



Department
for Transport

Taking Flight: The Future of Drones in the UK Government Response

Moving Britain Ahead



January 2019

CORRECTION SLIP

Title: Taking Flight: The Future of Drones in the UK Government Response

Session: 2017–2019

CP7

ISBN: 978-1-5286-0955-5

Correction: Page 11, para 2.5 where text referring to a 250g minimum weight limit for small drones was added in error.

Text currently reads:

The new zone will apply to all small drones weighing more than 250g.

Text should read:

The new zone will apply to all small drones, as defined in para 1.12 of this document.

17 January 2019



Taking Flight: The Future of Drones in the UK Government Response

Presented to Parliament
by the Secretary of State for Transport
by Command of Her Majesty

January 2019



© Crown copyright 2019

This publication is licensed under the terms of the Open Government Licence v3.0 except where otherwise stated. To view this licence, visit nationalarchives.gov.uk/doc/open-government-licence/version/3

Where we have identified any third party copyright information you will need to obtain permission from the copyright holders concerned.

This publication is available at www.gov.uk/government/publications

ISBN 978-1-5286-0955-5

CCS0119298508 01/19

Printed on paper containing 75% recycled fibre content minimum

Printed in the UK by the APS Group on behalf of the Controller of Her Majesty's Stationery Office

Contents

Ministerial Foreword	4
Introduction	7
Government action to date	9
2. Government Response to Section A - Foundation of future flights: The Air Navigation (Amendment) Order 2018	11
Restrictions on small drone flights near aerodromes	11
Minimum Age requirements	13
Model Aircraft Flying Associations	15
3. Government Response to Section B - A Draft Drones Bill	17
Police powers	17
Fixed penalty notices (FPNs)	20
Flight Information Notification Systems (FINS)	22
4. Government Response to Section C - The Future: Counter-drone technology and modelling the uptake of drones	24
Counter-drone technology	24
Commercial drone scenario modelling	25
5. Detailed Summary of Responses from Section A - Foundation of future flights: The Air Navigation (Amendment) Order 2018	27
Minimum Age requirements	27
Restrictions on small drone flights near aerodromes	29
Model Aircraft Flying Associations	32
6. Detailed Summary of Responses from Section B - A Draft Drone Bill	34
Flight Information Notification Systems (FINS)	34
Police powers	42
Fixed Penalty Notices	48
7. Detailed Summary of Responses from Section C - The Future: Counter-drone technology and modelling the uptake of drones	51
Counter-drone technology	51
Commercial drone scenario modelling	59
Annex A: Abbreviations and Definitions	64
Annex B: A summary of current laws relating to SUA use	65

Ministerial Foreword



The United Kingdom is a global leader in innovation and emerging technologies, and is at the forefront of a rapidly-developing drones market. We want to maintain the UK's position as the place for technology companies to build their businesses, to invest in new innovation, and to use science and engineering to drive new technologies to reach their full potential.

It is vital that we balance maintaining the UK's world-leading position in aviation safety and security with supporting the development of this emerging industry.

Drones are already being used to great effect. Our emergency and search and rescue services use them to help keep people safe and they reduce risks to people working in hazardous sectors such as the oil and gas industry. They are also being used across many other industries, the public sector and charities - to drive more efficient ways of working, to monitor environmental change, to deliver medicines, and to assist infrastructure inspections and construction.

But the recent disruption to Gatwick airport operations, affecting tens of thousands of passengers in the run up to Christmas, was a stark example of why continued action is required to make sure drones are used safely and securely in the UK.

The Government has already acted to regulate this new sector. It is an offence to endanger aircraft, drone pilots must not fly their drones near people or property, and drones have to be kept within visual line of sight. We have been working with the Civil Aviation Authority (CAA) which has been running its long standing 'Dronesafe' campaign and 'Dronecode' guide to help to raise awareness amongst the general public of these rules and regulations. Commercial users of drones are able to operate drones outside of these rules – but only once granted CAA permission to do so on the basis of meeting strict safety conditions.

We have continued to build on these rules. On 30th July 2018, new restrictions came into force to ban all drones from flying above 400ft across the UK, and within 1km of protected airport boundaries. From 30th November 2019, it will be a legal requirement for all drone operators to register and drone pilots to complete an online pilot competency test.

We are also working with manufactures to introduce new technologies which will help in making sure drones are used in accordance with the law. This includes geo-fencing, where a drone can be automatically prevented from flying within protected areas through in-built software, and electronic conspicuity, as laid out in the Government's Aviation Strategy Green Paper, which will allow the automatic identification of all airspace users including drones.

We are also continuing to develop policy relating to a Flight Information Notification System (FINS) as part of future unmanned traffic management and airspace

modernisation programmes to ensure that all aircraft use our airspace safely and securely and in accordance with the rules. We will continue to work closely with airports and police services to put into place the right plans to protect our sensitive national infrastructure from drone incursions.

This consultation set out the next steps we need to ensure safety, security and accountability of the drone industry, whilst harnessing the benefits that drones, used in a safe way, can bring to the UK economy.

We received over 5000 responses, a substantial increase from our last consultation, indicating the increasing interest in this emerging technology.

Responses reflected a broad range of views and positions on drones, but a common feeling shared by respondents was that the communication and enforcement of regulations to guarantee safety is of paramount importance. The Government shares this view and continues to work with the CAA to build on the 'Drone safe' campaign particularly in the run up to registration and competency testing becoming legal requirements in November 2019.

The vast majority of drone users fly safely and responsibly, and adhere to the rules and regulations that are in place. However, if a drone is used illegally we must ensure that the police have the powers to enforce the law, and that the most up to date technology is available to detect, track and potentially disrupt the drone.

The new measures proposed in the consultation, such as giving the police the power to request evidence from drone users where there is reasonable suspicion of an offence being committed, were met with strong support from respondents. These new powers will also include giving the police the option to issue fixed penalty notices for minor drone offences, to ensure effective enforcement and an immediate deterrent to those who may misuse drones or attempt to break the law.

The Government is finalising a Draft Drones Bill which will give the police these powers and we intend to bring this Bill forward in 2019.

We also consulted on the further use of counter-drone technology, and the consultation responses on the proposed framework and safeguards for doing this will now be used by the Home Office to expedite detailed policy work to develop an appropriate means to allow the expanded use of this technology in the UK.

