494	7.48	IOS	VOZ685	737NG 8FE/'	Virgin Austra	Day	Keilor	76	-37.72	0	144.82
20191013	19:45:42	13/10/19	13/10/19	13/10/201	Melbourne	3036	609.6	72	6721	-3.58	IOS	VOZ688	A330 243/A3	Virgin Austra	Evening	Keilor	78	-37.72	0	144.82
20191120	12:15:17	20/11/19	20/11/19	20/11/201	Melbourne	3036	556.26	72	2311	7.8	IOS	VOZ837	737NG 8FE/'	Virgin Austra	Day	Keilor	76	-37.72	0	144.82
20201028	12:29:00	28/10/20	28/10/20	28/10/202	Melbourne	3036	800.1	73	1470	8.78	IOS	AM321	King Air B20(	Air Ambulan	Day	Keilor	72	-37.72	0	144.82
20191011	19:26:13	11/10/19	11/10/19	11/10/201	Melbourne	3036	586.74	73	2310	5.85	IOS	JST520	A320 232/A3	Jetstar Airwa	Evening	Keilor	77	-37.72	0	144.82
20191117	15:22:24	17/11/19	17/11/19	17/11/201	Melbourne	3036	1432.56	73	4166	8.13	IOS	MAS148	A330 323E/A	Malaysia Air	Day	Keilor	76	-37.72	0	144.82
20200316	21:06:07	16/3/20	16/3/20	16/03/202	Melbourne	3036	548.64	73	2273	7.15	IOS	QFA494	737NG 838/'	Qantas	Evening	Keilor	77	-37.72	0	144.82
20201106	19:06:32	6/11/20	6/11/20	06/11/202	Melbourne	3036	929.64	73	3467	14.96	IOS	QFA7322	A330 303/A3	Qantas	Evening	Keilor	77	-37.72	0	144.82
20191119	22:58:02	19/11/19	19/11/19	19/11/201	Melbourne	3036	441.96	73	2115	7.48	IOS	QTR28N	A380 861/A3	Qatar Airwa	Evening	Keilor	78	-37.72	0	144.82
20191012	17:59:04	12/10/19	12/10/19	12/10/201	Melbourne	3036	441.96	73	2377	13.33	IOS	SIA248	777 212ER/B	Singapore Ai	Day	Keilor	77	-37.72	0	144.82
20191117	11:50:29	17/11/19	17/11/19	17/11/201	Melbourne	3036	487.68	73	2322	2.6	IOS	UAL99	787-9/B789	United Airlin	Day	Keilor	76	-37.72	0	144.82
20191015	12:58:24	15/10/19	15/10/19	15/10/201	Melbourne	3036	861.06	73	3236	6.5	IOS	VOZ23	777 3ZGER/E	Virgin Austra	Day	Keilor	76	-37.72	0	144.82
20191023	16:20:49	23/10/19	23/10/19	23/10/201	Melbourne	3036	495.3	73	2447	13	IOS	VOZ749	737NG 81D/	Virgin Austra	Day	Keilor	76	-37.72	0	144.82
20200315	18:54:57	15/3/20	15/3/20	15/03/202	Melbourne	3036	883.92	73	2538	13.66	IOS	VOZ881	737NG 8FE/'	Virgin Austra	Day	Keilor	77	-37.72	0	144.82
20191104	22:41:28	4/11/19	4/11/19	04/11/201	Melbourne	3036	952.5	74	2823	6.18	IOS	CES740	A330 243/A3	China Easter	Evening	Keilor	72	-37.72	0	144.82

Date 1	Time Value	Date Value	Date Value 2	Combined Date - Time	City	Postal Code	Altitude	Noise Level	Distance	Vert. speed	Device	Call Sign	Model/Type	Owner	Part of Day	municipality Subdivision	myAlt	Average of myLat	planePositionSource	Average of myLng
