

Drone Safety and Regulation

Engagement with Key Stakeholders

The Government's vision is to enable "a thriving, innovative and safe drone sector" in New Zealand. Our regulatory settings will need to keep up with developments so that we can maximise the social and economic benefits from the use of drones, while managing the associated risks. To do that, our regulatory system should be flexible, risk-based, proportionate, enforceable, and consistent with relevant international standards. We want to hear your thoughts on the best approach to achieving that.

Purpose

1. The Ministry of Transport and the Civil Aviation Authority (CAA) are reviewing New Zealand's drone¹ regulatory settings. We are considering potential measures to address current and emerging issues from the use of drones.
2. We would like to test our early thinking with stakeholders across the aviation sector and drone user groups to:
 - understand how various stakeholders see the challenges and opportunities, both now and for the future
 - test our problem definition
 - test our approach and early thinking on potential regulatory measures
 - seek ideas about what would work for New Zealand.
3. We have identified a range of possible regulatory options, as well considering what we can do outside regulation. These include:
 - 1) [Changing who and what the rules apply to](#)
 - 2) [Relaxing Part 101 requirements](#), including considering alternatives to the consent provision, relaxing spotter/observer requirements and reviewing the distance drones can fly from aerodromes
 - 3) [Registration](#)
 - 4) [Operator competency](#)
 - 5) [Remote identification](#) – technology on drones that transmits data during flight
 - 6) [Geo-awareness/geo-fencing](#) – technology that informs the drone operator when entering, or stops it from entering, a designated site (e.g. airports, critical infrastructure)
 - 7) [Import and sales controls](#)
 - 8) [Offences and penalties](#)
4. This engagement is intended to inform our early thinking and policy development. We will undertake formal consultation on policy proposals at a later stage. The document contains a number of questions to guide feedback. We would also welcome any other feedback you may have. The full list of questions can be found at **Annex 1**.

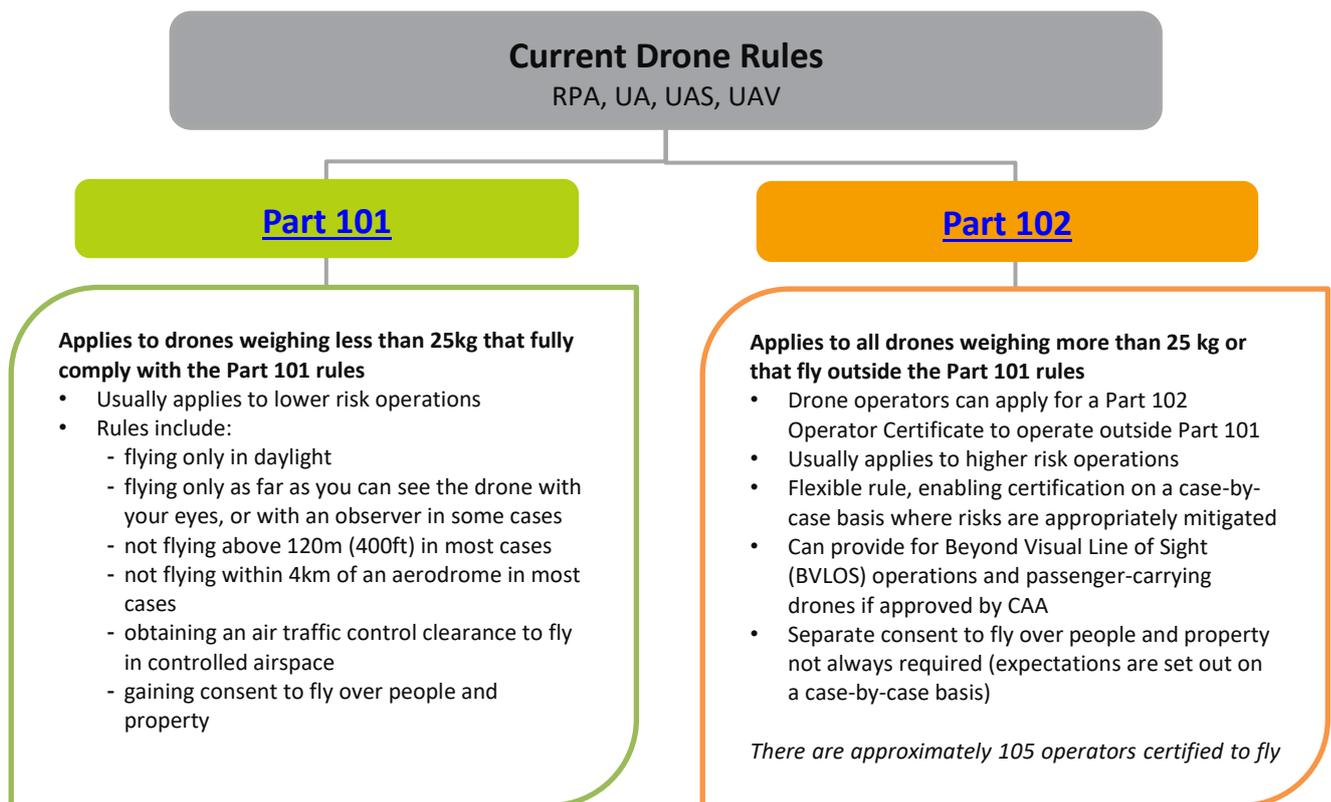
¹ In this document we use drones as the common descriptor for all classes of unmanned or remotely piloted aircraft. This includes unmanned aircraft systems (UAS), unmanned aerial vehicles (UAVs) and Remotely Piloted Aircraft Systems (RPAS).

Policy Objectives

5. The current work focuses on examining what we need to do in the short- to medium-term to:
- maintain appropriate standards of safety and security
 - enable innovation and development in the drone sector, while supporting the interests of the wider aviation sector
 - lay the early groundwork for future integration of drones into the transport system
 - increase public acceptance of drone use (“social licence”), through managing concerns relating to them.

Current drone settings

6. New Zealand’s Civil Aviation Rules for drones were updated in 2015.



No distinction is made between commercial and recreational users

7. Since the 2015 updates to the Civil Aviation Rules, we have seen:
 - a significant uptake of drones in New Zealand
 - rapid development of drone technology, meaning that they can do more (e.g. longer operating ranges and at a cheaper price)
 - an increase in complaints to the CAA² and incursions into controlled airspace.³ Airways (New Zealand's air traffic service provider) reports that on average there are two drone incursions into controlled airspace every week.
 - high-profile incidents involving drones in New Zealand and overseas, raising the profile of safety and security concerns.
8. This work focuses mostly, but not exclusively, on managing Part 101 drone operations. This is because the CAA engages directly with Part 102 operators, knows who they are and can tailor operational requirements for them through the Part 102 certification process.

Problem Definition

9. New Zealand's Civil Aviation Rules relating to drones, if followed, provide for a safe aviation system. Internationally, our regime is considered progressive, particularly in terms of the risk-based and enabling approach to advanced operations. However, there is room for improvement. The problems set out below draw on:
 - almost four years' experience since the rules were updated in 2015
 - CAA's dataset and summary of results from its post-implementation survey on the rules, released in October 2017.
 - international developments, research and experience.

Compliance:

- Drones operators often do not know the rules for safe flying or even that there are aviation rules that apply to them.
- Many drone operators consider the Part 101 rules too difficult to understand.