We will also be taking further action to ensure aviation and passenger safety. In their consultation responses, airlines and airports asked for the current airport restriction to be amended to better protect the landing and take-off paths of aircraft and low-flying aircraft such as helicopters. We have been working with the CAA and NATS to develop the optimum exclusion zone which helps meet those requirements.

Whilst increasing the restriction zone would not prevent a deliberate incident, it is important that proportionate measures are in place to help protect all arriving and departing aircraft using our aerodromes and avoid potential conflict with legitimate drone activity. We will therefore introduce additional 5km long by 1km width exclusion zones from runway ends, alongside an increase to the airport restriction out to the current Aerodrome Traffic Zone around airports (approximately a 5km radius circle). Drone pilots wishing to fly within these zones must only do so with permission from the aerodrome Air Traffic Control.

The Department for Transport will amend the Air Navigation Order 2016 to implement these changes.

We are determined to both continue to ensure drones are used safely and securely, and to provide the right platform to harness the wide-ranging opportunities and benefits that drones can bring. For those who operate their drones responsibly and safely, we do not want to make it difficult to realise the potential of this technology. In such a rapidly-changing market, we will ensure that the Government takes an agile approach, working with industry and other partners, to help ensure that the regulation supports and anticipates future innovation whilst keeping people safe.

A handwritten signature in black ink, appearing to be 'Sugg', written in a cursive style.

Baroness Sugg
Aviation Minister

Introduction

- 1.1 The Government ran a consultation between 26th July 2018 and 17th September 2018, the purpose of which was to receive feedback on the Government's proposals to develop policy and regulation surrounding the use of drones.
- 1.2 The consultation covered proposals in the following areas:
 - Next steps following the Air Navigation Order (ANO) 2016 and the Air Navigation (Amendment) Order 2018:
 - a. Whether the current airport restriction is sufficient, and if not, what kind of further extension should be considered;
 - b. The proposed age limit for small drone (see 1.12) operators;
 - c. The impact on model aircraft flying associations.
 - The possible content of a draft Drones Bill:
 - a. Police powers relating to drones and fixed penalty notices;
 - b. The proposed mandating and regulation of a flight information and notification system (FINS) or systems (FINSs) prior to and/or whilst flying certain types of drone or for certain types of users, and how this could or should be regulated.
 - Looking further forward:
 - a. How counter-drone technology could be used as a means of addressing the potential threat malicious misuse of drones can pose;
 - b. The estimated growth in numbers of commercial drones in the UK over future years.
- 1.3 There were 3,957 responses received via the consultation online survey, and a further 1,104 replies which were received as correspondence to the Department for Transport. The total number of responses was 5,061.
- 1.4 Respondents represented a broad range of stakeholders, including both organisations and individuals. There were also a significant number of campaign responses coordinated by organisations with specific interests. Respondents were asked to categorise themselves, according to a list of interests. Analysis of these results are below.
- 1.5 Of those who responded to the online survey:
 - 3813 represented individuals;
 - 144 represented organisations.
- 1.6 Of the individuals:
 - 2310 used drones for leisure;
 - 1947 were model aircraft flyers;

- 165 were general aviation pilots;
 - 265 flew drones for commercial reasons;
 - 187 classified themselves as “other”.
- 1.7 Of the organisations:
- 73 were businesses that use drones;
 - 22 were membership or representative organisations;
 - 12 were airports or airlines;
 - 4 were drone manufacturers or vendors;
 - 4 were research institutions or universities;
 - 10 were local authorities or statutory bodies;
 - 2 were businesses considering using drones;
 - 17 were in other groups.
- 1.8 Correspondence replies did not always contain the information required to categorise them in such a way, and are therefore not included in the above figures.
- 1.9 All responses to this public consultation have been recorded and analysed. As well as considering the full written response to questions, we have drawn out the common themes that emerged from these responses in order to obtain an indication of the most frequently expressed points of view. This document includes a summary of the responses received based on this analysis.
- 1.10 Each of the proposals in the above key areas stated in paragraph 1.2 were under consultation and are considered within this document. For each proposal, the Government's response is given, and information set out regarding the next steps. A more detailed summary of responses received for each proposal then follows.
- 1.11 The Government is grateful for the thoughtful responses received and values all the views expressed.
- 1.12 In the context of the consultation, the Government laid out that the word 'drone' is another term for unmanned aircraft. The ANO 2016 defines "small unmanned aircraft", also referred to as "SUA", as "any unmanned aircraft, other than a balloon or a kite, having a mass of not more than 20kg without its fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of its flight." This response uses the terms small drone and SUA interchangeably.
- 1.13 Regarding drone flight near airports, the ANO 2016 refers to 'protected aerodromes'. Protected aerodromes are airports at which the regulation applies. A list of protected aerodromes can be found at:
- http://www.nats-uk.ead-it.com/public/index.php%3Foption=com_content&task=blogcategory&id=6&Itemid=13.html.

Government action to date

1.14 The response to this consultation builds on the action the Government has taken to date to ensure responsible drone use. Below follows a summary of Government's action and current rules. Future action is laid out in the relevant Government Response sections following. An explanation of abbreviations and definitions can be found in Annex A at the end of this document, whilst a full summary of current regulations can be found in Annex B.

Summary of existing laws relating to drones

1.15 General aviation safety rules laid out in the ANO apply to drones:

- A person must not recklessly or negligently act in a manner likely to endanger an aircraft, or any person in an aircraft; and
- A person must not cause or permit an aircraft to endanger person or property.
- These offences can lead to a 5 year prison sentence, an unlimited fine, or both.

1.16 Under the Aviation and Maritime Security Act (1990), intentional use of a device to commit an act of violence at an international airport which causes or is likely to cause death, serious personal injury and endanger safe operations could result in a penalty of life imprisonment.

1.17 It is also a requirement that small drone pilots maintain direct, unaided visual contact with their drone to ensure the above. Breaking this law could lead to a fine of £2,500.

1.18 If the small drone is equipped with a camera:

- It must not be flown within 50m of persons or buildings; and
- It must also not be flown within 150m of densely populated areas.

1.19 The small drone pilot must not allow any article or animal to be dropped from the drone as to endanger persons or property.

Height and Aerodromes Restrictions, Registration and Competency Tests

1.20 All drones are restricted from flying above 400 feet and within 1 kilometre of airport boundaries. These requirements came into force on 30 July 2018. These offences can lead to a fine of £2,500.

