

Part II

Chapter 4

Safer Skies: Registration and education

4.1 In the previous chapter, the committee considered the widespread concern that unrestricted use of RPAS will lead to a serious aviation incident in Australia. This chapter examines in greater detail the concerns of witnesses and submitters, and evaluates registration and education as solutions proposed by a variety of RPAS and aviation industry stakeholders.

Identifying all RPAS operators

4.2 A key concern raised by inquiry participants was that many RPAS cannot be traced to their operators and that such operators are not required to report to CASA on where and how their RPAS will be flown. Unsure of just how many RPAS are in the sky, AusALPA highlighted a series of other unknowns:

We do not know the geographical distribution of operations, nor do we know what the operator demographics are. We also do not know if the operator population has the same distribution of cowboys and criminals as the general population. We do not know with any scientific vigour the probability of an aircraft-RPA collision either in general, by industry sector or by aircraft type. Critically, we do not know with any certainty what the consequences are likely to be of an aircraft-RPA collision.¹

4.3 Under the new regulations, formal registration requirements do not apply to model aircraft or RPA unless being flown for commercial purposes.² RPAS flown for recreation, and weighing less than 150kg need not be registered.³

4.4 However, evidence provided by the ATSB suggested that Australia is out of step with other aviation nations who have taken a more comprehensive regulatory response. The US, UK, Canada, France and New Zealand have all either established

1 Captain Murray Butt, Australian Airline Pilots' Association, *Committee Hansard*, 26 June 2017, p. 7.

2 Civil Aviation Safety Authority, *Commercial unmanned flight – remotely piloted aircraft under 2kg*, <https://www.casa.gov.au/standard-page/commercial-unmanned-flight-remotely-piloted-aircraft-under-2kg> (accessed 12 January 2018).

3 Civil Aviation Safety Authority, *Flying drones or model aircraft recreationally*, <https://www.casa.gov.au/modelaircraft> (accessed 12 January 2018).

or are moving towards a registration system and a requirement for RPAS to display identification markings.⁴

4.5 Current legislation in the US distinguishes between RPAS flying under the Special Rule for Model Aircraft, and those flying for commercial purposes.⁵ The Special Rule for Model Aircraft is similar to the excluded category of RPAS under the CASR Part 101. RPAS below 250g that fly exclusively under the Special Rule for Model Aircraft may be registered on a voluntary basis.⁶ However, RPAS above 250g are subject to mandatory registration, costing the operator USD \$5.00. Once registered, an RPAS operator is provided with a unique identification or tail number which must be displayed on the RPAS. Registration is valid for three years and failure to comply results in severe civil penalties.⁷ In 2018, it was announced that over one million RPAS had been registered.⁸

4.6 In Canada, all recreational RPAS below 35kg must be clearly marked with the owner's name, address and telephone number.⁹ Furthermore, Transport Canada conducted a public consultation in October 2017 about proposed registration rules for RPAS operators. The proposed rules seek to introduce additional registration requirements in 'small complex' areas such as aerodromes and urban spaces.¹⁰

4.7 The UK Civil Aviation Authority is considering a similar regulatory change to mandate the registration of RPAS over 250g,¹¹ whilst in South Africa, registration for

4 Mr Greg Hood, Australian Transport Safety Bureau, *Committee Hansard*, 29 August 2017, p. 19.

5 Federal Aviation Administration (US), *Unmanned Aircraft Systems (UAS) Frequently Asked Questions*, 11 July 2017, <https://www.faa.gov/uas/faqs/> (accessed 14 November 2017).

6 Professor Des Butler, *Submission 18*, p. 6; Federal Aviation Administration (US), *Flying for Fun under the Special Rule for Model Aircraft*, 31 July 2017, https://www.faa.gov/uas/getting_started/fly_for_fun/ (accessed 14 November 2017).

7 Federal Aviation Administration, *Press Release – FAA Announces Small UAS Registration Rule*, https://www.faa.gov/news/press_releases/news_story.cfm?newsId=19856 (accessed 16 November 2017).

8 Hobbyists may receive one identification number for all RPAS they own, whilst commercial users must register each device individually. See: Miram McNabb, 'DOT secretary says more than 1,000,000 drones registered', *Dronelife.com*, 11 January 2018, <https://dronelife.com/2018/01/11/dot-secretary-says-1000000-drones-registered/> (accessed 19 January 2018).

9 RPAS over 35kg or being used for commercial purposes must be operated with a Special Flight Operator's Certificate. See: Transport Canada, *Interim Order No. 8 Respecting the Use of Model Aircraft*, <https://www.tc.gc.ca/eng/mediaroom/interim-order-respecting-use-model-aircraft.html> (accessed 22 February 2018).

10 Transport Canada, *Flying your drone safely and legally*, <https://www.tc.gc.ca/eng/civilaviation/opssvs/flying-drone-safely-legally.html> (accessed 3 November 2017).

11 Department for Transport (UK), *Unlocking the UK's High Tech Economy: Consultation on the Safe Use of Drones in the UK – Government Response*, July 2017, pp. 17–19. Also see: Civil Aviation Safety Authority, *Discussion paper: Review of RPAS operations (DP 1708OS)*, August 2017, p. 11.

RPAS of all sizes is mandated by law.¹² In Ireland, all RPAS weighing more than 1kg must be registered while RPAS weighing less than 1kg are limited to operating at a height restriction of 50 feet, unless they are registered. Since December 2015, when RPAS registration became mandatory, the Irish Aviation Authority (IAA) has registered over 8000 RPAS and model aircraft.¹³ Upon registration, RPAS users in Ireland have access to the IAA official aeronautical data, mapping and RPAS registry.¹⁴

4.8 Submitters also drew the committee's attention to a Joint Statement issued in September 2016 by 16 aviation sector parties (including the International Air Transport Association) in support of a European Union-wide regulatory safety framework for RPAS.¹⁵ The signatories made seven recommendations relating to public education, training, research, and technical performance limitations by way of geo-fencing. In relation to registration, the signatories called for the registration of all RPAS to 'occur compulsorily at the time of purchase or resale'.¹⁶ The signatories noted that:

If the owner/pilot can be traced, it will encourage compliance with rules & regulations and could also serve as a motivation for training.¹⁷

4.9 The IALPG argued that Australia's regulations are out of step with the measures set out in the Joint Statement. It suggested that the regime in Australia 'sends a message that the skies are free to 2kg and under RPAS operators, and encourages rogue flights'.¹⁸

4.10 As a starting point, the IALPG and other witnesses expressed support for a mandatory registration scheme for RPAS users in Australia as well as the provision of

12 South African Civil Aviation Authority, *Remotely Piloted Aircraft Systems*, <http://www.caa.co.za/Pages/RPAS/Registration%20of%20RPAS.aspx> (accessed 3 November 2017). Also see: Drone Solutions Pty Ltd, *Submission 63*, p. 6.