Enforcement:

- Effective enforcement can be a powerful deterrent for unsafe or illegal behaviour. However, authorities are often constrained in their ability to take appropriate action, because the nature of drones means it can be hard to identify operators. The absence of clear enforcement is often seen to be compromising the effectiveness of the rules and eroding social licence.

Proportionality:

- People are more likely to comply with rules if they consider them to be fair and make sense. Some Part 101 requirements are seen as unjustified, disproportionate to the goal of maintaining safety and/or inhibiting the legitimate use of drones and growth of the sector.

² The total number of incidents reports to the CAA increased from 119 in 2015, to 506 in 2018. The majority of these (190 in 2018) relate to drones flying above people and property without their consent, followed by those operating in controlled airspace without clearance (67 in 2018) or within 4km of an aerodrome (60 in 2018).

³ Controlled airspace refers airspace from which Airways (New Zealand's air navigation service provider) provides air traffic control.

System Sustainability:

- Drone technology and uses are developing whether we like it or not. Traditional airspace management systems are not adequate to manage the increase in number and complexity of drones entering the aviation system. If we do not lay the groundwork for future development, we risk falling behind international safety standards and creating barriers to innovation.
- We do not have accurate data on the number of drones operating or trends, which is important to inform policy development, planning and decision-making.
- Drone operators are not currently paying to support management of the aviation safety system from which they are benefitting and in which they are creating risks.⁴

Questions:

- i. What is working well at the moment? What is not working?
- ii. Have we got the problem definition right?
- iii. What are we missing?

Context and related work

Strategic vision

10. On 17 July 2019, the Minister of Transport released the Drone Integration Paper, "[Taking Flight: an aviation system for the automated age](#)", which outlines a cross-government vision for the future of drone integration into the New Zealand aviation system and the wider transport sector. The paper identifies that creating an environment which facilitates integration will require a set of complementary building blocks including regulation, funding and investment, infrastructure and technology, research and development.
11. A number of government agencies have an interest in managing drones. The "UA Leadership Group", which comprises senior representatives from the Ministry of Transport, CAA, the Ministry of Business, Innovation and Employment, and Airways oversees and provides strategic guidance for our cross-agency drone work.

Security and counter-drone work

12. The focus of the work we are engaging on is potential regulatory updates in the short- to medium-term. The regulatory options we are considering below are designed to capture most participants and to mitigate most of the risks they may cause, but they are unlikely to have an impact on those who are determined to cause harm.
13. In addition to the regulatory work set out in this document, the Ministry of Transport is working with the CAA to address security issues relating to drones, including protocols for managing drone incidents at airports and other sites, and counter-drone technology and application where drones present a clear threat.

⁴ Drone cost recovery for Part 102 operators is limited to directly chargeable certification (or other) services. No charges apply to Part 101 operators.

Civil Aviation Bill

14. The Ministry of Transport is also working on a [Civil Aviation Bill](#) to replace the Civil Aviation Act 1990 and the Airport Authorities Act 1966. This is the first major review of the legislation since the enactment of the Civil Aviation Act. Public consultation on the Bill ran from 13 May 2019 to 22 July 2019 and included:
- proposed amendments to the pilot-in-command provisions to allow for drones. The draft states that, in the absence of a pilot on board, the duties, powers and obligations of the pilot-in-command fall to the operator of the aircraft
 - policy options relating to the ability to take action against drones being operated in contravention of civil aviation law, or in a way that may endanger people or property, including an option to expand powers for appropriate enforcement agencies.

Unmanned Traffic Management systems

15. The Ministry of Transport has also initiated a policy investigation into unmanned traffic management (UTM) systems as a potential solution for sustainable drone traffic management in New Zealand. This work aims to analyse UTM architectures and assess their suitability for New Zealand. The regulatory options discussed below are closely linked to this work, and we are considering them together

Data

16. There are a number of gaps in our drone data, particularly around the number of drones operating in New Zealand.⁵ The CAA, the Ministry of Transport and the Ministry of Business, Innovation and Employment, are jointly commissioning updated research on drones in New Zealand, including data on:
- the number and type of drones currently operating in New Zealand
 - knowledge of the rules
 - behaviour and attitudes of drone operators (including tourists) and the general public.
17. This research will inform our thinking on possible updates to drone regulatory settings. The research findings will be made public once available (likely to be later in the year).

Education

18. Education is one of the best ways to influence user behaviour and improve compliance and safety in the aviation system. International evidence shows the more the public know about drones, the better their perception, and level of comfort is with them in their lives and community.⁶ The CAA has led implementation of various education initiatives to boost education and outreach to drone operators and the wider public, as set out in **Table 1**.

⁵ The recent [Drone Benefit Study](#) estimated there to be approximately 77,600 drones in New Zealand. Colmar Brunton's 2017 survey [RPAS Use in New Zealand](#) estimated that 281,428 New Zealanders owned or had flown a drone, but did not break down the number of drones.

⁶ The UK Ministry for Transport report [Drone use: dialogue conducted to understand public attitudes](#), 2016. The project report from the New Zealand CAA and Finland CAA Policy Exchange project also reflected this.

Table 1

Web-based	FlyYourDrone.nz and digital campaign ⁷	<ul style="list-style-type: none"> New web-based resources to promote drone safe operations, including a drone-specific website, digital content, and Facebook and Twitter accounts
	Airshare.co.nz Managed by Airways	<ul style="list-style-type: none"> Allows drone users to log requests with air traffic control to fly in controlled airspace. It also has information on the rules for flying a drone, tips for safe flying and a short quiz on the rules
	CAA website	<ul style="list-style-type: none"> Resources that promote safe and responsible drone use, including relevant rules, and guidance material
Point-of-sale	<i>Fly the Right Way</i> brochure and <i>Fly Safe</i> packaging sticker	<ul style="list-style-type: none"> CAA-produced brochure and sticker for retailers that reinforces the drone rules and responsibilities and other online resources to support safe operations
Ongoing CAA activity	Part 101 and 102 support and outreach, safety promotion and communication	<ul style="list-style-type: none"> Ongoing operational support to Part 101 and 102 drone users, certification, and outreach by the CAA's Unmanned Aircraft team at aviation events, Part 102 days, school initiatives, and other community and cross-agency engagement Working with airports on new drone-specific signage near sensitive areas, and with Air New Zealand to provide drone-specific inflight videos Proactive media releases (e.g. at Christmas), articles in CAA's quarterly sector magazine <i>Vector</i>, and reactive media comment

⁷ Many other comparable countries, including [Australia](#), [Europe](#), [Canada](#), the [United Kingdom](#) and the [United States](#), have similar standalone websites focused on drones.

Options

19. This section sets out the range of options that are on the table, why we are considering them, what others are doing, and our initial thinking about them. Many of these measures are complementary and interdependent. Our initial assessment is that a package of measures is likely to be appropriate. This is a complex programme of work and it will take time to get it right.
20. The options set out below have been developed with the majority of drone operators in mind. We recognise that regulatory measures are not fail-safe, and are likely to have limited impact on operators that are negligent, reckless or deliberately intend harm. As described above (*Context and related work – Security and counter-drone work*), separate work is underway on managing risks from these operators.
21. **Annex 2** summarises for reference the different measures jurisdictions with comparable aviation systems have implemented, or are in the process of implementing.