1.21 Owners of drones weighing 250 grams or more will be required to register with the Civil Aviation Authority (CAA), and drone pilots will be required to take an online safety test. These requirements will come into force on 30 November 2019. Failure to comply with these rules can lead to a fine of £1,000.

Product standards

- 1.22 The Department for Transport is committed to working with the Home Office and the Department for Business, Energy & Industrial Strategy to consider product standards for drones.
- 1.23 The European Aviation Safety Agency (EASA) are also in the process of drafting new drone product standards, the current draft of which contains standards such as geo-fencing as a requirement.
- 1.24 At an international level, the International Organization for Standardization is currently developing standards for drone safety and operation in which the British Standards Institution (BSI) committee members represent the UK.

Electronic conspicuity

- 1.25 Aircraft equipped with electronic conspicuity equipment can actively signal their presence to other airspace users. Such devices also receive signals which can alert the pilot to other aircraft in the vicinity thus enabling the pilot see that aircraft and take action to avoid it.
- 1.26 In December 2018, the Department for Transport published “Aviation 2050 — the future of UK aviation” consultation which proposed that there should be mandatory identification of all aircraft in UK airspace. Government will work with the CAA and other stakeholders (including international partners) on the best way to achieve this, taking into consideration the EU’s product standard requirement, expected to come into force in 2022, which will require all new drones coming onto the market to be electronically conspicuous.

Geo-fencing

- 1.27 While a large proportion of commercially available drones already include geo-fencing capabilities (software and data contained in the drone that can restrict it from flying in certain areas, such as airports), the Government is engaging directly with drone manufacturers and industry on how these capabilities may be improved. We are working with NATS and the CAA to ensure that robust data on airspace restrictions, such as those around airports and other critical national sites, will be available in a format that manufacturers and technology developers can easily use, in order to improve safety and help drone users fly in accordance with the rules.

2. Government Response to Section A - Foundation of future flights: The Air Navigation (Amendment) Order 2018

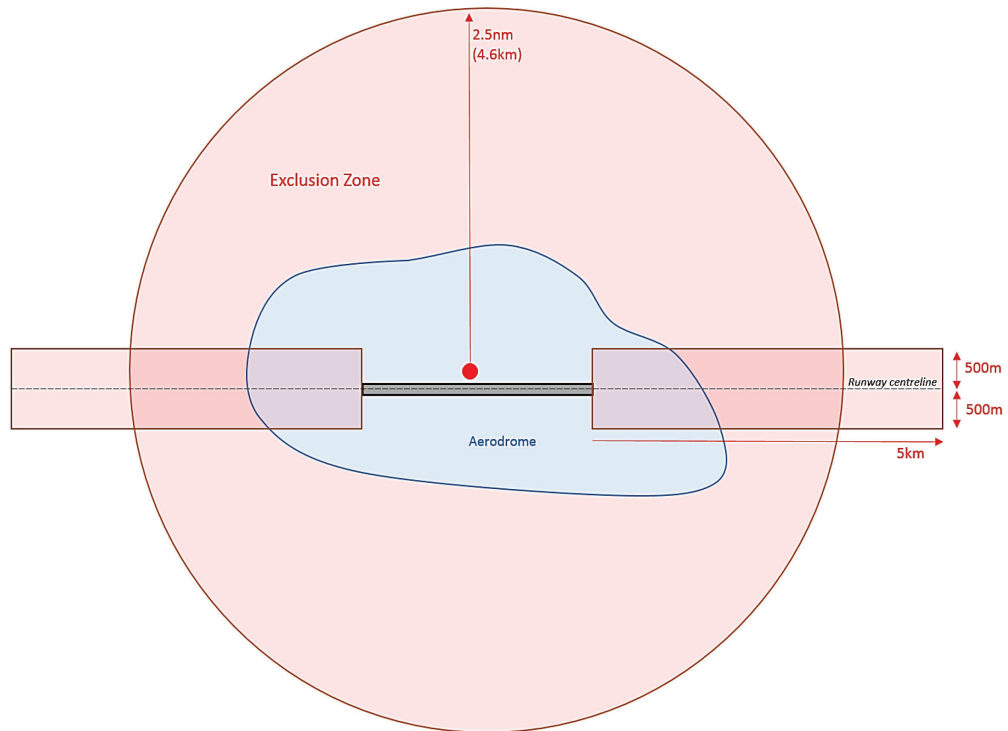
Restrictions on small drone flights near aerodromes

- 2.1 Safety is of paramount importance and continues to be the guiding principle of any decisions made regarding restrictions on drone flight near aerodromes. The Government continually reviews safety evidence to ensure that its policy is effective.
- 2.2 Prior to the consultation publication, the Department for Transport introduced in the ANO 2016, a restriction on flights by drones to protect aerodromes.

The amendment restricts drones of <7kg from flying within 1km of a protected aerodrome boundary as well as within the aerodrome unless permission is obtained from the air traffic control. Drones are also restricted from flying above 400ft across the UK. This came into force on the 30th July 2018. The amendment was introduced as an interim measure whilst further evidence was gathered.

Drones of >7kg are currently restricted from flying within the Aerodrome Traffic Zone (ATZ) of an aerodrome. The ATZ is a 2.5nm (4.6km) radius circle centred at an Aerodrome Reference Point (ARP). The ARP is the geographical location of the aerodrome and the centre of its traffic zone where an ATZ is established.

- 2.3 In general, consultation responses welcomed the introduction of the 1km restriction as an interim measure in order to better protect small drones and aircraft from coming within unsafe proximity of each other.
- 2.4 There was, however, strong consensus from airports and airlines that the current 1km restriction does not extend far enough to fully ensure that manned aircraft do not come within close proximity to a drone if the drone is flying at the maximum 400ft. This was highlighted as a concern particularly along landing and take-off paths.
- 2.5 As such, the Government is taking action to amend the current restriction zone. The new restriction zone will include rectangular extensions from the end of runways measuring 5km long by 1km wide to better protect take-off and landing paths. In addition, all drones will be required to ask permission from the airport's Air Traffic Control to fly within the ATZ (see paragraph 2.2). The overall restriction zone is displayed in the diagram overleaf. The new zone will apply to all small drones weighing more than 250g.