20200422	10:59:58	22/4/20	22/4/20	22/04/202	Melbourne	3036	556.26	74	2947	3.9	IOS	CPA2022	Boeing 747-4	Cathay Pacifi	Day	Keilor	28	-37.72	0	144.82
20191011	9:37:52	11/10/19	11/10/19	11/10/201	Melbourne	3036	617.22	74	1979	13	IOS	CSN3074	A330 343E/A	China Southe	Day	Keilor	73	-37.72	0	144.82
20191122	15:12:43	22/11/19	22/11/19	22/11/201	Melbourne	3036	541.02	74	2315	4.55	IOS	JST438	A320 232/A3	Jetstar Airwa	Day	Keilor	76	-37.72	0	144.82
20191023	16:19:36	23/10/19	23/10/19	23/10/201	Melbourne	3036	594.36	74	2273	6.18	IOS	JST518	A321 232/A3	Jetstar Airwa	Day	Keilor	76	-37.72	0	144.82
20191119	23:23:04	19/11/19	19/11/19	19/11/201	Melbourne	3036	533.4	74	2172	3.25	IOS	JST970	A320 232/A3	Jetstar Airwa	Evening	Keilor	78	-37.72	0	144.82
20191216	13:08:19	16/12/19	16/12/19	16/12/201	Melbourne	3036	464.82	74	2681	12.03	IOS	MAS146	A330 323E/A	Malaysia Air	Day	Keilor	73	-37.72	0	144.82
20191128	13:00:42	28/11/19	28/11/19	28/11/201	Melbourne	3036	510.54	74	2393	3.58	IOS	QFA35	A380-842/A3	Qf Eca A380	Day	Keilor	77	-37.72	0	144.82
20191122	15:09:26	22/11/19	22/11/19	22/11/201	Melbourne	3036	533.4	74	2535	14.63	IOS	QFA442	737NG 838/\	Qantas	Day	Keilor	76	-37.72	0	144.82
20191030	16:19:28	30/10/19	30/10/19	30/10/201	Melbourne	3036	457.2	74	2609	12.68	IOS	QFA446	737NG 838/\	Qantas	Day	Keilor	76	-37.72	0	144.82
20191030	16:37:50	30/10/19	30/10/19	30/10/201	Melbourne	3036	541.02	74	2366	8.78	IOS	QFA450	737NG 838/\	Qantas	Day	Keilor	76	-37.72	0	144.82
20191119	23:09:40	19/11/19	19/11/19	19/11/201	Melbourne	3036	685.8	74	2136	6.5	IOS	QFA7350	737 376SF/B	Qantas Freig	Evening	Keilor	78	-37.72	0	144.82
20191011	19:31:10	11/10/19	11/10/19	11/10/201	Melbourne	3036	655.32	74	2155	5.85	IOS	QFA777	737NG 838/\	Qantas	Evening	Keilor	77	-37.72	0	144.82
20191023	15:37:27	23/10/19	23/10/19	23/10/201	Melbourne	3036	723.9	74	2318	8.78	IOS	QFA818	737NG 838/\	Qantas	Day	Keilor	76	-37.72	0	144.82
20191023	12:28:31	23/10/19	23/10/19	23/10/201	Melbourne	3036	563.88	74	2451	5.2	IOS	QLK53D	DHC-8 402/D	Qantas Link	Day	Keilor	76	-37.72	0	144.82
20200303	13:41:23	3/3/20	3/3/20	03/03/202	Melbourne	3036	518.16	74	1943	8.13	IOS	TGG461	737NG 8FE/\	Tigerair Aust	Day	Keilor	77	-37.72	0	144.82
20191014	19:14:26	14/10/19	14/10/19	14/10/201	Melbourne	3036	739.14	74	2427	9.43	IOS	UAE405	Boeing 777-3	Emirates Air	Evening	Keilor	76	-37.72	0	144.82
20191216	13:28:43	16/12/19	16/12/19	16/12/201	Melbourne	3036	586.74	74	2218	9.1	IOS	VOZ1324	737NG 800/\	Virgin Austra	Day	Keilor	73	-37.72	0	144.82