13 Irish Aviation Authority, IAA Launch Drone Safety Awareness Campaign, *Press Release*, 17 November 2017, <https://www.iaa.ie/media-centre/2017/11/17/iaa-launch-drone-safety-awareness-campaign> (accessed 30 January 2018).

14 Irish Aviation Authority, *Two Step Drone Registration Process*, https://www.iaa.ie/docs/default-source/misc/two-step-drone-registration-process.pdf?sfvrsn=17d80bf3_2 (accessed 30 January 2018).

15 Other signatories included the Airports Council International Europe, International Federation of Air Line Pilots' Associations, International Federation of Air Traffic Safety Electronics Associations, International Air Carriers Association, International Council of Aircraft Owner and Pilot Associations and the Civil Air Navigation Services Organisation.

16 European Cockpit Association, *Joint call to safely integrate drones into Europe's airspace*, September 2016, <https://www.eurocockpit.be/positions-publications/joint-call-safely-integrate-drones-europes-airspace> (accessed 12 January 2018).

17 European Cockpit Association, *Joint call to safely integrate drones into Europe's airspace*, September 2016.

18 International Aerospace Law & Policy Group, *Submission 19*, pp. 15, 24–25.

an identifying code or marking attached to individual RPAS.¹⁹ These views were echoed in CASA's review of RPAS operations, whereby 86 per cent of the 910 respondents indicated support for at least some form of registration. According to CASA's analysis report, the majority voiced a preference for RPA registration by weight, with 250g being the most commonly cited cut-off.²⁰ This is consistent with registration requirements in the US and UK.

Identification in incidents or otherwise

4.11 A number of submitters argued that a compulsory registration system rightfully places the onus of responsibility on the RPAS operator who could be easily traced in the case of an incident.²¹ The Executive Director of AAUS, Mr Greg Tyrrell, noted that registration could act as a disincentive for non-compliant use of RPAS:

I think registration might help with deterring people from doing the wrong thing, if they think they are going to get caught. It is like if you are going to get caught with your car speeding, with your registration number. I think that will help as a deterrent as long as people are aware of what the rules are. So I think there is some merit in going down that track.²²

4.12 Submitters suggested that the RPAS operator should be required to register themselves online and that registration markings should be physically attached to the RPAS, by way of an engraved registration number or identifying code.²³ Helistar Aviation observed that the mandatory requirement should be similar to the registration process for road vehicles.²⁴

4.13 Alternatively, Mr Chris Roberts, Managing Director of Parrot ANZ proposed that registration be attached to the operator rather than the RPAS, much like a driver's licence:

A registration system could be created that encourages a user-friendly process and is suitable for mass-market product. We believe strongly that it should be online, free of charge and faster—basically instant. If you buy a product, you need to register today and be approved today. It should be the

19 See, for example: Australian Airline Pilots' Association, *Submission 39*, p. 5; Helistar Aviation, *Submission 23*, p. 3; Mr Greg Tyrrell, Australian Association for Unmanned Systems, *Committee Hansard*, 16 June 2017, p. 10.

20 Civil Aviation Safety Authority, *Analysis of responses – Review of RPAS operations (DP1708OS)*, 1 December 2017, pp. 6–7.

21 Global Drone Solutions, *Submission 15*, [p. 1]; International Aerospace Law & Policy Group, *Submission 19*, p. 21; ProUAV Australia, *Submission 20*, p. 1; Regional Express, *Submission 70*, p. 5; Maurice Blackburn Lawyers, *Submission 22*, p. 2.

22 Mr Greg Tyrrell, Australian Association for Unmanned Systems, *Committee Hansard*, 16 June 2017, p. 10.

23 Aerial Application Association of Australia Ltd, *Submission 49*, p. 3. Also see: Professor Des Butler, *Submission 18*, pp. 5–6.

24 Helistar Aviation, *Submission 23*, [p. 3].

operator that is assigned a unique number. It should not be the drone; it should be the operator, a bit like a driving licence. The applicable rules and what the operator is signing up for and complying with should be clearly stated.²⁵

4.14 Other submitters argued that visual displays of registration alone are insufficient for identification purposes, and should be accompanied by a technological component such as an in-built chip.²⁶ Representatives from Parrot ANZ noted that this technology already exists within their products, whereby users may opt-in to a registration regime through the company app, thus consenting to provide global positioning system (GPS) and mapping data for the purpose of technical analysis.²⁷ The committee was also made aware of the AeroScope technology built into new products by DJI, one of the largest manufacturers of civilian RPAS. According to DJI:

AeroScope uses the existing communications link between a drone and its remote controller to broadcast identification information such as a registration or serial number, as well as basic telemetry, including location, altitude, speed and direction. Police, security agencies, aviation authorities and other authorized parties can use an AeroScope receiver to monitor, analyze and act on that information. AeroScope has been installed at two international airports since April, and is continuing to test and evaluate its performance in other operational environments.²⁸

4.15 AusALPA stated that a registration regime would be consistent with the identification requirements that currently apply to the purchase of mobile phones and SIM cards. It argued that it should be 'necessary to provide valid identification to purchase a regulated RPAS in big primary and secondary markets'. In doing so, CASA would be empowered 'to prevent collisions rather than investigate the aftermath',²⁹ with the added benefit of improving data gathering of the types, numbers and use of RPAS in Australia.³⁰ The opportunity for data collection was also reflected in CASA's review into RPAS operations:

Registration provides a mechanism to gather data on total RPA numbers, RPA types, locations, and the operational categories (commercial versus recreational) RPAs are being used in. This data would be useful to determine the resources required to adequately oversight the safety of RPA

25 Mr Chris Roberts, Parrot ANZ Pty Ltd, *Committee Hansard*, 16 June 2017, p. 3.

26 Mr Mike Snabaitis, Australian Miniature Aerosports Society Inc., *Committee Hansard*, 28 June 2017, pp. 18–19.

27 Mr Chris Roberts, Parrot ANZ Pty Ltd, *Committee Hansard*, 16 June 2017, pp. 3–4.

28 DJI, *DJI Unveils Technology To Identify and Track Airborne Drones*, 12 October 2017, <https://www.dji.com/newsroom/news/dji-unveils-technology-to-identify-and-track-airborne-drones> (accessed 9 November 2017).