- 2.6 Drone fliers will continue to be able to apply for permission from air traffic control to fly within this zone, if for example, a commercial drone operator wishes to inspect a building.
- 2.7 This shape has been chosen to better ensure the safety and security of aircraft. The ATZ circular zone will protect all aircraft at their lowest altitudes, including helicopters which may approach from any direction, and other aircraft in low circling patterns. Moreover, the extensions from the end of runways will provide extra protection for aircraft along landing and take-off paths.
- 2.8 The Government will look to bring this amendment to the ANO 2016 in as soon as possible.
- 2.9 The Department for Transport will still be instructing the CAA to review the effectiveness of aerodrome restriction measures during the next year. The consultation asked respondents what they thought this review should cover. From this, the Department for Transport has concluded that, while the exact nature of the questions may evolve, themes which the review should cover include:
- What the minimal acceptable vertical separation between a drone and an aircraft should be;
 - How the surrounding geography around specific airports could impact on both the current 1km restriction and the extended restriction zone;
 - Areas where drones are likely to be used (such as public parks) which are near aerodromes, and could be issued with a permanent exemption;
 - Whether additional aerodromes should be added to the list of protected aerodromes;
 - Whether the restriction has had any impact on the number of drone sighting and Airprox reports (see Annex A) near aerodromes; and

- The number of permission requests generated to Air Traffic Controls, and what percentage were accepted or rejected.

Minimum Age requirements

2.10 Role definitions of the operator and remote pilot, as found in the ANO 2016 are currently as follows:

2.11 **Operator:** person or organisation who has management of the small drone but may not be directly controlling the flight. There is no requirement for the operator to be present during the small drone flight but their responsibilities are listed here:

- The operator must not permit their small drone to be flown at a height of more than 400ft above the surface, unless the permission of the CAA has been obtained;
- The operator must not permit their small drone to be flown within 1km of a protected aerodrome unless the required permissions have been obtained;
- As of 30th November 2019, the small drone operator must not permit their small drone to be flown unless the remote pilot of the aircraft has been issued with an acknowledgement of competency which is valid for that flight. To obtain the acknowledgement of competency, remote pilots will have to pass an online test;
- As of 30th November 2019, the operator of a drone between 250g-20kg in mass will be required to register themselves before permitting any of their small drones to be flown.

2.12 **Remote pilot:** person who operates the flight of the small drone by manual use of the controls, or when the small drone is flying automatically, monitors its course and is able to intervene and change its course by adjusting its flight controls. The remote pilot's responsibilities are listed here:

- The remote pilot of a small drone may only fly the aircraft if reasonably satisfied that the flight can safely be made;
- The small drone remote pilot will be responsible for ensuring they are adhering to all other relevant articles of the ANO 2016, such as restrictions on height limits which drones can fly up to, ensuring the drone is kept within visual line of sight, and avoiding any restricted airspace (such as near airports or sensitive sites);
- From 30th November 2019, before flying a drone of 250g-20kg in mass, the remote pilot will be required to obtain a valid acknowledgement of competency from the CAA. To obtain the acknowledgement of competency, remote pilots will have to pass an online test;
- As of 30th November 2019, before flying a drone of between 250g-20kg in mass, the remote pilot must ensure the small drone operator's registration number is affixed onto the drone and that the operator has a valid certificate of registration.

- 2.13 In the consultation, the Government proposed that the age of 18 be set as the minimum age at which a person may register as an SUA operator.
- 2.14 The consultation responses highlighted that the role and responsibilities of a SUA operator versus the role and responsibilities of an SUA remote pilot need better communication and clarification.
- 2.15 The difference between the operator and remote pilot roles associated with drone flight was often misinterpreted. Many responses had not appreciated that, if the Government implemented an age restriction for the operator role, those under that age would still be able to fly a drone as a remote pilot. Drones are flown by a wide range of people, including minors. Age is not necessarily an indicator of competence and the Government does not want to restrict minors from piloting drones, particularly as early use of technology can build vital skills for later life, as well as introducing young people to careers in Science, Technology, Engineering and Mathematics (STEM) fields.
- 2.16 The Government is keen to better communicate this distinction and will consider how to do this more effectively in communications going forward.
- 2.17 Given the descriptions of the roles, the Government proposed an age restriction for the operator role to reflect the additional legal responsibilities. The Government did not propose an age restriction for remote pilots, meaning people of any age would be permitted to fly a drone and access the benefits this affords them.
- 2.18 This position was largely supported in the responses to the consultation. Regardless of the widespread definition misinterpretation, many respondents echoed the Government's view that early learning and skill transfer are very important and thus people of all ages should have access to leisure drone flying. Many also recognised that by implementing a minimum age for an SUA operator, regulations are more likely to be understood and adhered to. Respondents felt this would lead to a culture of responsibility and increased trust associated with drone operations.
- 2.19 Since the Government consultation closed, there have been some developments at the European level which have the potential to affect UK legislation. Previously, the European Aviation Safety Agency ('EASA') ruled out setting minimum age requirements for remote pilots. However, the latest draft of proposed EU regulations contain a minimum age requirement of 16 or 18 years, depending on the type or class of drone, for the vast majority of remote pilots. These regulations propose that Member States will have some discretion to lower these ages to a minimum of 14 years in some scenarios. EASA has so far proposed no minimum age for an SUA operator, but it seems inconsistent to propose a minimum age for remote pilots but not SUA operators, given the added responsibility operators carry.
- 2.20 As previously outlined, the Government does not support the introduction of a remote pilot minimum age due to the positive early learning benefits, particularly through the introduction of STEM related skills, that the experience of piloting a drone can provide a young person. Therefore, the Government is currently engaging with EASA to better understand the justification behind such a proposal and to lay out our objections.
- 2.21 The Government still supports a minimum operator age, but will defer a decision until there is clarification and confirmation from EASA regarding future legislation at the

European level¹ with regards minimum ages for drone operators and remote pilots. Any minimum age requirements will need to be factored into the IT systems used to register drone operators and allow online testing of remote pilots. The Government will be looking for resolution on this issue from EASA imminently.