Questions:

As you work through the options below (1-8), we are interested in:

- iv. What priority you would give each of the measures?
 - Does it make sense to introduce measures as a package?
 - Or are there measures we should introduce before others? If so, which ones?
- v. What else should we be thinking about?

1. Changing who and what the rules apply to

22. Drones flown in New Zealand are subject to the Civil Aviation Rules, regardless of size or capability. The rules and the level of approval required to fly a drone are differentiated by weight, as set out in **Table 2**.

Table 2: Current drone differentiation by weight

Weight of Drone	Approval required
Less than 15kg (and operating within Part 101 limits)	No approval required
15-25kg (and operating within Part 101 limits)	Must be inspected and the operation approved by a person or organisation approved by the Director <i>(Currently the only approved association is Model Flying New Zealand)</i>
25kg and over OR Operating outside Part 101 limits	Operation must be certified under Part 102

23. We are considering changes to how drones are categorised, to support a risk-based and proportionate approach. This will be particularly relevant if we opt to introduce new measures, particularly registration, operator competency, remote identification and geo-fencing requirements.

Excluding very low risk drones

24. We are not interested in regulating drones that represent negligible risk. We are considering introducing a minimum threshold for inclusion of drones in the rules. A key challenge would be to determine what that should be – particularly as the threshold for safety risks from drones might differ considerably from the threshold for privacy and nuisance concerns stemming from drones.
25. Before 2015, model aircraft below 100 grams were not deemed aircraft and therefore the Civil Aviation Rules did not apply to them. Studies quantifying the safety risks of drones by weight and other characteristics (e.g. maximum speed, kinetic energy) are limited and remain disputed.⁸ Many jurisdictions have now set the minimum regulatory threshold for registration and other requirements at 250 grams,⁹ below which the risk is widely considered to be negligible (although the capability of drones at this weight is likely to increase in the future).

Differentiating within categories

26. It may also be appropriate to differentiate requirements within categories. Part 101 currently covers drones with a wide spectrum of capability and associated risks, with the same rules applying to all drones up to 15 kilograms (and some up to 25 kilograms). At the same time, there is benefit to keeping the rules as simple as possible. We are interested in ideas about what might work well in the New Zealand context.

Potential special authorisations

27. Model aircraft come under the Part 101 drone rules as a subset of ‘remotely piloted aircraft’. Model Flying New Zealand (MFNZ) is an “‘approved organisation’ under Part 101, which affords it some additional privileges (including the ability to approve drones 15-25 kilograms for flight without separate CAA approval, as set out above).
28. Drones operating under the auspices of model aircraft associations are likely to present limited risks to safety or other concerns – conversely, model aircraft associations make a significant contribution to educating recreational users on safe flying.
29. Some jurisdictions have included specific provisions for their civil aviation authorities to issue special authorisations for specified entities or zones, for which certain rules and requirements do not apply. For example, in consultation with its model aircraft clubs, Australia’s Civil Aviation Safety Authority has approved approximately 1,000 sites within which drones do not need to be registered when flown for recreational purposes within these sites.
30. In working through the possible measures, we will consider if it would be appropriate for the CAA to provide special authorisations. This could also extend to other entities that can prove that safety and other risks are effectively managed (e.g. local councils in designated areas, drone racing).

⁸ See for example [When planes and drones collide](#), University of Dayton Research Institute, 2018; *Small Remotely Piloted Aircraft Systems (drones) Mid-Air Collision Study*, The Department for Transport, the Military Aviation Authority and British Airline Pilots’ Association, 2016.

⁹ Countries that have set 250 grams as a lower threshold for registration include Australia, United States, United Kingdom, China and Brazil. Japan has set its threshold at 200 grams. The EU uses an approach that combines mass, kinetic energy and maximum speed, but effectively exempts most drones under 250 grams.

Questions:

- vi. What is the best way of determining the level of risk in the New Zealand context (e.g. weight/maximum speed/capacity/location/types of operation)?
- vii. Should we exclude very small/low-risk drones from the Civil Aviation Rules? If so, what should the threshold be?
- viii. What sort of differentiation would make sense?
- ix. How might special authorisations work?

2. Relaxing Part 101 requirements

31. This section sets out additional rules updates we are considering, that have not been captured in the sections above. These are based on feedback received from CAA's 2017 post-implementation survey on the rules and continued engagement with the sector and are intended to improve:
- **compliance**, by updating rules that are seen as not risk-based or proportionate. We also intend to simplify the language in the rules to make them easier to understand and follow; and consolidate the relevant rules in one place as far as possible.¹⁰
 - **proportionality**, by reducing the regulatory burden on users where appropriate. We want to make the rules as flexible and permissible as possible, while not compromising safety or security. Introducing other requirements to increase operator responsibility, such as registration, competency testing, geo-awareness and remote identification, could underpin the ability to relax the rules in some areas.

2.a Relaxing or removing the consent provision

32. The most significant change we are considering is to the 'consent provision', which refers to the requirements for Part 101 operators to gain permission from people before flying over them, or in the case of property, from the person occupying or owning it.¹¹ Many operators see the consent provision as impracticable, restrictive and unrealistic, leading to many to simply ignore it.
33. The consent provision was introduced as part of the Part 101 updates in 2015, to minimise the risk to people and property of an uncontrolled drone crashing. It is a unique imposition on drone operators; neither general nor commercial aviation operators are required to gain such permission – but other operational restrictions apply to them, the risk profile is different, and they fly at significantly different altitudes from most drones.
34. It is not clear that the consent provision is contributing to safety outcomes. However, it does act as a kind of proxy rule for managing privacy and nuisance concerns. This was not the intent of the rule and drone operators also need to comply with central and local government requirements relating to privacy and nuisance. However, complaints to the CAA about drones flying over people or property

¹⁰ For example, feedback suggests some operators miss the requirement to not to operate in controlled airspace as it is not in the drone section of Part 101.

¹¹ The consent provision also applies to Part 102 operators, but at a lower threshold, i.e. generally they must attempt to gain consent, rather than gain explicit consent. The requirements are determined on a case-by-base basis through the certification process.

without gaining consent have increased every year since 2015, and represent the CAA’s top complaint category about drones.¹²

35. If we relax or remove the consent provision, we will likely need to replace it with another means of managing safety, as well as taking into account privacy and nuisance concerns. We would need to work on this with other government agencies, including the Ministry of Justice and New Zealand Police.

What do others do?

36. Instead of requiring explicit consent, other jurisdictions manage the risks to people and property by defining the distance a drone can operate from people and property, as set out in **Table 3** below.