29 Australian Airline Pilots' Association, *Submission 39*, p. 5.

30 Department of Defence, answers to written questions on notice, 22 March 2018, p. 3 (received 24 April 2018).

operations in Australia and to more accurately determine the likely impacts of proposed legislative changes.³¹

A deterrent for misconduct

4.16 Many inquiry participants upheld the view that registration should apply to all RPAS operators, including commercial and recreational users.

4.17 Concern was expressed that by simply 'recommending' that commercial operators stamp their aviation reference number on to their RPA, the current regulations do not go far enough to deter RPAS misconduct.³² Mr John Tessarolo of regional airline, Rex, told the committee:

CASA basically says that operators that are required to notify CASA should either attach to or insert into their aircraft a fireproof identification plate or write in the identification details in indelible ink. That is about as far as the regulator has gone in actually saying, 'Let's identify these drones.' So, it really comes down to the regulations keeping up with technology.³³

4.18 According to AusALPA, the tightening of regulations and implementation of a mandatory registration regime could send a message to all RPAS operators that 'they are operating in a highly regulated system'. CASA's review paper supported this, stating that 'a person would be less likely to operate unlawfully when their RPA is more readily identifiable by authorities in the instance were [sic] the RPA operator operates unlawfully'.³⁴ AusALPA expressed hope that a review of the regulations would lead operators to further explore and understand the legal and safety constraints on RPAS operations.³⁵

Insurance

4.19 Drone Safety Services suggested that multi-step processes could be added to the registration system over time to enable the provision of insurance, or to confirm the applicability of an existing policy.³⁶ By requiring the registration of all RPAS, Helistar Aviation noted that it would then be possible to ensure that devices are insured for third party liability whilst also enabling the tracking of operators after incidents.³⁷

31 Civil Aviation Safety Authority, *Review of aviation safety regulation of remotely piloted aircraft systems*, May 2018, p. 11.

32 Interspatial Aviation Services, *Submission 74*, p. 3.

33 Mr John Tessarolo, Regional Express, *Committee Hansard*, 26 June 2017, p. 19.

34 Civil Aviation Safety Authority, *Review of aviation safety regulation of remotely piloted aircraft systems*, May 2018, p. 11.

35 Australian Airline Pilots' Association, *Submission 39*, p. 5.

36 Drone Safety Services, *Submission 78*, [p. 5].

37 Helistar Aviation, *Submission 23*, [p. 3].

4.20 In many jurisdictions overseas, insurance requirements for RPAS are already in place. In the European Union, all RPAS weighing less than 500kg are required to have public liability cover of approximately AUD \$1.1 million.³⁸ Public liability insurance of at least \$100 000 is also required in Canada for all RPA weighing more than 250g.³⁹ Insurance cover is made possible through mandatory registration that allows RPAS operators to be accountable in the event of an accident or incident.

4.21 In Australia, there is no requirement for RPAS operators to purchase insurance. However, commercial RPAS operators are typically expected to have public liability coverage as part of state and territory business obligations.⁴⁰ Whilst the committee heard that club membership with the Model Aeronautical Association of Australia (MAAA) and associated clubs includes insurance cover of \$20 million public liability,⁴¹ the vast majority of recreational RPAS operators are unlikely to be insured to cover damage or injury caused by devices under their control. The Insurance Council of Australia stated that this leaves many amateur RPAS operators financially vulnerable in the case of RPAS system failure or operator error resulting in personal or property damage.⁴²

4.22 According to submitters, the benefits of public liability insurance cover extend far beyond individual compensation. Coupled with a robust registration regime, operators with insurance cover would become more visible, accountable, and traceable in the case of an accident or incident. According to Mr Ashley Fairfield, the possession of an operators certificate and the associated insurance policy for his business, regularly acts as a deterrent for unsafe flight. In contrast, amateur or recreational operators who have 'no skin in the game' may be more inclined to illegally take on jobs or unsafe operations as 'they will most likely lose nothing but the fee they got for the job anyway'.⁴³

4.23 The Little Ripper Group likened this behavioural change to the 'self-regulation' of the automotive industry, in which drivers must be licenced, and cars insured. They suggested that this seemingly risk-averse culture could be emulated in the RPA industry through implementing similar insurance coverage requirements.⁴⁴

38 Australian Certified UAV Operators, *Submission 73*, p. 32.

39 Transport Canada, *Proposed rules for drones in Canada*, <https://www.tc.gc.ca/eng/civilaviation/opssvs/proposed-rules-drones-canada.html#liability> (accessed 22 November 2017). Amount is in Canadian dollars.

40 Department of Industry, Innovation and Science, *Arrange insurance for your business*, 10 May 2016, <https://www.business.gov.au/info/run/insurance-and-workers-compensation/arrange-insurance-for-your-business> (accessed 2 February 2018).

41 Mr Tim Nolan, Aeromodellers New South Wales, *Committee Hansard*, 26 June 2017, p. 26.

42 Insurance Council of Australia, *Submission 59*, [p. 4].

43 Mr Ashley Fairfield, *Submission 51*, [p. 2].

44 Little Ripper Lifesaver Pty Ltd, *Submission 16*, p. 5.

4.24 The IALPG pointed out that, without the introduction of a registration requirement allowing RPAS to be easily identified, strict liability compensation under the *Damage by Aircraft Act 1999* would be 'nearly impossible to enforce'. They remarked:

The legal regime which could act to provide the injured with remedies against drone operators...has little ability to operate as intended if the relevant aircraft operator is unable to be found.⁴⁵

4.25 Additional evidence from Australian Certified UAV Operators demonstrated how the lack of registration and insurance has previously resulted in a bystander footing the bill for an RPAS operator's mistake:

In August 2016 a DJI Inspire 1 RPAS collided into the front of a new Mercedes GLS as it was being driven across the Sydney Harbour Bridge. The impact left part of the RPAS embedded in the car bodywork and other debris scattered across the road. Because of heavy traffic the vehicle was travelling at a slow speed; had the traffic been moving faster the incident could have affected several vehicles and resulted in greater damage in general. Because the operator of the RPAS remains unknown, and despite police investigations, the owner of the motor vehicle has been left with the repair bill.⁴⁶

4.26 Noting that the cost impost of insurance would be 'problematic' for many recreational RPAS operators, Professor Des Butler suggested that an alternative solution could involve the issuance of educational material that highlights the significant legal liability associated with irresponsible RPAS operation.⁴⁷

Evidence against mandatory registration

4.27 Although the committee received a large amount of evidence supporting mandatory registration, a number of submitters, particularly those involved in drone racing, argued that registration is unnecessary. According to these submitters, the creation of a mandatory registration requirement would be ineffective in policing those who are already prone to breaching the rules. Drone racing club member and member of the MAAA, Dr Chris Thompson, stated:

The same people now who break the rules or don't care about them will keep on doing so, and those of us who fly safely will get registered but we aren't the problem and won't cause any problems...