20191119	20:12:33	19/11/19	19/11/19	19/11/201	Melbourne	3036	632.46	74	2077	6.83	IOS	VOZ1378	737NG 8FE/\	Virgin Austra	Evening	Keilor	78	-37.72	0	144.82
20191217	16:21:26	17/12/19	17/12/19	17/12/201	Melbourne	3036	541.02	74	2136	10.4	IOS	VOZ277	737NG 8FE/\	Virgin Austra	Day	Keilor	78	-37.72	0	144.82
20191120	12:17:41	20/11/19	20/11/19	20/11/201	Melbourne	3036	716.28	74	2963	10.73	IOS	VOZ327	737NG 8FE/\	Virgin Austra	Day	Keilor	76	-37.72	0	144.82
20191030	16:12:51	30/10/19	30/10/19	30/10/201	Melbourne	3036	487.68	74	2523	7.15	IOS	VOZ337	737NG 8KG/	Virgin Austra	Day	Keilor	76	-37.72	0	144.82
20191216	12:57:09	16/12/19	16/12/19	16/12/201	Melbourne	3036	655.32	74	2420	5.2	IOS	VOZ741	737NG 8FE/\	Virgin Austra	Day	Keilor	73	-37.72	0	144.82
20191009	17:35:46	9/10/19	9/10/19	09/10/201	Melbourne	3036	548.64	74	2501	1.63	IOS	VOZ869	737NG 8FE/\	Virgin Austra	Day	Keilor	68	-37.72	0	144.82
20191009	17:42:56	9/10/19	9/10/19	09/10/201	Melbourne	3036	533.4	74	2190	6.5	IOS	VOZ871	737NG 8FE/\	Virgin Austra	Day	Keilor	77	-37.72	0	144.82
20201202	19:37:09	2/12/20	2/12/20	02/12/202	Melbourne	3036	678.18	75	2901	5.2	IOS	JST566	A321 232/A3	Jetstar Airwa	Evening	Keilor	68	-37.72	0	144.82
20191216	13:09:59	16/12/19	16/12/19	16/12/201	Melbourne	3036	441.96	75	2714	11.38	IOS	QFA153	A330-202/A3	Sapphire Lea	Day	Keilor	73	-37.72	0	144.82
20191212	17:24:47	12/12/19	12/12/19	12/12/201	Melbourne	3036	624.84	75	2432	5.85	IOS	QFA628	737NG 838/\	Qantas	Day	Keilor	71	-37.72	0	144.82
20200113	9:10:37	13/1/20	13/1/20	13/01/202	Melbourne	3036	304.8	75	2319	-3.25	IOS	TGG513	A320 232/A3	Tigerair Aust	Day	Keilor	75	-37.72	0	144.82
20191208	13:06:28	8/12/19	8/12/19	08/12/201	Melbourne	3036	662.94	75	2349	5.2	IOS	TGG524	A320 232/A3	Tigerair Aust	Day	Keilor	76	-37.72	0	144.82
20191117	11:09:56	17/11/19	17/11/19	17/11/201	Melbourne	3036	563.88	75	2339	4.23	IOS	VOZ69	A330 243/A3	Virgin Austra	Day	Keilor	76	-37.72	0	144.82
20191210	20:56:15	10/12/19	10/12/19	10/12/201	Melbourne	3036	861.06	75	2928	11.38	IOS	VOZ697	737NG 8FE/\	Virgin Austra	Evening	Keilor	73	-37.72	0	144.82
20191117	11:26:14	17/11/19	17/11/19	17/11/201	Melbourne	3036	647.7	76	2415	10.4	IOS	CBJ462	A330 243/A3	Capital Airlin	Day	Keilor	76	-37.72	0	144.82
20191023	15:33:08	23/10/19	23/10/19	23/10/201	Melbourne	3036	655.32	76	2374	4.88	IOS	CPA104	A350 941/A3	Cathay Pacifi	Day	Keilor	76	-37.72	0	144.82