Model Aircraft Flying Associations

- 2.22 Many model aircraft fliers, through their responses to the consultation, have communicated dissatisfaction that in regulation, model aircraft fall under the umbrella SUA term.
- 2.23 The Government recognises the long-standing safety and education cultures which model aircraft flying associations promote and has therefore been examining ways in which the impacts of regulation can be minimised.
- 2.24 Whilst we are keen to minimise the legislative impacts on model aircraft fliers, there are, nevertheless, risks which must continue to be managed.
- 2.25 Model aircraft associations, however, display best practice in the management of these risks in order to maintain an excellent safety record. Associations take measures including membership registration, bespoke knowledge and competency courses and the requirement of mandatory insurance. They also promote strong cultures of safety and education.
- 2.26 In the responses to the consultation, many respondents agreed with the Government's position that in order to be included in possible exemptions from regulation, model aircraft fliers should be a member of a CAA recognised association. Individuals who are not members cannot provide assurance of the safety measures outlined above being implemented or followed, and can therefore not benefit from any exemptions given to members of model aircraft flying associations.
- 2.27 The Government has therefore taken action, in conjunction with the CAA, to provide members of model aircraft clubs with some exemptions to current regulations.
- 2.28 Since the consultation was published, the following permissions have been granted by the CAA.
- Members of:
 - The Society of Model Aeronautical Engineers trading as the British Model Flying Association (BMFA);
 - The Scottish Aeromodellers Association (SAA);
 - The Large Model Association (LMA); and
 - FPV UK
- may operate a small unmanned aircraft of a weight below 7kg in excess of 400 feet above the surface, subject to the conditions laid out by the CAA which can be found at:

¹ On 23 June 2016, the EU referendum took place and the people of the United Kingdom voted to leave the European Union. Until exit negotiations are concluded, the UK remains a full member of the European Union and all the rights and obligations of EU membership remain in force. During this period the Government will continue to negotiate, implement and apply EU legislation. The outcome of these negotiations will determine what arrangements apply in relation to EU legislation in future once the UK has left the EU.

https://bmfa.org/DesktopModules/Bring2mind/DMX/Download.aspx?Command=Core_Download&EntryId=2643&language=en-GB&PortalId=0&TabId=1506.

- Members of the above list of associations are exempt from the requirement to ensure that direct unaided visual contact is maintained with the aircraft provided the SUA does not exceed 3.5kg, at heights lower than 1000ft and that first person view is maintained. A full list of additional conditions can be found at https://bmfa.org/DesktopModules/Bring2mind/DMX/Download.aspx?Command=Core_Download&EntryId=2644&language=en-GB&PortalId=0&TabId=1506.

2.29 The Government will continue working with model aircraft associations to discuss the possibility of future exemptions. We are keen to minimise, if possible, the burden on those members of model aircraft associations who are already registered through a club and have already passed certain competency tests. However, this must be achieved without imposing undue burden on the state and the taxpayer, whilst also being efficient and enforceable, without compromising the integrity of the policy. A blanket exemption from registration and competency tests, as suggested in many of the consultation responses submitted by model fliers, will not meet these criteria.

2.30 These criteria and possible solutions that meet them will be subject to further discussion between the model aircraft flying associations and the Department for Transport. A decision will be required before the final development and implementation of the operator registration and remote pilot competency testing IT systems, which are set to go live on 1st October 2019 and become a legal requirement on 30th November 2019.

3. Government Response to Section B - A Draft Drones Bill

Police powers

- 3.1 The Government proposed specific new powers to enable the police to better enforce drone misuse and clamp down on malicious behaviour, following feedback in our previous consultation that the police were lacking sufficient powers. These powers are particularly crucial, given that the majority of Airprox incidents are as a result of drone fliers breaking current laws.
- 3.2 The Government proposed to give police across the UK the power to:
- Require the production of evidence in specific circumstances for:
 - drone operator registration,
 - remote pilot acknowledgement of competency,
 - the use of a mandated and/or regulated FINS by the remote pilot and/or drone operator, should the decision be taken to mandate their use, and
 - other requirements for specific flights, such as permission for commercial drone use or exemptions from the CAA from any ANO 2016 articles;
 - Obtain information such as the names and addresses of the registered drone operator and/or remote pilot believed to be in charge of the drone in specific circumstances (such as where there is a reasonable suspicion of the commission of an offence);
 - If the identity of the drone operator is not provided, the power to obtain the name and address of the person who made the drone available for use by the remote pilot should be given to the police;
 - Require a remote pilot to land a drone in specific circumstances;
 - Enter and/or search premises, with a warrant, where there is reasonable suspicion that there is a drone and/or its associated components which the police reasonably suspects of having been involved in the commission of an offence;
 - Seize and retain a drone and/or its associated components which the police reasonably believes of having been involved in the commission of an offence on entering and/or searching premises;
 - Access information stored electronically on a seized drone and/or its associated components which a constable reasonably suspects:
 - is evidence in relation to an offence, or
 - has been obtained as a result of the commission of an offence, and

- it is necessary to do so in order to prevent it being concealed, lost, tampered with or destroyed;
 - Require any information stored in electronic form on a drone to be produced in a visible and legible form. The power can only be exercised if the police has reasonable grounds for believing that:
 - it is evidence in relation to an offence, or
 - it has been obtained as a result of the commission of an offence, and
 - it is necessary to do so in order to prevent it being concealed, lost, tampered with or destroyed.
- 3.3 The Government also proposed to allow drone users, such as drone operators and/or remote pilots a seven day grace period within which to produce the required evidence at a police station. This process is similar to that of certain road traffic offences as contained in the Road Traffic Act 1988.
- 3.4 Most responses to this part of the consultation showed strong support for new police powers specific to drone misuse, as they felt it would improve enforcement and act as a more significant deterrent to anyone thinking of using a drone illegally. However, alongside this, many also voiced concerns that police powers alone would not solve the issue, and more education and communication of the regulations was necessary. Some also questioned whether the police had enough resource to carry out enforcement, and others suggested that the police needed more knowledge and training on drone use and the laws that apply.
- 3.5 There were some respondents who were against the introduction of any new specific police powers, stating that such powers were disproportionate to the risks posed by drones. Some of these respondents were also worried about police potentially abusing their powers, especially where broad terms or definitions were being used, which could be flexibly interpreted. For example, in the Government's proposal, the police would have a power to ground a drone, if they believed that it would protect people from harassment, alarm or distress. Several respondents made the suggestion that a warrant should be required for some of the other significant powers, similar to other search and entry powers.
- 3.6 Several of the proposed police powers required evidence, such as a certificate of registration to be submitted to the police when requested, within a seven day grace period, just as with driving licences. In general, there was support for these powers and agreement that they were proportionate. However, many made the suggestion that digital solutions should be investigated to allow real-time enforcement, rather than cause inconvenience for the police and the drone user involved.
- 3.7 The Government has carefully considered the feedback received on its proposed new police powers and as a result will:
- Continue to work with the police and CAA to improve the police's awareness and knowledge of drones and the laws that apply, and update guidance on best practice where necessary;
 - Ensure the needs of the police and drone users are taken into account when designing and building the drone operator registration and remote pilot online testing databases and software, to help immediate and effective enforcement take place and ensure ease of use for all;
 - Look to restrict the power to land a drone to established offences only, rather than the broader terms used in the consultation document;