The people who are the problem won't get registered, and the resources required to catch them vastly outweighs the actual risk they pose.⁴⁸

45 International Aerospace Law & Policy Group, *Submission 19*, p. 21.

46 Australian Certified UAV Operators, *Submission 73*, p. 31.

47 Professor Des Butler, *Submission 18*, pp. 6–7.

48 Dr Chris Thompson, *Submission 81*, [pp. 7, 8]. Also see: Mr Egon Kuster, *Submission 9*, [p. 2].

4.28 Another drone racer questioned how mandatory registration would be applied to RPAS consisting of custom made parts. Mr John Cotterill suggested that risk assessment and verification are made more difficult in the case of operators who frequently change the parts on their RPAS to modify its function.⁴⁹ Mr Robert Carpenter of One Giant Leap Australia also alerted the committee to the increasing number of second-hand RPAS sales that may further complicate registration.⁵⁰

4.29 The ease with which individuals are able to access RPAS presents one of the most significant challenges to the establishment of a registration system. CASA suggested that operators who are able to purchase an RPAS straight off the shelf are unlikely to take active steps to register their device, while those that choose to register 'would most likely comply with the relevant safety requirements in any case'.⁵¹

4.30 To address these challenges, the committee heard that registration should therefore be required before the time of use, to enable basic safety awareness training before operation.⁵² The IALPG also suggested that registration could take place through an in-built technological mechanism to be activated upon sale.⁵³ Additionally, the registration of RPAS used for racing purposes could be captured by a dedicated sports administration body such as MAAA or Recreational Aviation Australia (RA-Aus), as is the case with other specialised aircraft such as balloons and sport rotorcraft.⁵⁴

Educating all RPAS operators

4.31 The lack of training and education of RPAS operators presented another issue with the existing regulatory framework for RPAS. As highlighted in evidence to the committee, there is currently no formal procedure by which RPAS operators must learn the standard operating conditions or certify compliance with the rules. The only exceptions to this are commercial operators of RPAS over 2kg who are required to obtain a ReOC or RePL.⁵⁵ Yet, submitters suggested that there is a real prospect that

49 Mr John Cotterill, *Submission 86*, p. 1.

50 Mr Robert Carpenter, One Giant Leap Australia Pty Ltd, *Committee Hansard*, 26 June 2017, p. 3.

51 Civil Aviation Safety Authority, *Discussion paper: Review of RPAS operations (DP 1708OS)*, August 2017, p. 10.

52 Mr Simon Bourke, Australian Airports Association, *Committee Hansard*, 29 August 2017, p. 3. Also see: Department of Defence, answers to written questions on notice, 22 March 2018, p. 3.

53 International Aerospace Law & Policy Group, *Submission 19*, p. 16.

54 CASA overlooks a number of self-administering organisations including MAAA and RA-Aus that operate under a series of exemptions from the ordinary regulations. See: Civil Aviation Safety Authority, *Self-administering organisations*, <https://www.casa.gov.au/standard-page/self-administering-organisations> (accessed 2 May 2018).

55 According to CASA, a RePL allows individuals to fly an RPA for an operator, who in turn needs to hold a ReOC. Therefore those working for themselves will need both. See Chapter 2 for an overview of current regulations.

RPAS will be increasingly manned by inexperienced operators who are unable or unwilling to understand the operating restrictions placed on their RPAS use.⁵⁶

Inexperienced operators

4.32 Submitters noted that the mass introduction of RPAS on the consumer market has rapidly expanded the availability of RPAS from specialist military stakeholders to everyday retail consumers with limited training or aviation knowledge.⁵⁷ At the same time, RPAS technology has become more advanced, offering technological enhancements such as greater reliability, increased battery life, and longer operating ranges, all at a decreasing cost. The Australian Airports Association noted that these factors have contributed to a growing cohort of inexperienced operators accessing and operating sophisticated technology:

Familiarity and enthusiasm with the technology encourages amateur operators to upgrade to more and more sophisticated RPAS devices. As the sophistication grows, so do the operating capabilities of these systems and therefore the potential risk to aviation safety.⁵⁸

4.33 The IALPG commented further:

Australia's very wide and clear skies are a temptation for all untrained, and amateur operators – the problem with the deregulation of commercial operation is simply that it makes the problematic malicious, uncaring, or untrained recreational operator, a *legitimate* operator, and thus one who can make money through their exploits.⁵⁹

4.34 VIPA suggested that many RPAS users, particularly those without a RePL, have little regard for public safety and the risks associated with operating an unmanned aerial vehicle. It highlighted numerous reports of illegal flights over populated areas and at night, both of which are contrary to the current regulations.⁶⁰

4.35 The Australian Certified UAV Operators took the view that many illegal operations were borne 'out of naivety' as many such operators 'have not read the regulations correctly or interpreted them correctly'.⁶¹ Research from the UK Civil Aviation Authority revealed that only 36 per cent of buyers receive guidance about

56 Virgin Independent Pilots Association, *Submission 11*, p. 3.

57 Australian Airports Association, *Submission 12*, p. 1.

58 Australian Airports Association, *Submission 12*, p. 2. Also see: Australian Airline Pilots' Association, *Submission 39*, pp. 2–3.