20191030	9:50:26	30/10/19	30/10/19	30/10/201	Melbourne	3036	617.22	76	6847	-4.23	IOS	CSN321	A330 323E/A	China Southe	Day	Keilor	76	-37.72	0	144.82
20200117	13:11:29	17/1/20	17/1/20	17/01/202	Melbourne	3036	457.2	76	2038	7.8	IOS	CSN344	A380 841/A3	China Southe	Day	Keilor	75	-37.72	0	144.82
20191022	17:08:25	22/10/19	22/10/19	22/10/201	Melbourne	3036	647.7	76	2343	9.1	IOS	ETD25G	787 9/B789	Etihad Airwa	Day	Keilor	71	-37.72	0	144.82
20191023	12:05:19	23/10/19	23/10/19	23/10/201	Melbourne	3036	457.2	76	2432	10.4	IOS	HVN780	787 9/B789	Vietnam Airl	Day	Keilor	76	-37.72	0	144.82
20191217	16:20:01	17/12/19	17/12/19	17/12/201	Melbourne	3036	541.02	76	2144	5.2	IOS	JST440	A321 232/A3	Jetstar Airwa	Day	Keilor	78	-37.72	0	144.82
20191216	13:05:42	16/12/19	16/12/19	16/12/201	Melbourne	3036	525.78	76	2540	2.93	IOS	JST474	A320 232/A3	Jetstar Airwa	Day	Keilor	73	-37.72	0	144.82
20191216	17:37:33	16/12/19	16/12/19	16/12/201	Melbourne	3036	586.74	76	2249	5.85	IOS	JST476	A320 232/A3	Jetstar Airwa	Day	Keilor	73	-37.72	0	144.82
20191023	15:36:33	23/10/19	23/10/19	23/10/201	Melbourne	3036	685.8	76	3212	4.23	IOS	JST514	A321 231/A3	Jetstar Airwa	Day	Keilor	76	-37.72	0	144.82
20191023	15:07:00	23/10/19	23/10/19	23/10/201	Melbourne	3036	632.46	76	2443	7.15	IOS	MAS148	A330 323E/A	Malaysia Air	Day	Keilor	76	-37.72	0	144.82
20191023	15:40:43	23/10/19	23/10/19	23/10/201	Melbourne	3036	601.98	76	2298	8.45	IOS	QFA444	737NG 838/\	Qantas	Day	Keilor	76	-37.72	0	144.82
20191009	17:48:34	9/10/19	9/10/19	09/10/201	Melbourne	3036	541.02	76	2191	8.78	IOS	QFA454	737NG 838/\	Qantas	Day	Keilor	77	-37.72	0	144.82
20191216	12:59:37	16/12/19	16/12/19	16/12/201	Melbourne	3036	541.02	76	2758	6.18	IOS	QFA475	737NG 838/\	Qantas	Day	Keilor	73	-37.72	0	144.82
20191212	20:20:52	12/12/19	12/12/19	12/12/201	Melbourne	3036	601.98	76	2426	5.53	IOS	QFA481	A330-203/A3	Qantas Airw	Evening	Keilor	75	-37.72	0	144.82
20191030	16:31:01	30/10/19	30/10/19	30/10/201	Melbourne	3036	609.6	76	2302	6.5	IOS	QFA626	737NG 838/\	Qantas	Day	Keilor	76	-37.72	0	144.82
20191117	11:04:18	17/11/19	17/11/19	17/11/201	Melbourne	3036	381	76	2306	8.45	IOS	QFA93	A380-842/A3	Qf Eca 2008-	Day	Keilor	76	-37.72	0	144.82
20200303	15:31:59	3/3/20	3/3/20	03/03/202	Melbourne	3036	662.94	76	1970	13.33	IOS	QLK285D	DHC-8 402/D	Qantas Link	Day	Keilor	73	-37.72	0	144.82
20191122	15:10:32	22/11/19	22/11/19	22/11/201	Melbourne	3036	662.94	76	2118	5.85	IOS	RXA3492	340 B/SF34	Regional Exp	Day	Keilor	76	-37.72	0	144.82
