



**WORKING PAPER**

**ASSEMBLY — 40TH SESSION**

**EXECUTIVE COMMITTEE**

**Agenda Item 15: Environmental Protection – General provisions, Aircraft Noise and Local Air Quality– Policy and Standardization**

**AIRCRAFT NOISE – REMOTELY PILOTED AIRCRAFT (RPA)**

(Presented by Australia and co-sponsored by New Zealand)

**EXECUTIVE SUMMARY**

Australia is cognisant of a range of work being progressed in ICAO in relation to RPA (commonly referred to as drones) especially in relation to aviation safety, air navigation and aviation security. Another emerging issue is the community impact of RPA operations, particularly in terms of their operation in built-up and residential areas. These impacts include aircraft noise as well as privacy issues. In 2019, Australia approved limited flights by RPA to deliver a number of products to households in our capital city Canberra, which is part of the Australian Capital Territory (ACT). Australia is also aware that the United States and European authorities have approved similar operations. There are currently no ICAO noise standards for RPA, as there are for other aircraft types. The different nature of RPA operations, and the potential closer proximity of smaller RPA to people than conventional aircraft types, raises challenges for regulators around the world. Future operations of larger RPA carrying passengers will also inevitably lead to calls for international RPA noise standards to be developed for this type of aircraft.

**Action:** The Assembly is invited to:

- a) encourage States to share their experiences in responding to aircraft noise issues related to RPA operations, especially in built-up and residential areas.

<i>Strategic Objectives:</i>	This working paper relates to Strategic Objective E – Environmental Protection
<i>Financial implications:</i>	The activities referred to in this paper will be undertaken subject to the resources available in the 2020-2022 Regular ICAO Programme Budget and/or from extra budgetary contributions.
<i>References:</i>	<ul style="list-style-type: none"> <li>• Christian, A and Cabbell, R, Initial Investigation into the Psychoacoustic Properties of Small Unmanned Aerial System Noise, AIAA Paper 2017.</li> <li>• National Endowment for Science, Technology and the Arts, 2018 Report - Flying High: shaping the future of drones in UK cities.</li> <li>• Boucher, P, Foresight and Behavioural Insights Unit, Joint Research Centre (JRC), European Commission, 2015 paper, ‘You Wouldn’t have Your Granny Using Them’: Drawing Boundaries Between Acceptable and Unacceptable Applications of Civil Drones.</li> </ul>

## 1. INTRODUCTION

1.1 In mid-2018, Wing Aviation commenced a RPA trial in Canberra, delivering pharmaceutical, food and beverage items.

1.2 All trials required the approval of the Australian aviation safety regulator, the Civil Aviation Safety Authority (CASA) under the Civil Aviation Safety Regulations.

1.3 The trial required an exemption from CASA to standard RPA operating conditions (which include not flying a drone within 30 metres of people, unless the other person is involved in controlling or navigating the drone), in order to allow the RPA in the trial to operate within 5 metres above and 2 metres horizontally from a person.

1.4 The trial resulted in a range of community feedback, including concerns being raised over privacy, wildlife impact, security and particularly noise.

1.5 Subsequently, Australia's Department of Infrastructure, Transport, Cities and Regional Development (the Department) received legal advice that the existing national aircraft noise regulatory regime did apply to many RPA operations.

1.6 As well as seeking approval from CASA, Wing Aviation subsequently applied for, and received approval from, the Department under aircraft noise regulations to operate limited flights to three different locations in Canberra (locations with a combined population of approximately 16,400 people) to deliver pharmaceutical, food and beverages items to selected households.

1.7 The Department has placed a number of operating conditions on these flights including average flights operating per day and days/hours of operation.

## 2. NOISE ISSUES ASSOCIATED WITH RPA

2.1 With the exception of the recent Commission Delegated Regulation (EU) 2019/945 in Europe, there are no published standards internationally for operating RPA.

2.2 A number of States have examined RPA noise at the local level and determined that while regulations do not currently exist for managing noise at lower level airspace, this is an area for which local authorities would be better placed to impose noise limits, similar to existing environmental noise restrictions for urban residences, commercial districts or industrial zones.

2.3 While RPA deliveries could have a range of benefits such as reducing road fatalities, reducing vehicle emissions and increasing leisure time, their increased introduction, especially in built-up and residential areas, will be better supported by building community acceptance.