59 International Aerospace Law & Policy Group, *Submission 19*, p. 13.

60 Virgin Independent Pilots Association, *Submission 11*, [p. 3].

61 Mr Bradley Mason, Australian Certified UAV Operators, *Committee Hansard*, 28 June 2017, p. 14.

safe flying when buying an RPAS.⁶² In Australia, it is difficult to quantify the number of recreational RPAS users, due to the lack of a registration system, let alone the number who take the time to understand the rules for safe operation. When an RPAS is purchased, the operator is provided with a yellow brochure titled 'Flying with Control?' and is directed to the CASA website for further details.⁶³ However, submitters stated this piece of information was 'very simplistic' and provided only the bare minimum amount of guidance to new RPAS users.⁶⁴

4.36 Contrarily, hobbyist users were keen to establish that their RPAS operations are conducted under strict flying conditions and are generally without incident. Mr John Cotterill, a recreational RPAS user, reported that unauthorised or dangerous behaviour is frowned upon by the RPAS community, which in many ways 'self-regulates'.⁶⁵

4.37 Other recreational RPAS operators, particularly those with model aircraft club membership, were regarded by submitters as 'a risk-averse and mature set of operators' from which 'many lessons can be learned'.⁶⁶ Indeed, with the strict oversight of CASA's Sport Aviation team, Aeromodellers New South Wales reported that all events and sites used by its members have the 'full support' of the regulator. Safe flying practices are promoted through a comprehensive Manual of Procedures, and members undertake education programs and direction from the MAAA.⁶⁷

4.38 Another educative initiative brought to the committee's attention was the roll-out of DJI's mandatory RPAS flight quiz. Since 14 February 2018, RPAS pilots using DJI products are now required to correctly answer nine questions about the rules for flying RPAS in Australia. The pre-flight quiz is built into the mobile app used to fly DJI GO or DJI GO 4 products, and is also posed to foreign flyers that have brought their DJI products to Australia to fly. Australia is the third country to receive the DJI

62 Author unknown, 'Getting a drone for Christmas? The UN releases its 10 tips on operating it safely', *BBC Newsbeat*, 11 December 2016, <http://www.bbc.co.uk/newsbeat/article/38275128/getting-a-drone-for-christmas-the-un-releases-its-10-tips-on-operating-it-safely> (accessed 5 October 2017).

63 At an estimates hearing, CASA CEO Mr Shane Carmody admitted that 'the piece of paper does not actually explain what the rules are; it tells them where to go for the rules'. See: Mr Shane Carmody, Civil Aviation Safety Authority, *Budget Estimates Hansard*, 23 May 2017, p. 102.

64 Piper Alderman, *Submission 65*, p. 3; Australian Miniature Aerospots Society Inc., *Submission 71*, p. 3.

65 Mr John Cotterill, *Submission 86*, p. 1.

66 International Aerospace Law & Policy Group, *Submission 19*, p. 8.

67 Aeromodellers New South Wales, *Submission 14*, [p. 1].

pre-flight quiz, following similar launches in the US in October 2017 and the UK in December 2017.⁶⁸

4.39 Beyond the educational support associated with club membership, and initiatives rolled out by individual manufacturers, the committee heard that there is no overarching mandatory requirement to ensure new recreational RPAS operators are aware of their safety obligations and are able to demonstrate an appropriate standard of aviation awareness. In short, 'there are no checks and balances' at a national level to ensure RPAS users fully understand the restrictions on RPAS operation and are competent to fly.⁶⁹

4.40 The Australian Certified UAV Operators suggested that, in implementing the regulations, CASA made 'sweeping assumptions' that all RPAS operators have sufficient aptitude to find the relevant aviation legislation and regulations applicable to them; understand the aviation language and terminology contained within the regulations; and grasp their legal obligations when operating an RPA.⁷⁰

4.41 The IALPG agreed, noting that the standard operating conditions are ineffective if RPAS users are not educated on how to comply:

The legislation purports to preserve safety purely by having such SOCs [standard operating conditions], but in reality...there is no requirement that people take up the kind of aeronautical education that would skill them to even comply with the SOCs.⁷¹

4.42 A representative from Drone Solutions drew on personal experience to demonstrate the level of complexity inherent in aviation regulations that amateur RPA operators are unlikely to grasp:

I had no previous aviation and no model aircraft background when I started operating RPA. It is only after receiving a suitable level of training that much of the "aviation language" started making any sense. The [Civil Aviation Legislation Amendment (Part 101) Regulation 2016] and [standard operating procedures] makes many assumptions about aviation

68 Jennifer Dudley-Nicholson, 'Drone safety: DJI forces drone pilots to pass safety test before lift-off in Australia', *News.com.au*, 13 February 2018, <http://www.news.com.au/technology/gadgets/cameras/drone-safety-dji-forces-drone-pilots-to-pass-safety-quiz-before-liftoff-in-australia/news-story/6467acb75b0920f1a61870a68cd66516> (accessed 14 February 2018). Also see: Emily Piesse, 'Australian DJI pilots forced to take quiz or face being grounded in national crackdown', *ABC News*, 14 February 2018, <http://www.abc.net.au/news/2018-02-14/australian-dji-drone-pilots-forced-to-take-quiz-to-fly/9443712> (accessed 15 February 2018).

69 Mr John Tessarolo, Regional Express, *Committee Hansard*, 26 June 2017, p. 20.

70 Australian Certified UAV Operators, *Submission 73*, pp. 22–23. Also see: Drone Safety Services, *Submission 78*, [p. 4].

71 International Aerospace Law & Policy Group, *Submission 19*, p. 15.

knowledge that are unrealistic.⁷² How is anyone, without adequate training, going to fully understand concepts like:

- Controlled Aerodromes – What are these and how do you know how to locate them?
- Non-Controlled Aerodromes - What are these and how do you know how to locate them?
- Restricted Areas – How do you find out where they are and what hours they are operational?
- RA1, RA2, RA3 – What are these and how do you know how to locate them?⁷³

4.43 Representatives from the Unmanned Research Aircraft Facility at the University of Adelaide acknowledged that even trained RPA operators may have difficulty interpreting airspace requirements 'with the level of accuracy required to meet the regulations, and maintain safe, regulated aircraft-RPAS distance'. They submitted that the risks involved were 'greatly amplified in pilots operating commercially under 2kg with no training, potentially fewer available information resources, and no pre- and post-flight oversight'.⁷⁴

4.44 Witnesses therefore argued that at least a basic level of education and training should be a priority for lawmakers.⁷⁵ The point was made that any RPAS registration system should have as a minimum, the dual purpose of educating and registering RPAS operators. To this end, the committee was told that, as part of a mandatory registration system, an RPAS operator must be required to demonstrate an adequate understanding of the applicable regulations in order to be issued with an identification number and access to mapping and data information.⁷⁶

4.45 Mr Chris Roberts of Parrot ANZ commented that, regardless of whether the pilot is located in or below the aircraft, 'the pilot is ultimately always responsible for the operation' and should therefore be sufficiently educated about his or her responsibilities.⁷⁷

72 Standard operating procedures refer to the standard operating conditions set out in Regulation 101.238 of the CASR by which RPAS operators must adhere, also referred to as SOCs.