20191120	12:50:49	20/11/19	20/11/19	20/11/201	Melbourne	3036	655.32	76	2314	8.45	IOS	RXA3561	340 B/SF34	Regional Exp	Day	Keilor	76	-37.72	0	144.82
20191217	16:12:41	17/12/19	17/12/19	17/12/201	Melbourne	3036	541.02	76	2093	8.78	IOS	TGG413	737NG 8FE/\	Tigerair Aust	Day	Keilor	78	-37.72	0	144.82
20191011	16:58:42	11/10/19	11/10/19	11/10/201	Melbourne	3036	1234.44	76	4875	9.43	IOS	TGG536	737NG 8FE/\	Tigerair Aust	Day	Keilor	73	-37.72	0	144.82
20191105	12:44:56	5/11/19	5/11/19	05/11/201	Melbourne	3036	975.36	76	5513	10.4	IOS	UAL61	787-9/	United Airlin	Day	Keilor	72	-37.72	0	144.82
20191030	16:16:48	30/10/19	30/10/19	30/10/201	Melbourne	3036	541.02	76	2300	8.13	IOS	VOZ1328	737NG 8FE/\	Virgin Austra	Day	Keilor	76	-37.72	0	144.82
20191011	19:28:26	11/10/19	11/10/19	11/10/201	Melbourne	3036	533.4	76	2306	9.1	IOS	VOZ755	737NG 8FE/\	Virgin Austra	Evening	Keilor	77	-37.72	0	144.82
20191011	19:23:39	11/10/19	11/10/19	11/10/201	Melbourne	3036	617.22	76	2166	8.78	IOS	VOZ879	737NG 8FE/\	Virgin Austra	Evening	Keilor	77	-37.72	0	144.82
20191117	15:16:13	17/11/19	17/11/19	17/11/201	Melbourne	3036	914.4	77	3168	7.8	IOS	GCR7946	A330 243/A3	Tianjin Airlin	Day	Keilor	76	-37.72	0	144.82
20191210	17:51:42	10/12/19	10/12/19	10/12/201	Melbourne	3036	655.32	77	2089	5.53	IOS	JST741	A320 232/A3	Jetstar Airwa	Day	Keilor	77	-37.72	0	144.82

Date 1	Time Value	Date Value	Date Value 2	Combined Date - Time	City	Postal Code	Altitude	Noise Level	Distance	Vert. speed	Device	Call Sign	Model/Type	Owner	Part of Day	municipality Subdivision	myAlt	Average of myLat	planePositio nSource	Average of myLng
20200113	8:57:32	13/1/20	13/1/20	13/01/202	Melbourne	3036	320.04	77	2494	-3.58	IOS	QFA809	737NG 838/\	Qantas	Day	Keilor	75	-37.72	0	
20200108	20:15:38	8/1/20	8/1/20	08/01/202	Melbourne	3036	662.94	77	2302	1.95	IOS	SIA208	A350 941/A3	Singapore Ai	Evening	Keilor	75	-37.72	0	
20200422	11:49:24	22/4/20	22/4/20	22/04/202	Melbourne	3036	457.2	77	2187	5.2	IOS	SIA7275	Boeing 747-4	Singapore Ai	Day	Keilor	77	-37.72	0	
20191010	17:16:19	10/10/19	10/10/19	10/10/201	Melbourne	3036	883.92	77	3257	10.08	IOS	VOZ867	737NG 8FE/\	Virgin Austra	Day	Keilor	72	-37.72	0	
20191027	11:41:42	27/10/19	27/10/19	27/10/201	Melbourne	3036	861.06	78	3081	5.85	IOS	CSN344	A330 323X/A	China Southe	Day	Keilor	76	-37.72	0	
20191216	13:37:49	16/12/19	16/12/19	16/12/201	Melbourne	3036	434.34	78	1738	0.33	IOS	HM5	AW.139/A13	Babcock Mcs	Day	Keilor	73	-37.72	0	