Table 3

International approaches to safe distance	
Australia Civil Aviation Safety Authority (CASA)	Must keep the drone at least 30m away from other people and you must not fly over or above people. This could include at beaches, parks, events, or sport ovals where there is a game in progress.
United States Federal Aviation Administration (FAA)	Must remain at least 25ft (approximately 7.6m) from individuals and vulnerable property, cannot fly over groups of people, public events, or stadiums.
Canada Transport Canada	For basic operations, users must maintain a minimum horizontal distance of 30m from bystanders, away from emergency operations and advertised events and avoid forest fires, outdoor concerts, and parades. An advanced operations certificate is required to fly within 30m of bystanders.
United Kingdom Civil Aviation Authority (CAA)	Open Category (equivalent to Part 101) requirement differ by subcategory: <ul style="list-style-type: none"> • A1 <250g (low risk, toys): ‘Fly over people’, but not open-air assemblies • A2 <4kg: ‘Fly close to people’, i.e. minimum horizontal distance of 30m from uninvolved people, or 5m when “low speed mode” is selected • A3 <25kg: ‘Fly far from people’, only fly in areas clear of uninvolved people, minimum horizontal distance of 150m from residential, commercial, industrial or recreational areas, until further guidance received a minimum horizontal distance of 50m from all uninvolved people
European Union European Aviation Safety Agency (EASA)	
Singapore Civil Aviation Authority of Singapore (CAAS)	Drones cannot be flown over people or crowds and need to maintain ‘sufficient’ distance from people, property, and other aircraft.

¹² 475 in total January 2015-May 2019, but this will include complaints that have been made about Part 102 operations, for which explicit consent is not required.

Questions:

- x. How do you think the consent provision is working:
 - for safety?
 - for privacy and nuisance?
- xi. Should we retain the consent provision?
- xii. If we remove the consent provision, how could we manage safety, privacy and nuisance concerns? What could we replace it with?

37. We are also considering other updates, as set out below.

2.b Relaxing spotter/observer requirements for first person view (FPV) operations

38. FPV systems provide a video stream from a drone to an operator through a remote pilot station to extend their visual line of sight. This makes the operator feel as if they are on board the drone, extending their visual line of sight. The use of FPV systems is growing, particularly for activities such as rotorcross or drone racing in closed conditions. Part 101 specifies that you must be able to see an aircraft with your own eyes to ensure separation from other aircraft, or use a spotter/observer to do this. This applies to FPV because a person's field of view is generally more restricted through the use of equipment than if they were maintaining natural visual line of sight. However, some operators consider this is often not justified, particularly in closed conditions, and it can be unnecessarily limiting.
39. There may be merit in relaxing this requirement in circumstances where there is no possible conflict with other aircraft, e.g. in forests or other areas of shielded operation,¹³ on the basis that removing the observer in these circumstances would present minimal risk.

2.c Reviewing distance restrictions around aerodromes

40. The Part 101 rules specify that you cannot fly a drone closer than four kilometres from any aerodrome, controlled or uncontrolled, except in some circumstances.¹⁴ A controlled aerodrome is one which has air traffic control services, provided by Airways.
41. The usage of uncontrolled aerodromes around New Zealand varies considerably, with some only used once or twice a week. Some operators have requested a reassessment of the distance around uncontrolled aerodromes, particularly where there are low levels of piloted aircraft activity, to increase available airspace and flexibility. We are considering if this as an option, but decisions would depend on the ability to establish a robust safety case.
42. We also consider there is a case for reassessing the distance around controlled aerodromes. Four kilometres is a useful standard, but it is not always justified from a safety perspective. Any changes to this rule would need to be based on appropriate evidence that any changes would not create new or heightened safety risks.

¹³ A shielded operation is where the drone remains within 100m of, and below the top of objects e.g. trees and buildings.

¹⁴ There are two ways to fly a drone within controlled airspace - one is to get clearance from Air Traffic Control and the other is to do a shielded operation outside the airfield boundary.

43. A key challenge would be in ensuring drone operators know where and when they can fly, particularly if standards differ across the country. However, geo-fencing requirements and improved education through operator competency testing, if adopted, could help manage those concerns.

Questions:

- xiii. Do you agree that these are the areas we should focus on?
- xiv. Do you have any specific comments on the proposals above?
- xv. Have we missed anything?

3. Registration

44. New Zealand does not have a registration scheme for drones. Part 101 exempts drones from the registration requirements that apply to other (manned) aircraft.¹⁵ Similarly, the CAA holds a publicly-available [list of Part 102 Unmanned Aircraft Operator Certificate Holders](#), but this does not constitute registration.
45. AirShare, a fully-owned subsidiary of Airways (New Zealand's air navigation service provider),¹⁶ offers a website and app that provides drone operators with relevant information on how to operate their drones safely in New Zealand. This is an optional and free service that enables drone operators to log flights and request access to controlled airspace.
46. A number of other jurisdictions have introduced or are planning to introduce compulsory registration schemes for drones, as part of a set of measures to maintain safety and security and facilitate drone integration. These are usually online, digital systems that identify and associate an operator with their drone/s using a unique registration number.

What are the potential benefits of registration?

47. If there is widespread uptake of a registration scheme in New Zealand, it would likely provide the following benefits:
- **compliance** with the rules, and therefore safety and security, by
 - increasing awareness of the rules and accountability among drone operators
 - enabling direct communication with operators and targeted education on safe flying and responsibilities. Registration is also recognised as a tool to raise public awareness of safety and security requirements
 - deterring users from breaching the rules through increased ability for authorities to take action if breached, noting operators that intend harm are not likely to register their drones
 - **enforcement** of the rules, through improving the ability of authorities to identify drone users and take action against non-compliant operators (particularly when combined with remote identification)

¹⁵ These requirements are set out in Civil Aviation Rule Part 47.

¹⁶ AirShare was launched as a collaboration between Airways), Callaghan Innovation, UAVNZ, and CAA to improve education for drone operators and the public. AirShare was incorporated as a subsidiary of Airways on 16 November 2018.

- **system sustainability**, by
 - supporting the safe integration of drones into the current transport system, by acting as a building block along with other measures such as remote identification
 - building accurate and reliable data on the number of drones/operators and trends to inform policy thinking and resourcing
 - helping build public acceptance of drones, through increasing operator accountability
 - ensuring drone operators are contributing to participate in the aviation system, from which they are benefitting and in which they are creating risks (if charges apply).

48. We consider that registration would have limited impact on its own. Rather, it is likely to deliver most benefits if combined with other measures, such as operator competency and remote identification requirements.

What are the likely costs and challenges of registration?

49. Developing, establishing and maintaining a registration system would also come with costs and challenges. These may include costs to the Government; and new costs and regulatory requirements for operators. We recognise that compulsory registration of drones would be a significant step and we need to be clear that the benefits justify the costs
50. We are not in a position to determine the likely cost of a drone registration system for New Zealand at this stage, as it would depend on the type and design of the system. However, other jurisdictions have reported that the costs and resources required to implement drone registration are considerable,¹⁷ and that full cost recovery may not be possible from the outset.
51. According to the [transport regulatory system funding principles](#), drone operators, as aviation participants, can be charged fees for the cost of services they receive (e.g. costs of running a register), and levies for their share of the costs of running a well-regulated civil aviation system, but a range of funding models are possible.
52. If we were to opt to introduce a registration system for New Zealand, we would need to work through the following considerations:
- **what** a registration scheme should look like (**form**), e.g. online, app-based system that associates drones/operators with unique registration number
 - **who** should set up and manage a registration scheme
 - **what** should be registered, e.g. the drone, the owner/operator under both Parts 101 and 102, or flight path
 - how to **differentiate** requirements based on risk (e.g. subcategories), including the lower threshold for registration
 - **when** registration should apply, e.g. before flying, at point of sale
 - if registration should be **linked to operator competency testing** (i.e. as a prerequisite)
 - **duration/validity** of the registration, e.g. one-off or renewal annually/less often
 - the **cost structure**, including for registering multiple drones
 - how to identify drone/operators with unique identification number, e.g. **physical marking** and/or **electronic identification**
 - if there should be **minimum age requirement(s)**, and if so what they should be

¹⁷ Significant costs are attributed to digitising systems for both unmanned and manned aircraft, which would likely be required to support a future aviation system.