73 Drone Solutions Pty Ltd, *Submission 63*, pp. 6–7. A full list of concepts can be found in the original submission.

74 Unmanned Research Aircraft Facility, University of Adelaide, *Submission 43*, p. 3.

75 See, for example: Aeroeye, *Submission 41*, [p. 2]; Interspace Aviation Services Pty Ltd, *Submission 74*, p. 2.

76 See, for example: Captain Murray Butt, Australian Airline Pilots' Association, *Committee Hansard*, 26 June 2017, p. 8; Aeroeye, *Submission 41 – Supplementary Submission 1*, [p. 2]; Drone Safety Services, *Submission 78*, [p. 4].

77 Mr Chris Roberts, Parrot ANZ Pty Ltd, *Committee Hansard*, 16 June 2017, pp. 2–3.

Education, awareness and certificates/licences

4.46 Witnesses to the inquiry emphasised the point that RPAS have the potential to cause a breach of national security, cause damage to life or property and can invade the privacy of others. As such, there should be a requisite equivalent and proportionate requirement on the part of the operator to have some level of technical skill, as well as an appropriate understanding of the rules and regulations concerning the operation of their device. To this end, some submitters voiced their support for a certification or licensing test for RPAS operators.

4.47 Model aircraft hobbyist Mr Edward Browning proposed a requirement similar to the Basic Aeronautical Knowledge test for student pilots, which would be followed by a practical demonstration of ability.⁷⁸ Similarly, VIPA suggested that all RPAS operators be 'required to complete a basic air law examination'.⁷⁹

4.48 In their September 2016 Joint Statement, international aviation bodies recommended mandatory training and certification as a top priority. The signatories argued that an obligation to obtain a certificate or licence creates awareness and mandates knowledge of the applicable regulations and restrictions. They continued:

Moreover, a legally required certificate or license also enhances the ability to enforce rules. Operating a drone is thereby reserved for people who have acquired permission to do so.

This requirement should be mandatory except for the harmless drones. This category of drones is understood to do no harm to people (e.g. be limited to a maximum weight of 250g and a radius of action of no more than 50 meters from the pilot).⁸⁰

4.49 A number of submitters were in favour of a system whereby RPAS operators are legally bound by a licence to abide with the regulations.⁸¹ The notion of legal accountability was supported by Aeroeye. It stated that education is more effective if operators 'have something to lose if they choose to operate outside of the rules', such as a licence or registration.⁸²

4.50 Some submitters also argued a licencing test would raise the standard of operation by challenging the misconception that RPAS are harmless toys for children. Captain Phil Stevens noted in this regard:

78 Mr Edward Browning, *Submission 10*, [p. 2].

79 Virgin Independent Pilots Association, *Submission 11*, [p. 4].

80 European Cockpit Association, *Joint call to safely integrate drones into Europe's airspace*, September 2016, <https://www.eurocockpit.be/positions-publications/joint-call-safely-integrate-drones-europes-airspace> (accessed 12 January 2018).

81 International Aerospace Law & Policy Group, *Submission 19*, p. 25.

82 Aeroeye, *Submission 41*, [p. 2]. Also see: Mr Ashley Fairfield, *Submission 51*, [p. 2].

Would you issue a pilot licence to an 8 or 10 years old child? No. So why will you allow a similar child to fly a drone?⁸³

4.51 Maurice Blackburn Lawyers added that a standard education requirement would send the right message to the public and add to the credibility of the industry through 'weeding out' unsafe operators.⁸⁴

4.52 In CASA's RPAS operations review, approximately half of the 910 respondents agreed that both proficiency and/or training should be compulsory, taking the weight of the RPAS into account.⁸⁵ CASA stated that, whilst many recreational and excluded category operators do so lawfully and with a sound understanding of their safety obligations, 'there is an increasing number of RPA operators...who have a poor understanding of the RPA legislation, or have interpreted it incorrectly'.⁸⁶

4.53 However, the need for low-cost and time-effective training was also emphasised by submitters.⁸⁷ AAUS noted that the challenge was to develop a standardised syllabus that is able to deliver training at a national level and at a price that is affordable for recreational RPAS operators.⁸⁸

4.54 These concerns were again reflected in CASA's review responses, with submitters suggesting a free, user-friendly education syllabus, available through e-learning platforms that are regularly updated to meet industry and technology standards.⁸⁹

4.55 The example of marine radio operator certification was brought to the committee's attention. Details about the training requirements for marine radio operators are outlined in case study 4.1 below.

Case study 4.1 – Training requirements for marine radio operation

Marine radio operators are required to complete a number of training requirements before obtaining their marine radio operators licence. Training requirements draw on

83 Captain Philip Stevens, *Submission 87*, [p. 4]. Also see: Civil Air Australia, *Submission 21*, p. 2.

84 Maurice Blackburn Lawyers, *Submission 22*, p. 4.

85 Civil Aviation Safety Authority, *Analysis of responses – Review of RPAS operations (DP1708OS)*, 1 December 2017, pp. 11–12.

86 Civil Aviation Safety Authority, *Review of aviation safety regulation of remotely piloted aircraft systems*, May 2018, p. 15.

87 Mr Anthony Marsh, Aeroeye, *Committee Hansard*, 16 June 2017, p. 11; Mr Chris Roberts, Parrot ANZ Pty Ltd, *Committee Hansard*, 16 June 2017, p. 11.

88 Australian Association for Unmanned Systems, *Submission 46*, p. 6. Also see: Dr Chris Thompson, *Submission 81*, [p. 6].

89 Civil Aviation Safety Authority, *Analysis of responses – Review of RPAS operations (DP1708OS)*, 1 December 2017, pp. 11–15.

an approved syllabus, and assessment is undertaken by an independent invigilator. Operators must demonstrate proficiency before being allowed to use their vessel for recreational activity.