- Further explore how to land a drone safely following a request from the police to do so, and whether the remote pilot should be able to use the reason of safety as a defence if they refuse to cooperate with the request; and
- No longer pursue police powers specifically attached to this FINS policy at this time.
- In order to address the general concerns around proportionate use of these powers, the Government will also restrict the more significant powers being proposed, such as search and entry powers, to specified summary² aviation law offences in the Air Navigation Order and offences in the Bill only. They will therefore not apply to the broader general 'misuse of drones' term used in the consultation.
- The Government would also like to reassure respondents that the powers being proposed are not unique to drone offences. For indictable offences, the police already have the powers being proposed, such as search and entry and seizure. The Government's intention with these proposals is to effectively duplicate these powers for specified 'summary' drone offences and offences in the Bill. This is to enable the police to more effectively tackle the increasing incidents where drone users are committing these particular aviation offences.
- Finally, the Government had already proposed that the search and entry powers would require a warrant before they can be used. Following consultation feedback, the new proposed power to access electronic information on a drone will only apply to unmanned aircraft seized in accordance with its proposed search and entry powers. In practice, this power in the Bill will only be used subsequent to successful application for a warrant. The usual process for obtaining a warrant, by applying to a justice of the peace or Magistrate's Court will therefore more substantially safeguard against any abuse of powers. For indictable offences, the police are also required to obtain a warrant for these kinds of powers.

New Police Powers Government is taking forward

3.8 The police will be given the powers outlined below.

- Require the production of evidence in specific circumstances for:
 - drone operator registration,
 - remote pilot acknowledgement of competency, and
 - other requirements for specific flights, such as permission for commercial drone use or exemptions from the CAA from any ANO 2016 articles;
- Obtain information such as the names and addresses of the registered drone operator and/or remote pilot believed to be in charge of the drone in specific circumstances (such as where there is a reasonable suspicion of the commission of an offence).

² Summary offences can generally only be tried in a Magistrate's Court, where the sentences are typically lower. For example, the maximum imprisonment a Magistrate's Court can sentence someone to is 6 months. Indictable offences are tried in the Crown Court, and the police possess greater powers to investigate and prevent indictable offences, such as powers to 'enter and search' premises.

- If the identity of the drone operator is not provided, the power to obtain the name and address of the person who made the drone available for use by the remote pilot should be given to the police;
- Require a remote pilot to land a drone in specific established offence circumstances;
- Enter and/or search premises, with a warrant, where there is reasonable suspicion that there is a drone and/or its associated components which the police reasonably suspects of having been involved in the commission of an offence;
- Seize and retain a drone and/or its associated components which the police reasonably believe has been involved in the commission of an offence on entering and/or searching premises;
- Access information stored electronically on a seized drone and/or its associated components which a constable reasonably suspects:
 - is evidence in relation to an offence, or
 - has been obtained as a result of the commission of an offence, and
 - it is necessary to do so in order to prevent it being concealed, lost, tampered with or destroyed.
- Require any information stored in electronic form on a drone to be produced in a visible and legible form. The power can only be exercised if the police has reasonable grounds for believing that:
 - it is evidence in relation to an offence, or
 - it has been obtained as a result of the commission of an offence, and
 - it is necessary to do so in order to prevent it being concealed, lost, tampered with or destroyed.

Fixed penalty notices (FPNs)

3.9 The Government proposed to give the police the power to issue a Fixed Penalty Notice (FPN) for less serious drone-related offences as a way to immediately and effectively enforce as a deterrent to offenders and to reduce pressure on Magistrates' Courts.

3.10 The Government proposed to attach FPNs to the following offences:

- Not producing registration documentation, and/or proof of registration for drones between 250g and up to and including 20kg in mass, at the request of a police constable;
- Not producing evidence that a flight plan was submitted before flying, or that an appropriate FINS is being used, should the decision be taken to mandate the use of FINS;

- Not producing evidence of any other relevant permissions required by legislation, for example if you are a commercial drone operator or have an exemption from the CAA from an ANO 2016 article;
 - Not complying with a police officer when instructed to land a drone;
 - Flying a drone without a valid acknowledgement of competency, or failure to provide evidence of meeting this competency requirement when requested.
- 3.11 Other offences under the ANO, such as flying a small drone (SUA) with a camera or other data collection device within 50m of people, vehicles or buildings. An FPN would only be issued when certain conditions have been met, where a constable believes that the offender did not, and did not intend to:
- endanger any other aircraft (whether or not an unmanned aircraft);
 - cause any persons harm, harassment, alarm or distress;
 - cause any persons occupying any premises nuisance or annoyance relating to their occupation of the premises;
 - undermine security or good order in prisons or in other institutions where persons are lawfully detained;
 - disturb public order; or
 - damage property (including land or buildings).
- 3.12 If the police believe the offender did intend to, or did cause, any of the above, then the Government proposed that an FPN should not be used, as it would not appropriately reflect the potential harm any of the above could cause.
- 3.13 A large proportion of respondents to the consultation were supportive of FPNs being used as an alternative to prosecution for certain drone-related offences. Those who disagreed sometimes gave the reason that other measures should be considered instead. Examples of these included education, or 'first warning' or 'multiple strike' systems (the points used on driving licences was given as one example of the latter). When questioned about the specifics of the process, in particular the seven day grace period, respondents made similar suggestions to those in the police powers section - in particular that the process should be made as digital as possible, to the benefit of both the police and drone users. Finally, when it came to the question as to the level of the fine, the majority of respondents did not agree that the FPN penalties should be between £100-£300; nor should the power to issue FPNs be given to anyone other than police constables.
- 3.14 As a result of this feedback, the Government has taken the decision to proceed with the FPN as proposed in the consultation document, but with some key changes:
- As per the above, the proposals to attach FPNs to any policy relating to FINS will now no longer be pursued, given that FINS policy will not be part of the Bill;
 - The Government will work with the police to pull together guidance for the police on how to appropriately use FPNs for effective enforcement, and explore the options for police constable discretion, including using warnings first;
 - As with the police powers, the Department for Transport will look to pursue digital solutions wherever possible to aid the police in enforcing policies such as registration and online testing requirements; and

- The Government will ensure a restraint is put in the Bill that restricts the maximum amount FPNs can be, and will ensure that FPNs stay below £100 until such time as an increase is proposed, subject to a review of how effective the penalties below £100 have been.