- if **special authorisations** should apply (e.g. model aircraft clubs and associations)
- how registration would apply to **tourists/short-term visitors**
- if new **penalties** should apply for non-compliance (see section 7)
- any **transition period**, given the number of drones already in the system

What are others doing?

53. As set out in **Annex 2**, many other jurisdictions have introduced, or are in the process of introducing, requirements for drones above a certain weight (usually 250 grams) to be registered electronically before flying. Some jurisdictions also require operators to physically mark their drones with a unique identifier provided at registration, whereas others link identification to the manufacturer's marking.

Questions:

- xvi. Do you see value in implementing a registration scheme for drones in New Zealand? Why/why not?
- xvii. Do you see any alternatives to registration that would achieve similar objectives?
- xviii. If we opt for a registration scheme:
 - what would you like to see? (form, cost, duration etc)
 - what should we avoid?
- xix. What impact would registration likely have on you?

4. Operator competency

54. We are considering the option of introducing compulsory basic competency testing requirements for Part 101 operators. This would effectively be a targeted education tool, to improve operators' awareness of the airspace they are operating in, and understanding of the relevant rules and risks of flying a drone.
55. As set out above (see *Context and related work*), the CAA has implemented a range of initiatives to educate drone operators and the wider public. These initiatives are supported by other regulatory measures, including enforcement where appropriate. However, New Zealand's experience mirrors that of other jurisdictions in that, despite significant investments in education and outreach, many operators continue to be unaware of the rules or do not understand the risks.¹⁸
56. Most drone operators are not traditional participants in the aviation system. Part 101 specifies that drone operators need to understand the airspace in which they are operating (e.g. understanding of aeronautical charts) and recommends users get formal training, but there are currently no formal testing requirements. Realistically, many Part 101 operators may not need advanced, in-depth aviation knowledge to operate a drone safely, but basic knowledge is required.
57. Testing for Part 101 operators would most likely take the form of an online or app-based test, covering the key rules relating to safe and responsible drone operations, that operators would have to pass before operating a drone. Any such testing would be designed to be user-friendly to maximise participation and accompanied by readily-accessible information on the rules. The testing

¹⁸ [RPAS Use in New Zealand](#), Colmar Brunton, August 2017 showed that three quarters of New Zealand operators and seven out of ten visitors said they had at least basic understanding of the rules. When asked about the twelve specific Part 101 rules between 22% and 44% of NZ users and between 19% and 52% of overseas users were unaware of each of the rules. The planned research will indicate the impact of current education and outreach activities.

requirements could be graduated according to any subcategories that we may introduce under Part 101.

58. Under Part 102, the CAA assesses the qualification and/or knowledge required for all personnel involved in an operation, based on the nature and scope of the operation. This includes knowledge of both general aviation and drone-specific regulatory requirements. Part 102 operators generally comply with the rules and we are not considering changing how this operates at this stage.
59. A number of [Part 141 aviation training organisations](#) deliver drone courses and training to operators, including to help them meet Part 102 training requirements.

What are the potential benefits of competency testing?

60. A basic testing requirement would be designed to improve **compliance** with the rules and deliver safety benefits, by requiring operators to demonstrate their understanding of how to fly safely before operating a drone. For operators, a well-designed system would offer a quick and easy means of finding the information they need to fly safely.

What are the likely costs and challenges of competency testing?

61. Developing, establishing and maintaining operator competency testing would come with upfront costs to the Government. It would also introduce new conditions for operators, as well as potential new costs.
62. Operator competency would likely go hand-in-hand with registration. If we opt to introduce operator competency testing, we would need to work through similar considerations, including:
 - **what** would operator competency testing look like (**form**), e.g. online, multiple choice, and certification
 - what **areas** it would cover, e.g. safety, security, privacy
 - **who** should set up and manage operator competency testing
 - **who** should be required to complete competency testing (every operator, or person responsible), recognising that more people will fly drones than own drones
 - **when** should the test be taken, including how it would link to registration
 - if and how to **differentiate** requirements (e.g. based on any subcategories)
 - **duration/validity** of operator competency testing
 - if **costs** should apply
 - if there should be **minimum age requirement(s)**, and if so what they should be
 - if **special authorisations** should apply (e.g. model aircraft clubs and associations)
 - how testing requirements would apply to **tourists/short-term visitors**
 - if new **penalties** should apply for non-compliance (see item 7)

What are others doing?

63. As set out in **Annex 2**, many relevant jurisdictions have implemented or plan to implement basic competency testing requirements alongside or as a prerequisite for registration. For low-risk operations, this is usually in the form of a short online quiz or set of questions.

Questions:

- xx. Do you see value in having an operator competency testing requirement for drone operators? Why/why not?
- xxi. What else could we do to improve education and drone operator behaviour (both regulatory and non-regulatory measures)?
- xxii. If we opt for introducing operator competency testing:
 - what would you like to see?
 - what should we avoid?
- xxiii. What impact would operator competency testing likely have on you?

5. Remote identification

64. Remote identification, or e-identification, refers to technology that sends out drone identification information during a flight, without needing physical access to the drone. It can provide information in real-time about:
- flight characteristics (location, altitude, speed, direction)
 - drone/operator identification (e.g. serial number, registration number or other unique identifier, make and model)
 - location of the operator (base location).
65. This section focuses on the ability for drones to be identified electronically. Some manufacturers are also equipping drones with receivers that enable operators to “see” nearby aircraft and avoid them.¹⁹
66. Remote identification technology is still developing, but systems are already available ranging from simple beacons and transponders to more sophisticated systems using the mobile network. Industry is leading the development of the technology and most large manufacturers already include some form of remote identification capability in their drones.

What are the potential benefits of remote identification?

67. The primary benefits of introducing remote identification capability requirements in New Zealand would be to improve:
- **safety and security**, by improving the ability for authorities to take **enforcement** action. Remote identification can allow authorities to determine in real-time whether an operator has the clearances to fly a drone in a particular location and, through the flight characteristics, help assess the relative risk(s) of the operation. It can also identify the location of the operator, to enable authorities to take action if a drone is causing safety or security concerns.
 - **compliance** with the rules, by encouraging operator responsibility and accountability. We recognise that some operators may deliberately attempt to override the technology, so it is unlikely to be a fail-safe solution. In some cases, however, remote identification is fully integrated and the drone cannot be flown without it.²⁰ A lack of remote identification may also help identify deliberate threats to safety or security.

¹⁹ DJI, which dominates the New Zealand market, has committed to installing ADS-B transceivers on all drones weighing more than 250 grams from 2020.

²⁰ For example, DJI has indicated it is fitting all drones above a certain capacity with remote sensing technology, and that drones fitted with the technology cannot fly without it.