Legislative framework

The legislative framework for the qualification of marine radio operators is authorised by the International Telecommunication Union (ITU) Radio Regulations. Like ICAO, the ITU was established by the United Nations and provides guidance on the wide range of issues affecting information and communication technologies internationally. As a member state, Australia has established training requirements for marine radio operators. Five different certificates of proficiency and one certificate of endorsement are issued to operators of marine radios as follows:

- Long Range Operator Certificate of Proficiency (LROCP);
- Short Range Operator Certificate of Proficiency (SROCP);
- Global Maritime Distress and Safety System General Operators Certificate of Proficiency (GOCP);
- GMDSS First-Class Radio Electronic Certificate (1st-Class REC);
- GMDSS Second-Class Radio Electronic Certificate (2nd-Class REC); and
- Marine Satellite Communications Endorsement (Satcom).

The type of qualification required depends on the type of equipment carried on the marine vessel.

Training bodies

A number of certificates of proficiency can be obtained by undertaking private study. However, colleges of technical and further education, volunteer marine safety organisations, marine training schools and commercial companies, may also provide courses in marine radio proficiency.

The Australian Maritime Safety Authority (AMSA) is responsible for the issue of GOCPs and 1st- and 2nd-Class RECs. AMSA has accredited a number of educational institutions and registered training organisations to conduct examinations to test candidates at the conclusion of the course. Approved providers are listed on the AMSA website.

LROCPs, SROCPs and Satcoms are issued by the Australian Maritime College (AMC) on behalf of the Australian Media and Communications Authority. AMC approves invigilators to conduct examinations on its behalf. A list of both independent invigilators, and those associated with organisations, are listed on their website.

Certificates are issued on presentation of the results of approved examinations, and a small fee is charged.⁹⁰

A tiered education system

4.56 Many submitters, including Mr Greg Tyrrell of AAUS, noted that training should be 'geared to risk' such that recreational operators are required to have a base level of knowledge, and operators with further commercial intent may be required to know more.⁹¹

4.57 Similarly, Helistar Aviation proposed that a tiered system be introduced whereby recreational and small RPAS operators are required to complete a recreational pilot licence theory exam, while commercial operators could be asked to complete instrument flight rule (IFR) training before conducting 'beyond visual line of sight' operations (BVLOS).⁹²

4.58 According to submitters, a tiered system offers the prospect of limiting and controlling the capability of an RPAS in accordance with the competency, aviation awareness and education of its operator. As a starting point, 'off-the-shelf' RPAS could be equipped with technical constraints on altitude and distance. All buyers of RPAS would be required to pass a basic competency test and register their device before use. For recreational operators who are interested in unlocking additional capabilities and functions on their RPAS, a second tier requirement would have to be met by way of further education and skill development. The third tier would require operators to meet current licencing requirements before commencing commercial operations.

4.59 In this vein, proponents of the MAAA's 'wings' program advocated for a tiered accreditation system. As an example, the 'bronze wing' certification available through MAAA's program is aimed at aero-modellers who fly models below 2kg; 'silver wings' is aimed at those flying models over 2kg, and 'gold wings' is awarded to pilots who are able to complete difficult manoeuvres such as a Cuban Eight, inside loop and horizontal roll.⁹³ MAAA Secretary, Mr Kevin Dodd further explained:

Bronze and silver basically are the mandatory solo proficiencies. In most of the clubs now, if not all, if you visit and do not have your bronze or silver

90 Australian Media and Communications Authority, *Marine radio qualifications*, <https://www.acma.gov.au/Citizen/TV-Radio/Radio/Marine-and-Amateur-Radio/marine-radio-qualifications> (accessed 29 May 2018); Australian Maritime College, *Marine Radio Operators Certificates*, <http://www.amc.edu.au/industry/omc/certificates> (accessed 29 May 2018).

91 Mr Greg Tyrrell, Australian Association for Unmanned Systems, *Committee Hansard*, 16 June 2017, p. 11.

92 Helistar Aviation, *Submission 23*, [p. 4]. Instrument ratings are detailed in Part 61 of the Civil Aviation Safety Regulations 1998.

93 Model Aeronautical Association of Australia, *Wings*, <https://www.maaa.asn.au/wings> (accessed 14 November 2017).

wings, they would probably stand an instructor with you until such time as they were happy to see you fly.⁹⁴

4.60 Representatives from Aeromodellers New South Wales, who assisted in the development of the wings system, added that the program 'helps to set a culture within the clubs and our pilots of knowledge of the rules and safety'.⁹⁵ It also ensures consistency across state jurisdictions—a key benefit of any federally driven regulation.

4.61 A tiered training program for all RPA operators, in combination with 'off-the-shelf' technical restrictions, was generally supported in evidence to the committee. Under such a system, all RPAS operators would be required to pass a minimum level of testing before flying an RPAS, with the option to upgrade and fly further.⁹⁶ Representatives from Airservices Australia stated they 'would happily work with manufacturers' to implement such a program,⁹⁷ whilst ATSB suggested that the idea could inform further policy.⁹⁸ In line with DJI's in-built quiz initiative, CASA encouraged all RPA manufacturers to utilise technology to assist in enhancing user's understanding and compliance with Australian RPA legislation.⁹⁹

Implications for other industries

4.62 Submitters suggested that mandated education requirements could shape the way in which insurers develop policy.¹⁰⁰ Drone Solutions recounted difficulty in finding an aviation insurance broker willing to provide public liability insurance in the absence of a RePL. It reported:

Insurance professionals are experts at using risk profiles to determine insurability and premium rates. If the insurance professionals are concluding that it is too risky to insure someone in the sub 2kg excluded

94 Mr Kevin Dodd, Model Aeronautical Association of Australia, *Committee Hansard*, 16 June 2017, p. 17.

95 Mr Tim Nolan, Aeromodellers New South Wales, *Committee Hansard*, 26 June 2017, p. 21.

96 At a public hearing of the committee, Senator Fawcett put the following idea to witnesses: 'the first level of training is an independently invigilated exam that shows that they understand the safety implications of the current envelope—three miles or three kilometres around airports, 400 feet et cetera—and that the geo-fencing is expanded to a hard limit of 400 feet and the other area and then a final level, which is commercial, all the normal commercial considerations that currently exist, would remove those limitations from the device'. See: *Committee Hansard*, 29 August 2017, p. 26.

97 Dr Rob Weaver, Airservices Australia, *Committee Hansard*, 29 August 2017, p. 15.

98 Mr Greg Hood, Australian Transport Safety Bureau, *Committee Hansard*, 29 August 2017, p. 26.

99 Civil Aviation Safety Authority, *Review of aviation safety regulation of remotely piloted aircraft systems*, May 2018, p. 16.