FPN offences being taken forward

3.15 FPNs will be attached to the below offences:

- Not producing registration documentation, and/or proof of registration for drones between 250g and up to and including 20kg in mass, at the request of a police constable;
- Not producing evidence of any other relevant permissions required by legislation, for example if you are a commercial drone operator or have an exemption from the CAA from an ANO 2016 article;
- Not complying with a police officer when instructed to land a drone; and
- Flying a drone without a valid acknowledgement of competency, or failure to provide evidence of meeting this competency requirement when requested.

3.16 Other offences under the ANO, such as flying a small drone (SUA) with a camera or other data collection device within 50m of people, vehicles or buildings may also be subject to a FPN but only under certain conditions. An FPN may be issued where a constable believes that the offender did not, and did not intend to:

- endanger any other aircraft (whether or not an unmanned aircraft);
- cause any persons harm, harassment, alarm or distress;
- cause any persons occupying any premises nuisance or annoyance relating to their occupation of the premises;
- undermine security or good order in prisons or in other institutions where persons are lawfully detained;
- disturb public order; or
- damage property (including land or buildings).

Flight Information Notification Systems (FINS)

3.17 The Government proposed mandating the use of a Flight Information and Notification System(s) (FINS(s)) for drone users. The ambition of this policy was to provide digital, interactive and real time information to improve the safety, security and accountability of drone use. This would be achieved by using an ‘app’, or other computer system, to display air space use and restrictions and real-time traffic information, as well as the ability to notify other airspace users or controllers, such as pilots of commercial aircraft.

- 3.18 It was suggested the FINS(s) would be used for three broad functions:
- To obtain real time local airspace information and local traffic or weather conditions;
 - To check the surrounding airspace is suitable and to observe local flight restrictions;
 - To create a notification that a drone is going to be flown at a particular location at a given time.
- 3.19 Consultation responses generally showed resistance to the implementation of a FINS(s), and specifically, the requirement to file a pre-flight notification. There were a range of concerns, including that these new measures would be too restrictive on drone users, limiting spontaneous flight and drone operations when phone signal cannot be accessed. Many believed the current regulations are adequate to manage the safe operation of drones, and the FINS(s) posed practical difficulties such as making sure people actually use the system.
- 3.20 Although there was a common theme throughout responses that the FINS(s) may improve flight safety and accountability, it was believed by many not to be a safety-critical system. Many respondents believed that current drone information 'apps' already sufficiently support drone use, and that any future regulations should look to avoid placing too much of a financial burden on drone users, which might hinder the sector and reduce compliance.
- 3.21 Alongside this, it is also crucial to ensure there is an internationally harmonised framework to ensure safety and security and also help businesses unlock the potential of multiple markets with ease and efficiency. Currently, future international strategies regarding FINS are still being developed, and there are ongoing discussions as to whether the use of apps is the correct long-term solution, given the technology is moving increasingly quickly and the potential for new innovations to emerge. It is therefore currently difficult to determine whether our potential proposed regulation would align with wider international strategies and standards.
- 3.22 Having considered this, the Government has decided not to mandate the use of a FINS at this time, but will nevertheless continue to develop the policy as part of wider aviation strategies, including as part of an unmanned traffic management (UTM) system. Not implementing a requirement to use a FINS at this time will allow for a more cohesive approach to airspace management which recognises all those using our airspace, not just drones. Based on future developments we will continue to assess the need for this policy, which will be largely dependent on future options and timescales for unlocking unmanned traffic management.
- 3.23 While this policy is being reviewed, the Government will continue to work closely with the CAA to educate drone users, which is crucial to improve safety. This will be achieved by promoting the use of current drone information 'apps' and developing best practice guidelines, to help encourage their use and improve consistency of data. We will engage with industry leaders in order to achieve this, which will feed into shaping future policy in this area.

4. Government Response to Section C - The Future: Counter-drone technology and modelling the uptake of drones

Counter-drone technology

- 4.1 The Government consulted on possible frameworks for the testing and use of counter-drone technology that detects and/or 'effects' drones in the UK and technology that could be used to protect sensitive national infrastructure from possible malicious drone incursions in the future.
- 4.2 The consultation proposed operational procedures and safeguards that could be applicable for the use of drone detection technology, how to assess the security threat in a live situation, the use of drone effector technology and the testing of both detection and effector technology.
- 4.3 There was a dominant view throughout, that the operational purposes identified for the use and testing of these types of technology, as well as the proposed methods for responding in a live security situation were largely appropriate. Several respondents recommended that the use of such technology could also be considered to 'protect other airspace users'.
- 4.4 However, respondents were understandably concerned that this kind of technology could be misused and agreed that safeguards were required and that they needed to be specific, and not vaguely worded. Suggestions for additional safeguards that could be considered included limiting geographical areas or types of national infrastructure this kind of technology could be used to protect, or limiting who was able to use this technology.
- 4.5 Respondents also highlighted that the impact of counter-drone technology on legitimate drone use should be considered, and supported proposals for clear communication for the use of such technology.
- 4.6 The feedback this consultation has collected supports the Government's view that action in this area is required, but that there are significant sensitivities and complexities in setting standards for and authorising use of this technology in the UK.
- 4.7 Making sure that equipment to appropriately counter unlawful drone use can be safely tested and evaluated within a legal framework is a priority for the Government.
- 4.8 The Home Office will therefore expedite detailed policy work to develop an appropriate means of achieving this.

Commercial drone scenario modelling

4.9 In this section, the Department for Transport was seeking feedback on some Government produced scenarios of future drone use and estimations of the possible numbers of commercial operators and drones. These scenarios and numbers were used to inform the impact assessment accompanying the consultation. The charts below show these possible scenarios.



Chart 1. Scenarios for the number of commercial operators based on assumptions outlined in the consultation.