- **system sustainability**, by allowing air traffic control systems to see drones flying in controlled and uncontrolled airspace, to help avoid mid-air collisions. Remote identification can also help distinguish drones from other objects, such as birds, therefore avoiding unnecessary disruptions for all users of airspace. Remote identification capability would be a key building block to enable more advanced drone operations and facilitate drone integration; and help lay the groundwork for a future aviation system (including a possible UTM system).
- **proportionality**. Technological tools such as remote identification, which improve the ability to track and trace drones, may underpin the ability to relax some of the current rules.

68. Remote identification is likely to be most effective when combined with registration, and vice versa.

What are the likely costs and challenges of remote identification?

69. The costs for operators would mainly depend on the requirements imposed on manufacturers (or people making custom drones) to equip drones with the appropriate technology, including the effect on drone weight and battery life. As the technology advances and becomes more widely available, the costs are likely to come down.

70. For the Government, the main costs would be in setting up the systems and infrastructure to access the identification information remotely and make use of it.

71. If we opt to introduce remote identification requirements, we will need to work through the following considerations:

- **interaction** between remote identification requirements and other measures, such as registration
- the **threshold** (e.g. weight) for requiring remote identification
- **where** remote identification requirements should apply, i.e. only for drones operating in controlled airspace/everywhere.
- **standards** for remote identification technology. Adopting an international standard or aligning with key jurisdictions would make it easier for visitors wishing to fly their drones in New Zealand, as well as for New Zealanders wishing to fly their drones overseas
- **interaction and interoperability** with other forms of electronic conspicuity, including ADS-B.²¹ Full interoperability of electronic identification systems will likely be required to achieve the maximum benefits from a future aviation system, but in the shorter term, a balance will be required between visibility of aircraft and not creating congestion in electronic detection systems
- **privacy and security** considerations, including who should have access to the information (e.g. Police, CAA, other operators) and how to secure and store data to protect operators' privacy
- any **transition period**, including requirements for **existing or custom drones**

²¹ New Zealand is introducing ADS-B (Automatic Dependent Surveillance-Broadcast) to replace the existing aviation surveillance system. This will require all traditional aircraft flying in controlled airspace to be fitted with ADS-B transmitters to transmit their flight information to air traffic controllers and other aircraft and deliver a number of safety benefits.

What are others doing?

72. As set out in **Annex 2**, a number of similar jurisdictions have signalled they will be moving to introduce remote identification requirements, but are waiting for technology and standards to develop.
73. The European Union regulations require all drones above 250 grams to be equipped with remote identification equipment that enables the following information to be available in real time during the whole flight: unique serial number, geographical position, height above the take-off point and associated date and time, geographical position of take-off point. The UK is matching these requirements. The United States Federal Aviation Administration (FAA) is expected to release a proposed rule on remote identification for public comment in September 2019.
74. The FAA is leading work to come up with a US standard for remote identification. ASTM International, an international standard body, is managing this work, with significant input from industry experts. Most jurisdictions that have signalled they will introduce mandatory remote identification are expected to adopt this or a similar standard.²²

Questions:

- xxiv. Do you see value in introducing remote identification requirements for drone users? Why/why not?
- xxv. If we opt for introducing remote identification requirements:
 - what would you like to see? (e.g. type, transitional arrangements, privacy considerations)
 - what should we avoid?
- xxvi. What impact would remote identification requirements likely have on you?

6. Geo-awareness/geo-fencing

75. Geo-awareness is a system that uses virtual barriers to detect and restrict drones from flying into designated zones, i.e. sites that have been “geo-fenced”, or above specific heights, e.g. 120 meters. It is based on satellite navigation networks, such as GPS, and works by informing the operator when their drone is entering a prohibited zone, or automatically stopping the drone from entering it.
76. Geo-fencing is a key technological tool to protect high-risk or sensitive areas, such as aerodromes, other critical infrastructure, prisons, conservation land and other crowded places, as well as major events.
77. There is considerable investment internationally, led by industry, in developing this technology. Some manufacturers have pre-empted regulatory change and voluntarily equipped their drones with geo-fencing software.²³

²² The ICAO Unmanned Aircraft Systems Advisory Group (UAS-AG) is developing a recommendation to not support ADS-B out as the standard for drone remote identification, because of congestion for air traffic control systems.

²³ For example, DJI uses GPS receivers on its drones to disable its drones from flying in designated areas. Its drones also come with automatic altitude limits.

What are the potential benefits of geo-awareness?

78. The key benefits of introducing geo-awareness requirements would be to improve:
- **Enforcement** - geo-fencing is a tool to help enforce the rules and reduce the risk of accidents and incidents involving other aircraft, people and property in high-risk areas; as well as to help address security risks for sensitive sites.
 - **Compliance** - for operators, geo-fencing is a tool to help understand where they are allowed to fly and prevent unintentional breaches. The introduction of geo-fencing could also enable easier access to airspace and reduce insurance premiums, i.e. through adding an additional layer of protection about where drones can and cannot fly.
 - **System sustainability** - along with remote identification, geo-fencing can be seen as a building block technology for future drone integration. As technology evolves, it is likely to support operations beyond visual line of sight (BVLOS) and be a key component of UTM systems.

What are the likely costs and challenges of geo-awareness?

79. The main costs of geo-awareness would be associated with the requirement for drones to be equipped with the appropriate technology (software). As with remote identification, as the technology advances and becomes more widely available, the costs are likely to decrease.
80. Geo-fencing technology is not fail-safe and the drone operator is ultimately responsible for flying away from restricted zones. Manufacturers have indicated that geo-fencing cannot be guaranteed in all conditions – it requires several elements that may be missing, damaged or interfered with during a flight. As with remote identification, some operators may deliberately override it. However, if geo-fencing requirements are in place, it will help authorities to clearly identify threats (i.e. if someone is flying where they clearly should not be) and take appropriate response action.
81. If we opt to introduce geo-awareness requirements, we would need to work through the following considerations:
- **who could determine zones** for geo-fencing (e.g. CAA, Police, national security agencies, local authorities etc)
 - **how** it would work, including developing and maintaining a database with up-to-date location information on geo-fenced areas and any other infrastructure requirements
 - how to ensure **manufacturers** have accurate and up-to-date data, and that their drones comply with any obligations
 - how to ensure **operators** keep their drones updated (e.g. auto-download requirements)
 - how to manage any **safety risks** associated with drones being diverted from a geo-fenced area
 - how to manage **special authorisations** for operators cleared to fly into a designated zone (i.e. under Part 102 and including in emergency situations)
 - how it would apply to **existing or custom drones**, including any transition period.

What are others doing?

82. Although there is strong interest in geo-fencing and geo-awareness as a tool, we are not aware of any jurisdictions that have introduced geo-awareness requirements to date. The EU has indicated it will introduce geo-fencing requirements as a key part of its U-Space (UTM) system, but these are not yet in place.

Questions:

- xxvii. Do you see value in introducing geo-awareness requirements for drone users? Why/why not?
- xxviii. If we opt for introducing geo-awareness requirements:
 - what would you like to see?
 - what should we avoid?
- xxix. What impact would geo-awareness requirements likely have on you?