100 Australian Association for Unmanned Systems, *Submission 46*, p. 4; Ms Aranka Nolan, Aeromodellers New South Wales, *Committee Hansard*, 26 June 2017, p. 26.

category without providing a RePL, then they also seem to disagree with CASA's risk assessment.¹⁰¹

4.63 This implied that any potential changes to CASA's regulations are likely to have an impact on the insurance industry. The IALPG agreed that the increased number of RPAS operating under the Part 101 amendments will cause the insurance market to adjust policies and prices accordingly.¹⁰²

4.64 This view was seemingly illustrated in January 2018 when QBE launched a dedicated RPAS insurance policy. Created in recognition of CASA's 'relaxed regulations' for sub-2kg RPAS, the policy offers accidental damage cover, ground risk cover, and third party liability cover for bodily injury or property damage as a result of an RPAS incident.¹⁰³

4.65 The committee also noted that in December 2015, Vero Insurance revised its public liability insurance policy to include fatality or major destruction caused by a commercially operated RPAS below 10kg.¹⁰⁴

Public awareness

4.66 The committee received considerable evidence in relation to CASA's public awareness and media activities. According to CASA, it has collectively reached over 1.2 million people through RPAS safety videos; with 51 000 social media followers to date.¹⁰⁵ Cinema advertising to target recreational RPAS operators has also commenced, with an estimated total audience reach of over 436 208.¹⁰⁶

101 Drone Solutions Pty Ltd, *Submission 63*, p. 8.

102 International Aerospace Law & Policy Group, *Submission 19*, p. 17.

103 QBE, *QBE RPAS Cover*, <https://www.qbe.com.au/business/insurance-for-businesses/specialist-business-insurance/aviation/rpas> (accessed 17 January 2018). Also see: Author unknown, 'QBE launches dedicated drone cover', *National Insurance Brokers Association*, 16 January 2018, <https://www.insuranceandrisk.com.au/qbe-launches-dedicated-drone-cover/> (accessed 17 January 2018).

104 Author unknown, 'Take Cover: Drones get PL Policy', *National Insurance Brokers Association*, 9 December 2015, <https://www.insuranceandrisk.com.au/take-cover-drones-get-pl-policy/> (accessed 17 January 2018).

105 Civil Aviation Safety Authority, *Drone safety review*, 4 December 2017, <https://www.casa.gov.au/aircraft/standard-page/drone-safety-review> (accessed 12 January 2017). Also see: Civil Aviation Safety Authority, answers to questions on notice, 23 May 2017 (received 7 July 2017).

106 Civil Aviation Safety Authority, *Drone safety review*, 4 December 2017 (accessed 12 January 2017).

4.67 In October 2017, CASA launched the 'Droneflyer' website which, it argued, features 'a very simple, plain-English, accessible explanation of the rules'.¹⁰⁷ CASA also released a Christmas safety video ahead of the 2017 holiday period to remind RPAS operators to fly responsibly.¹⁰⁸ However, of particular significance to many witnesses was the CASA mobile phone application, '*Can I fly there?*'.

Can I fly there?

4.68 *Can I fly there?* is a mobile phone application that shows the user where they are and are not permitted to fly their RPAS. It also identifies prohibited zones such as airports, helicopter landing sites and other restricted areas. Released in May 2017, the app was commissioned by CASA in response to an increasing number of reports from pilots about near-misses with RPAS.¹⁰⁹

4.69 In August 2017, CASA's Chief Executive Officer (CEO), Mr Carmody, told the committee that the app had been downloaded over 35 000 times and that the web version had been accessed more than 60 000 times.¹¹⁰ Updated figures released in May 2018 showed that the app had been downloaded an additional 60 000 times. As well as the existing data map available, the app also displays a 5.5km circular area around fire-affected emergency zones.¹¹¹

4.70 The Unmanned Research Aircraft Facility at the University of Adelaide commented that the app's release is consistent with initiatives by the US FAA and UK National Air Traffic Control Service. The US mobile app, 'B4UFLY', provides information and alerts to RPA operators about when and where their RPAS can be flown, whilst the app produced in the UK goes further to alert operators of areas where privacy may also be a concern, such as near a school.¹¹²

107 Civil Aviation Safety Authority, *Drone safety review*, 4 December 2017 (accessed 12 January 2017). Also see: Mr Shane Carmody, Civil Aviation Safety Authority, *Committee Hansard*, 29 August 2017, p. 28; Civil Aviation Safety Authority, answers to questions on notice, 23 May 2017 (received 7 July 2017).

108 Civil Aviation Safety Authority, *CASA Christmas drone safety animation*, <https://droneflyer.com.au/#!/christmas-drone-safety-animation> (accessed 8 January 2018).

109 James Dunlevie, 'Mobile app 'Can I Fly There' released to help drone pilots, after increase in near-misses with aircraft', *ABC News*, 26 May 2017, <http://www.abc.net.au/news/2017-05-26/mobile-phone-app-can-i-fly-there-for-drone-pilots-released/8563826> (accessed 10 November 2017).

110 Mr Shane Carmody, Civil Aviation Safety Authority, *Committee Hansard*, 29 August 2017, p. 28.

111 Civil Aviation Safety Authority, *Review of aviation safety regulation of remotely piloted aircraft systems*, May 2018, p. 21.

112 Unmanned Research Aircraft Facility, University of Adelaide, *Submission 43*, pp. 3, 6. Also see: Victorian Department of Environment, Land, Water and Planning, *Submission 75*, p. 11.

4.71 Submitters were generally supportive of the mobile app as a means of educating the general public about the safe use of RPAS and to enforce 'no drone' zones. However, the mobile app alone was viewed as just one step towards bolstering public education about safe RPAS use.¹¹³ In addition, RPAS stakeholders expressed broad support for training and demonstrated proficiency requirements in order to make users aware of the relevant regulations, risks and responsibilities associated with RPAS operation.¹¹⁴

113 Mr Simon Bourke, Australian Airports Association, *Committee Hansard*, 29 August 2017, pp. 1–2; Dr Rob Weaver, Airservices Australia, *Committee Hansard*, 29 August 2017, pp. 15–16; Australian Association for Unmanned Systems, *Submission 46*, p. 5; Canberra UAV, *Submission 47*, [p. 3]; UAS International, *Submission 66*, p. 4.

114 Civil Aviation Safety Authority, *Analysis of responses – Review of RPAS operations (DP1708OS)*, 1 December 2017, pp. 11–12.