20191123	21:01:19	23/11/19	23/11/19	23/11/201	Melbourne	3036	655.32	78	2270	6.18	IOS	JST524	A320 232/A3	Jetstar Airwa	Evening	Keilor	76	-37.72	0	
20191009	17:40:39	9/10/19	9/10/19	09/10/201	Melbourne	3036	563.88	78	2508	5.85	IOS	JST772	A320 232/A3	Jetstar Airwa	Day	Keilor	77	-37.72	0	
20191012	17:56:05	12/10/19	12/10/19	12/10/201	Melbourne	3036	693.42	78	3283	12.68	IOS	QFA045	737-838/B73	Qantas	Day	Keilor	77	-37.72	0	
20191120	12:22:21	20/11/19	20/11/19	20/11/201	Melbourne	3036	464.82	78	2812	15.28	IOS	QFA430	737NG 838/\	Qantas	Day	Keilor	76	-37.72	0	
20191120	12:49:28	20/11/19	20/11/19	20/11/201	Melbourne	3036	312.42	78	3220	12.03	IOS	QFA432	737NG 838/\	Qantas	Day	Keilor	76	-37.72	0	
20191030	16:05:24	30/10/19	30/10/19	30/10/201	Melbourne	3036	571.5	78	2397	5.85	IOS	QFA681	737NG 838/\	Qantas	Day	Keilor	76	-37.72	0	
20191030	16:32:12	30/10/19	30/10/19	30/10/201	Melbourne	3036	571.5	78	2281	8.78	IOS	QFA826	737NG 838/\	Qantas	Day	Keilor	76	-37.72	0	
20191119	23:26:34	19/11/19	19/11/19	19/11/201	Melbourne	3036	640.08	78	1057	6.83	IOS	SH171	Metro III/SW	Sharp Airline	Evening	Keilor	78	-37.72	0	
20191009	18:59:35	9/10/19	9/10/19	09/10/201	Melbourne	3036	685.8	78	2795	13	IOS	TGG262	737NG 8FE/\	Tigerair Aust	Day	Keilor	72	-37.72	0	
20191120	13:46:04	20/11/19	20/11/19	20/11/201	Melbourne	3036	822.96	78	2766	14.31	IOS	TGG461	737NG 8FE/\	Tigerair Aust	Day	Keilor	76	-37.72	0	
20191117	14:39:44	17/11/19	17/11/19	17/11/201	Melbourne	3036	548.64	78	2183	5.53	IOS	TGG505	737NG 8FE/\	Virgin Austra	Day	Keilor	76	-37.72	0	
20191117	14:30:56	17/11/19	17/11/19	17/11/201	Melbourne	3036	609.6	78	2680	5.53	IOS	VOZ1041	737NG 81D/	Virgin Austra	Day	Keilor	76	-37.72	0	
20191023	16:05:53	23/10/19	23/10/19	23/10/201	Melbourne	3036	571.5	78	2276	4.88	IOS	VOZ859	737NG 8FE/\	Virgin Austra	Day	Keilor	76	-37.72	0	
20191030	16:39:25	30/10/19	30/10/19	30/10/201	Melbourne	3036	525.78	78	2406	11.05	IOS	VOZ863	737NG 8FE/\	Virgin Austra	Day	Keilor	76	-37.72	0	
20191217	16:08:22	17/12/19	17/12/19	17/12/201	Melbourne	3036	556.26	79	2006	7.48	IOS	QFA1015	737NG 838/\	Qantas	Day	Keilor	78	-37.72	0	
20200108	19:16:53	8/1/20	8/1/20	08/01/202	Melbourne	3036	510.54	79	2529	5.85	IOS	QFA462	A330-202/A3	Qantas Airw	Evening	Keilor	71	-37.72	0	
20191119	13:37:59	19/11/19	19/11/19	19/11/201	Melbourne	3036	701.04	79	2888	5.2	IOS	QFA769	A330-202/A3	Qantas Airw	Day	Keilor	76	-37.72	0	