7. Import and sales controls

- 83. Some stakeholders have recommended that Government introduces controls on the sale and import of drones, as a way of enforcing product standards for drones.
- 84. Many drones are small, readily available from overseas vendors and appeal to some members of the public as novelty-type items. As with import controls for high-powered lasers, import controls for drones are likely to be costly and impractical to enforce. Intercepting non-compliant drones would be difficult, as it would either require border agencies to independently test imports to determine whether they exceed product standards (a resource-intensive approach that border agencies are not equipped to perform), or rely on product markings as an accurate representation of capability.
- 85. For these reasons, we do not consider that introducing these types of controls is a viable option at this stage. The Australian Government has taken a similar position.
- 86. New Zealand is also unlikely to have the ability of some other jurisdictions to influence manufacturing standards and impose separate requirements on manufacturers on its own. Instead, New Zealand is likely to be a standard “taker” in this regard.
- 87. Internationally, the EU is one of the leaders in developing product standards for drones in close collaboration with manufacturers, importers and distributors. Importers and manufacturers will be required to ensure drones available in the EU market are designed and manufactured in compliance with EU requirements. For example, manufacturers of remote identification equipment are required to ensure each drone comes with a unique serial number that complies with the appropriate EU standard. Any drone sold in the EU for use in its “open category” (equivalent to Part 101) must be marked with a product standard marking (C0-C4), which is used to both indicate compliance with EU standards and also to link consumers to information about the flight rules that apply to their drone.²⁴
- 88. We will continue to watch international developments and assess what might be appropriate for New Zealand.

Questions:

- xxx. Do you think we should be doing more to control the import and sale of drones? If so, why and how

²⁴ This is comparable to the EU’s “CE” (Conformité Européenne) marking scheme for products sold in the European Economic Area, that show compliance with EU safety, health and environmental protections requirements.

8. Offences and penalties

89. A range of offences and penalties apply to drones operated in careless or intentionally harmful manner in New Zealand. Aviation safety is typically regulated and administered by the CAA, along with other aviation-specific legislation, such as the Civil Aviation Act 1990. The key offences and penalties relevant to drones are set out in **Table 4** below.

Table 4

Key offences and penalties		
Legislation	Offence	Maximum available fine and/or penalty
Crimes Act 1961	Endangering transport (with intent to cause danger to persons or property or with reckless disregard for safety)	Individuals face a maximum prison term of 14 years.
Summary Offences Act 1981	Acts endangering safety	Individuals face either a maximum prison term of 3 months or a maximum fine of \$2,000
Civil Aviation Act 1990	Operating aircraft in a careless manner	Individuals face a maximum fine of \$7,000.
Civil Aviation (Offences) Regulations 2006	Person must not operate unmanned aircraft without taking all practicable steps to minimise hazards to other aircraft, persons or property	Individuals are subject to an infringement fee of \$2,000. Upon conviction, the maximum fine is \$5,000.

90. In addition to aviation-specific legislation, the obnoxious use of drones is subject to offences and penalties set out in general law (e.g. prohibiting trespass onto private property or making intimate recordings). For example, under certain circumstances, filming people with a drone could count as making an intimate visual recording under the Crimes Act 1961. Making, possessing or distributing such recordings are all offences punishable by prison terms of up to three years. The Civil Aviation Act 1990 (Section 97) also deals with nuisance, trespass and responsibility for damage.
91. As discussed above, the nature of drones means it is currently difficult to apply these offences in practice, primarily due to the difficulty in identifying drone operators. The threshold for prosecutions is also relatively high and in most cases might not make sense for relatively minor drone offences.
92. If we introduce new regulatory measures, including those set out above, we would likely need to introduce corresponding offences and penalties, as is usually the case with aviation rule changes. The Ministry of Transport also has a separate project underway to align penalties and offences across the transport system, to improve the coherence and comparability of fines and fees.
93. One option we are considering is introducing low-level fines for less serious drone-related offences, similar to minor traffic or parking offences. The United Kingdom has recently proposed a suite of new powers to improve the ability for police to enforce the rules against misuse of drones. This includes introducing fixed penalty notices (spot fines) for less serious drone offences, capped at £100 (approximately NZ\$185).

Questions:

- xxxi. Do you think the current offences and penalties regime is working well? Why/why not?
- xxxii. How could the offences and penalties regime be improved?
- xxxiii. Should we consider introducing spot fines to respond to less serious drone offences? Why/why not?

Annex 1: List of questions

Problem definition

- i. What is working well at the moment? What is not working?
- ii. Have we got the problem definition right?
- iii. What are we missing?

Options

- iv. What priority would you give each of the measures?
 - Does it make sense to introduce measures as a package?
 - Or are there measures we should introduce before others? If so, which ones?
- v. What else should we be thinking about?

1) Changing who and what the rules apply to

- vi. What is the best way of determining the level of risk in the New Zealand context (e.g. weight/maximum speed/capacity/location/types of operation)?
- vii. Should we exclude very small/low-risk drones from the Civil Aviation Rules? If so, what should the threshold be?
- viii. What sort of differentiation would make sense?
- ix. How might special authorisations work?

2) Relaxing Part 101 requirements

Consent provision

- x. How do you think the consent provision is working?
 - for safety
 - for privacy and nuisance?
- xi. Should we retain the consent provision?
- xii. If we remove the consent provision, how could we manage safety, privacy and nuisance concerns? What could we replace it with?

Other rule changes

- xiii. Do you agree that these are the areas we should focus on?
- xiv. Do you have any specific comments on the proposals above?
- xv. Have we missed anything?

3) Registration

- xvi. Do you see value in implementing a registration scheme for drones in New Zealand? Why/why not?
- xvii. Do you see any alternatives to registration that would achieve similar objectives?
- xviii. If we opt for a registration scheme:
 - what would you like to see? (form, cost, duration etc)
 - what should we avoid?
- xix. What impact would registration likely have on you?

4) Operator competency

- xx. Do you see value in having an operator competency testing requirement for drone operators? Why/why not?
- xxi. What else could we do to improve education and drone operator behaviour (both regulatory and non-regulatory measures)?
- xxii. If we opt for introducing operator competency testing:
 - what would you like to see?
 - what should we avoid?
- xxiii. What impact would operator competency testing likely have on you?

5) Remote identification

- xxiv. Do you see value in introducing remote identification requirements for drone users? Why/why not?
- xxv. If we opt for introducing remote identification requirements:
 - what would you like to see? (e.g. type, transitional arrangements, privacy considerations)
 - what should we avoid?
- xxvi. What impact would remote identification requirements likely have on you?

6) Geo-awareness/geo-fencing

- xxvii. Do you see value in introducing geo-awareness requirements for drone users? Why/why not?
- xxviii. If we opt for introducing geo-awareness requirements:
 - what would you like to see?
 - what should we avoid?
- xxix. What impact would geo-awareness requirements likely have on you?

7) Import and sale controls

- xxx. Do you think we should be doing more to control the import and sale of drones? If so, why and how?

8) Offences and Penalties

- xxxi. Do you think the current offences and penalties regime is working well? Why/why not?
- xxxii. How could the offences and penalties regime be improved?
- xxxiii. Should we consider introducing spot fines to respond to less serious drone offences? Why/why not?

Annex 2: What others are doing

Internationally drone rules and regulations are changing rapidly. The information in this table is based on best efforts to collate the information available at the time of writing (August 2019).