2.4 Community acceptance of this technology is likely to be influenced by:

- a) the level of perceived societal benefit from delivery scenarios;
- b) experience in exposure to the noise (not just decibel levels but also pitch, number of noise events over a day, proximity and noticeability);

- c) the number of flights during specific periods (e.g. day/night, morning, weekends, public holidays),
- d) concentration (or spread) of flight paths over certain areas;
- e) addressing broad ranging concerns such as privacy and wildlife effects; and
- f) meeting relevant safety and security requirements.

2.5 More work is also needed in understanding the impact of RPA from a noise perspective, both in measured noise levels and pitch. In order for RPA to deliver a payload, it requires a high rotor rotation rate to gain lift. The trade-off with a high rotor rotation rate is higher noise levels (and higher pitch) than generated from traditional rotor-driven aircraft.

2.6 A preliminary NASA study [1] in 2017 of 38 subjects found there may be a systematic difference between the annoyance responses generated by the noise of an RPA versus the noise generated by road vehicles. Research from NESTA (a UK charity) [2] also found that only around 30 per cent of respondents felt that they had a good understanding of drones and their uses.

2.7 Moreover, perceptions of RPA are not uniform, and like aircraft noise, public tolerance may vary from person to person or reflect the purpose for which the RPA is being used.

2.8 For example, members of the community may be more tolerant of the use of RPA for a public purpose (such as medical deliveries, power line surveys, firefighting and aerial beach safety patrols) than they are for purely commercial usage. Some initial research has found that many participants also saw delivery services as offering insignificant benefits to society and, therefore, unacceptable [3].

2.9 The type of RPA will be a factor in the discussion on future noise regulation of RPA. Smaller, lighter RPA, often used for recreational purposes as “toys”, are already subject to less safety regulation globally and if they are less noisy may also warrant less noise regulation.

2.10 Heavier, larger commercial RPA can generate more noise and future operations of larger RPA carrying passengers operating in urban areas will attract support for international RPA noise standards to be developed (especially if operating in built-up and residential areas).

2.11 RPA manufacturers will also need to continue to engineer airframes and rotor systems which reduce both pitch and noise levels consistent with the evolution of quieter manned aircraft.

2.12 Commercial RPA operators will also need to factor in operational issues (such as number of flights, time of operations, potential alternate flight paths and meteorological conditions) to assist in gaining broader community acceptance of operations in built-up and residential areas.

### **3. LOCAL/STATE/TERRITORY/NATIONAL NOISE REGULATION**

3.1 In Australia, local authorities and state and territory governments generally have responsibility for regulating non-aircraft noise in built-up and residential areas.

3.2 Regulations are not uniform, however the majority of regulations for non-aircraft noise cover similar noise intrusions within an urban environment, such as noise from motor vehicles, gardening equipment, construction tools, urban social gatherings and municipal services.

3.3 However, in the past the regulation of aircraft noise has generally been undertaken at the national level.

3.4 This model of regulation has served Australia well in the past in relation to traditional aircraft types operating at airports within urban environments. However, the regulation of low level airspace and future plans for unmanned traffic management (UTM) for RPA, will challenge regulators.

3.5 The challenge presented in regulating aircraft at the local level is that compliance measures to determine ‘offensive noise’ (i.e. noise that cannot be tolerated for sustained periods) are based on temporal metrics, which are typically much longer in duration than traditional aircraft movements.

3.6 The effects of aircraft noise for traditional aircraft can vary in timing between one to five minutes depending on aircraft type, altitude, ambient noise and perceptions of the individual.

3.7 Offensive (non-aircraft) noise tends to occur over periods of five minutes or more, and non-compliance can be measured by a local inspector at the noise source.

3.8 Management of RPA noise poses significant challenges, as urban deliveries involve noise exposure during a delivery period of less than one minute (per delivery), and overflight noise of RPA is generally for periods of less than 20 seconds. Nonetheless, community impacts of RPA noise will need to be carefully considered and responded to by the appropriate regulatory agencies.

3.9 The Australian Government will be working with state, territory and local governments to identify the most effective mechanism of regulating RPA noise. To this end, the Department is undertaking a review of its aircraft noise regulations, scheduled to be completed by the end of 2019.

#### 4. **CONCLUSIONS**

4.1 The international, national and local response to noise impacts of RPA on communities will benefit from ICAO States sharing their experiences in managing RPA, especially in their introduction in built-up and residential areas.

4.2 Australia will be willing to share its experiences with other ICAO States as it undertakes a review of national RPA noise regulation, which is scheduled to be completed by the end of 2019.