20191011	19:10:09	11/10/19	11/10/19	11/10/201	Melbourne	3036	754.38	79	2102	8.45	IOS	RXA3783	340 B/SF34	Regional Exp	Evening	Keilor	77	-37.72	0	
20191009	17:54:20	9/10/19	9/10/19	09/10/201	Melbourne	3036	1165.86	79	5807	6.5	IOS	VOZ691	A330 243/A3	Virgin Austra	Day	Keilor	77	-37.72	0	
20191221	15:25:37	21/12/19	21/12/19	21/12/201	Melbourne	3036	739.14	79	2912	14.31	IOS	VOZ853	737NG 8FE/\	Virgin Austra	Day	Keilor	76	-37.72	0	
20200303	14:30:23	3/3/20	3/3/20	03/03/202	Melbourne	3036	662.94	80	2078	7.8	IOS	GIA717	A330 343E/A	Garuda Indo	Day	Keilor	77	-37.72	0	
20191216	13:39:46	16/12/19	16/12/19	16/12/201	Melbourne	3036	510.54	80	2388	4.55	IOS	JST574	A320 232/A3	Jetstar Airwa	Day	Keilor	73	-37.72	0	
20191011	19:14:00	11/10/19	11/10/19	11/10/201	Melbourne	3036	518.16	80	2255	8.78	IOS	QFA460	737NG 838/\	Qantas	Evening	Keilor	77	-37.72	0	
20200108	19:10:16	8/1/20	8/1/20	08/01/202	Melbourne	3036	525.78	80	2156	5.2	IOS	RBA6	787 8/B788	Royal Brunei	Evening	Keilor	71	-37.72	0	
20191011	19:12:41	11/10/19	11/10/19	11/10/201	Melbourne	3036	586.74	80	2248	6.5	IOS	VOZ877	737NG 800/\	Virgin Austra	Evening	Keilor	77	-37.72	0	
20191009	17:42:15	9/10/19	9/10/19	09/10/201	Melbourne	3036	129.54	80	4209	12.68	IOS		737NG 8FE/\	Virgin Austra	Day	Keilor	77	-37.72	0	
20191030	9:56:43	30/10/19	30/10/19	30/10/201	Melbourne	3036	541.02	81	5750	-4.23	IOS	CXA803	Boeing 787-8	Xiamen Airli	Day	Keilor	76	-37.72	0	
20191030	16:03:08	30/10/19	30/10/19	30/10/201	Melbourne	3036	586.74	81	2417	4.88	IOS	JST940	A321 231/A3	Jetstar Airwa	Day	Keilor	76	-37.72	0	
20191212	20:17:39	12/12/19	12/12/19	12/12/201	Melbourne	3036	601.98	81	2299	6.18	IOS	TGG566	737NG 8FE/\	Virgin Austra	Evening	Keilor	75	-37.72	0	
20191026	22:59:56	26/10/19	26/10/19	26/10/201	Melbourne	3036	1676.4	82	6785	13	IOS	ETD10K	777 3FXER/B	Etihad Airwa	Evening	Keilor	76	-37.72	0	
20191212	20:11:32	12/12/19	12/12/19	12/12/201	Melbourne	3036	579.12	82	2304	4.23	IOS	JST035	787 8/B788	Jetstar Airwa	Evening	Keilor	75	-37.72	0	
20191011	19:18:23	11/10/19	11/10/19	11/10/201	Melbourne	3036	640.08	82	2230	5.53	IOS	QFA159	737NG 838/\	Qantas	Evening	Keilor	77	-37.72	0	
20191212	20:23:42	12/12/19	12/12/19	12/12/201	Melbourne	3036	579.12	82	2324	4.88	IOS	QFA466	737NG 838/\	Qantas	Evening	Keilor	75	-37.72	0	
20191212	20:27:04	12/12/19	12/12/19	12/12/201	Melbourne	3036	579.12	82	2311	6.83	IOS	QFA490	737NG 838/\	Qantas	Evening	Keilor	75	-37.72	0	
20191216	13:54:54	16/12/19	16/12/19	16/12/201	Melbourne	3036	579.12	82	2270	8.45	IOS	QFA685	737NG 838/\	Qantas	Day	Keilor	73	-37.72	0	