	Where are they up to?	Registration			Competency Testing			Identification		Minimum age	Visitors	Special authorisations	Penalties
		Who/what?	Cost	Validity	Who?	Cost	Validity	Physical and electronic ID	Remote ID				
Australia Civil Aviation Safety Authority (CASA)	Online registration and accreditation schemes to be introduced together. Commercial drone operators must register before November 2019 , and everyone else by March 2020	<ul style="list-style-type: none"> All drones used commercially Recreational drones above 250g 	Proposed: Recreational: Less than A\$20 for the first drone only Commercial: A\$100-160 per drone	1 year	Accreditation certificate required for all recreational drone operators and all commercial drones in the "excluded" category (under 2kg or flying on own land): <ul style="list-style-type: none"> Watch a short safety video online Pass a short online safety quiz (unlimited number of attempts) <p><i>Commercial operators operating drones more than 2kg are required to hold a remote pilot licence (RePL) or remotely piloted aircraft operator's certificate (ReOC)</i></p>	Free	3 years	Unique manufacturer's marking (e.g. serial number barcode or QR code) linked to drone at registration; or if not available a unique identifier can be affixed	No current requirements (CASA indicated might be introduced in future, but if so unlikely to require retrofitting of existing drones.)	<ul style="list-style-type: none"> 16yrs Operators under 16yrs must be supervised by an accredited person above 18yrs 	Specific accreditation process for visitors, which aligns with registration requirements ²⁵	Model aircraft association members operating at CASA-approved airfields (approximately 1,000 sites)	<ul style="list-style-type: none"> Not yet specified (could include fines and 'demerit' style points) General penalties: If prosecuted, fine up to \$10,500. For operating a drone in a way that is hazardous to other aircraft, fine up to \$25,000 or 2 years in prison.
United States Federal Aviation Administration (FAA)	Online or paper-based registration system in place since 2015 . Testing requirements in place since 2017 for drones under 25kg used commercially (Part 107)	All drones above 250g (Includes drones flown commercially under <i>Part 107</i> and model aircraft (formerly section 336))	US\$5 per drone	3 years	Remote pilot certificate (Part 107) for drones under 25kg used commercially: <ul style="list-style-type: none"> 60 question multiple choice test to answer in 2 hours at licensed testing centre <p><i>New online test requirements for recreational operators to be introduced in fall 2019</i></p>	US\$150 (Part 107)	2 years	Operators must: <ul style="list-style-type: none"> mark each of their drones with unique registration number before operating (one number for all drones) be able to provide FAA registration certificate 	Proposed rule on remote identification expected to be released for public comment in September 2019.	<ul style="list-style-type: none"> 13yrs for registration for recreational use (a person 13yrs or older must register for operators under this age) 16yrs for commercial (Part 107) 	<ul style="list-style-type: none"> Visitors flying drones recreationally must get a "recognition of ownership" from registry Visitors flying drones commercially must obtain an economic authority 	FAA to issue guidance on how it will recognise community-based organisations	<ul style="list-style-type: none"> General penalties: <ul style="list-style-type: none"> Fine up to US\$27,500 for civil offences Fine up to US\$250,000 and/or up to 3 years' imprisonment for criminal offences
Canada Transport Canada	New rules published January 2019. Online registration system implemented from 1 June 2019	All drones between 250g and 25kg <i>Drones over 25kg do not need to be registered, but operators must have special flight operations certificate (SFOC)</i>	C\$5 per drone	New drones or on transfer of ownership (registration number remains the same)	Basic Pilot Certificate required for: basic operations (in uncontrolled airspace, more than 30m horizontally from bystanders and not over bystanders): Online small basic exam with 35 multiple choice questions to answer in 90 minutes (65% to pass) Pilot certificate – Advanced Operators required for other flights below 25kg: Online small advanced exam with 50 multiple choice questions to answer in 60 minutes (80%) to pass	C\$10 (per attempt)	2 years	<ul style="list-style-type: none"> Operators must mark (write, label, engrave) drones with unique registration number before flying 	No current requirements	<ul style="list-style-type: none"> 14yrs for basic operations 16yrs for advanced operations (unless supervised by a person with proper certificates) 	Visitors must obtain a special flight operations certificate (SFOC)		<ul style="list-style-type: none"> Individuals: Fine up to C\$1,000 for flying without registration, marking or a drone pilot certificate, or where not allowed; up to \$3,000 for putting aircraft and people at risk Corporations: Fine up to C\$5,000 for a corporation for flying without registration, marking or a drone pilot certificate, or where not allowed; up to \$15,000 for putting aircraft and people at risk
United Kingdom Civil Aviation Authority (CAA)	EU regulations will apply from 1 July 2020, including in relations to online registration and pilot competency systems <i>UK CAA will review and implement any changes from April 2021</i>	All operators of drones between 250g and 20kg <i>Operators of drones above 20kg must obtain an exemption before any flight can take place</i>	£16.50 per operator (will be reviewed)	1 year	Online safety test (details to come)	Not yet specified	Not yet specified	Unique digital registration number issued by UK CAA must be displayed on each drone for which operator is responsible (one code for all drones)	Mandatory remote identification will be introduced (Details not yet decided)	<ul style="list-style-type: none"> 12yrs solo flight Any age if pass foundation test and supervised by an operator above 16yrs 	Not yet specified	UK CAA signalled it is considering special authorisations for e.g. model aircraft clubs and associations	<ul style="list-style-type: none"> Fine up to £1,000 for failure to register or sit competency tests Fixed penalty notice (FPN, or "spot fine") up to £100 for minor drone-related offence

²⁵ The separate process is based on the ICAO requirement that an aircraft can only be registered in one country.

	Where are they up to?	Registration			Competency Testing			Identification		Minimum age	Visitors	Special authorisations	Penalties
		Who/what?	Cost	Validity	Who?	Cost	Validity	Physical and electronic ID	Remote ID				
European Union European Aviation Safety Agency (EASA)	Member States must implement a digital national registration scheme by 1 July 2020 according to the requirements set out in the implementing regulation . The schemes must be interoperable within the EU, and allow for mutual access and information exchange.	EU uses a combination of mass, kinetic energy and speed. Effectively: <ul style="list-style-type: none"> All drones above 250g Drones below 250g that i) have a sensor able to capture personal data (unless classed as toy²⁶) or ii) are able to transfer energy of more than 80 joules to a human in the event of a collision <p><i>Drones above 25kg or flying beyond visual line of site (BVLOS) are required to register, alongside other authorisation and certification requirements</i></p>	Member States to determine	Member States to determine	Drones between 250-900g + drones up to 25kg flown far from people: Online training course and online foundation test Drones up to 4kg flown close to people: As above with additional theoretical knowledge exam to receive Certificate of Remote Pilot Competency	Member States to determine	Member States to determine	Unique digital registration number issued by EU Member State must be displayed on each drone	Remote identification mandatory for all classes of drones above 250 grams, regardless of where operating, by July 2020. Two-year transition period.	<ul style="list-style-type: none"> 16yrs (unless reduced in Member State to 12yrs) Any age if supervised by an operator above 16yrs. Must pass foundation test 	Member States to determine	Member States can issue special authorisations to model clubs and associations to deviate from EU regulations (should be received by June 2022)	Member States to determine
Singapore Civil Aviation Authority of Singapore (CAAS)	The Government announced in early July that it will introduce a mandatory registration regime for all drones.				All operators of "large or capable drones" to be licenced by the end of 2019				No current requirements				

²⁶ Toys are defined as products designed or intended (whether or not exclusively) for use in play by children under 14 years old