20191119	20:20:22	19/11/19	19/11/19	19/11/201	Melbourne	3036	586.74	82	2119	14.63	IOS	TGG264	737NG 8FE/\	Virgin Austra	Evening	Keilor	78	-37.72	0	
20191119	20:06:38	19/11/19	19/11/19	19/11/201	Melbourne	3036	548.64	82	2265	11.38	IOS	VOZ243	737NG 8FE/\	Virgin Austra	Evening	Keilor	78	-37.72	0	
20191119	20:08:01	19/11/19	19/11/19	19/11/201	Melbourne	3036	632.46	82	1878	4.88	IOS	VOZ99	737NG 8FE/\	Virgin Austra	Evening	Keilor	78	-37.72	0	
20191212	20:19:15	12/12/19	12/12/19	12/12/201	Melbourne	3036	662.94	83	2305	8.78	IOS	VOZ891	737-8FE/B73	Va Borrower	Evening	Keilor	75	-37.72	0	
20200108	19:19:34	8/1/20	8/1/20	08/01/202	Melbourne	3036	510.54	84	2423	1.95	IOS	JST715	A320 232/A3	Jetstar Airwa	Evening	Keilor	71	-37.72	0	
20191216	13:56:10	16/12/19	16/12/19	16/12/201	Melbourne	3036	624.84	84	2220	4.88	IOS	QFA436	737NG 838/\	Qantas	Day	Keilor	73	-37.72	0	
20191212	20:09:13	12/12/19	12/12/19	12/12/201	Melbourne	3036	640.08	84	2609	4.23	IOS	QFA484	737NG 838/\	Qantas	Evening	Keilor	75	-37.72	0	
20191120	12:53:13	20/11/19	20/11/19	20/11/201	Melbourne	3036	655.32	84	2372	5.53	IOS	TGG562	737NG 8FE/\	Tigerair Aust	Day	Keilor	76	-37.72	0	
20191117	14:42:34	17/11/19	17/11/19	17/11/201	Melbourne	3036	586.74	84	2313	6.83	IOS	VOZ229	A320 232/A3	Tigerair Aust	Day	Keilor	76	-37.72	0	
20191122	15:06:08	22/11/19	22/11/19	22/11/201	Melbourne	3036	609.6	84	2376	10.4	IOS	VOZ333	737NG 8FE/\	Virgin Austra	Day	Keilor	76	-37.72	0	
20191216	13:25:29	16/12/19	16/12/19	16/12/201	Melbourne	3036	518.16	84	2454	12.35	IOS	VOZ845	737NG 8FE/\	Virgin Austra	Day	Keilor	73	-37.72	0	
20191216	13:54:12	16/12/19	16/12/19	16/12/201	Melbourne	3036	876.3	85	3296	8.13	IOS	QFA434	737NG 838/\	Qantas	Day	Keilor	73	-37.72	0	
20201026	12:00:32	26/10/20	26/10/20	26/10/202	Melbourne	3036	960.12	85	1027	12.35	IOS	TROJ24	C-130J-30 He	Royal Austra	Day	Keilor	71	-37.72	0	
20191119	20:16:55	19/11/19	19/11/19	19/11/201	Melbourne	3036	571.5	85	2011	5.2	IOS	VOZ1332	737-800/B73	Short Haul 2	Evening	Keilor	78	-37.72	0	
20191020	12:55:18	20/10/19	20/10/19	20/10/201	Melbourne	3036	891.54	86	2328	15.61	IOS	QFA682	737NG 838/\	Qantas	Day	Keilor	76	-37.72	0	
20191212	20:06:17	12/12/19	12/12/19	12/12/201	Melbourne	3036	609.6	87	2294	3.58	IOS	VOZ887	737NG 8FE/\	Virgin Austra	Evening	Keilor	75	-37.72	0	
20191009	17:39:14				Melbourne	3036	1066.8	78	3173	3.25	IOS	ALK605	A330 343E/A3	Srilankan Airli	Day	Keilor	77	-37.72	0	