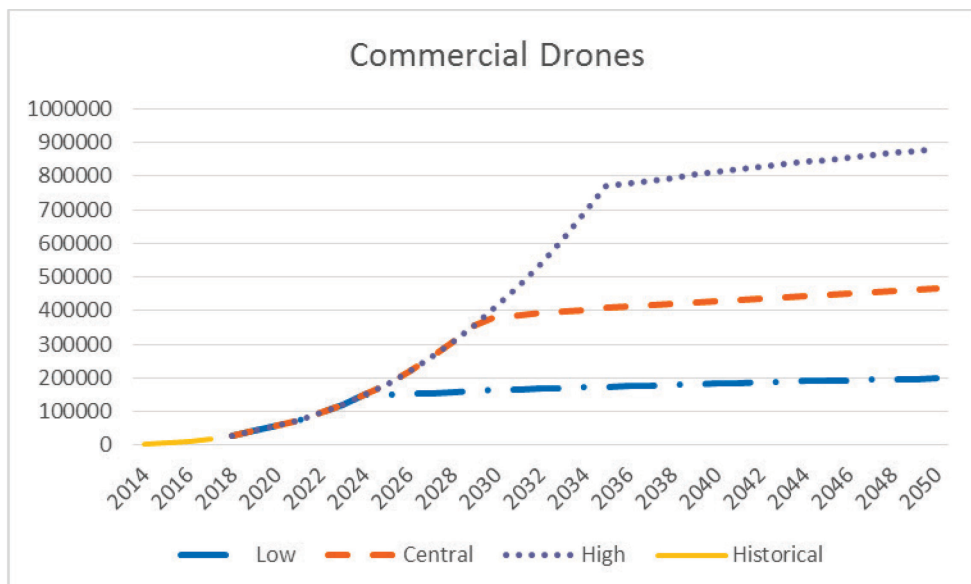


Chart 2. Scenarios for the number of commercial drones based on assumptions outlined in the consultation.

4.10 The scenarios give an idea of the possible extent of drone use if historical trends in commercial operator permissions continue. These scenarios are under development by analysts in the Department for Transport and are based on a significant number of assumptions. They should therefore not be interpreted as expectations or targets.

- 4.11 Respondents were asked to provide their views on these scenarios. Respondents, dominantly leisure users, felt the Department's estimated numbers for commercial drones and commercial drone operators were overestimated due to a variety of factors such as market saturation occurring more quickly than expected. However, some leisure users also felt the numbers were realistic, due to the potential growth of the industry. Respondents were asked to rate a number of assumptions outlined in the consultation. For example, growth of commercial drone users will continue according to the quadratic trend that best fits historical data. However, respondents consistently felt that they could not accurately rate the assumptions outlined in the consultation.
- 4.12 Respondents were also asked to provide estimates on how many drones they expect to operate in the short and long term. These responses suggested that there would be an increase in the number of drones operated by both individuals and organisations, in the next few years. However, it was not possible to identify from the responses any possible trend in this area beyond the next few years. These estimates will feed into scenario development to improve our understanding of future drone use.
- 4.13 Respondents also provided estimates on what they expected the average number of drones per commercial user to be now and in the future. These estimates suggested there will be an increase in the average number of drones per commercial user in the next few years after which numbers are suggested to stabilise in the long term. In regards to non-commercial users, there was a degree of variation in the responses.
- 4.14 The Department for Transport's analysts will use these responses to update the assumptions they used to estimate the scenarios outlined above, and refine these. We will also continue to collect further evidence to develop the scenarios over time. This will allow the Government to fine-tune its understanding of the future growth in drone use in the UK.

5. Detailed Summary of Responses from Section A - Foundation of future flights: The Air Navigation (Amendment) Order 2018

Minimum Age requirements

- 5.1 In the consultation, the Government proposed that the age of 18 be set as the minimum age at which a person may register as an SUA operator.
- 5.2 As outlined in the Government Response sections, respondents often misinterpreted the difference between the operator and remote pilot. Many responses had not appreciated that if the Government implemented an age restriction for the operator role, those under that age would still be able to fly a drone as a remote pilot. The Government is keen to better communicate this distinction and will be working with the CAA to achieve this. As a reference, the role definitions, taken from the ANO 2016, can be found below. A full list of each role's responsibilities can be found in the Government Response sections.
- 5.3 **Operator:** person or organisation who has management of the SUA but may not be directly controlling the flight.
- 5.4 **Remote pilot:** individual who operates the flight of the SUA by manual use of remote controls, or when the SUA is flying automatically, monitors its course and is able to intervene and change its course by operating its flight controls.

Question 1: Do you see any advantages to the introduction of a minimum age for SUA (small drone) operators?

If yes, what advantages?

- 5.5 Many respondents recognised that there are advantages associated with the introduction of an SUA operator age. Many felt that operators above a certain age would have a greater level of maturity and take a more responsible approach to drone operations.
- 5.6 Responses frequently outlined that a minimum age restriction would lead to greater understanding and adherence to regulation, resulting in fewer incidents and improving safety. Some responses also highlighted that access to public liability insurance is easier to obtain above certain ages.

- 5.7 Another benefit emphasised in some answers was that the public image of SUA flying would be improved through increased responsible drone operations.

Question 2: Do you see any disadvantages to the introduction of a minimum age for SUA (small drone) operators?

If yes, what disadvantages?

- 5.8 It was clear that some respondents felt that there are both advantages and disadvantages to the introduction of a minimum age.
- 5.9 As previously stated, many respondents felt that a key disadvantage of a minimum operator age would be that those of a younger age would be unable to fly an SUA in any circumstance, which is not correct. This clearly demonstrated that many respondents had not appreciated the difference between the operator and remote pilot roles. Many suggested that a supervisor or operator type role (that exists with the dual remote pilot and drone operator roles) to support younger fliers would actually be beneficial to enhance the transfer of skills and the communication of regulations. A few respondents felt that the definitions of the operator and remote pilot roles need clarifying and communicating more widely so that greater understanding of the regulation is achieved.
- 5.10 Some answers highlighted that age is not necessarily a good indicator of responsibility and thus applying a minimum age restricts younger people unfairly from becoming an operator.
- 5.11 There was also some concern that the requirement for an elder operator may discourage younger people from leisure SUA flying. Some responses were also concerned that a minority of younger people may not have access to a suitable or willing operator and thus would be excluded from flying SUAs altogether. Respondents highlighted that this may lead to a drop in young people pursuing an interest or career in aviation or STEM subjects.
- 5.12 Some responses suggested that SUAs should be further categorised with different operator age limits associated with features such as weight or size, fixed wing or multi-rotor or autonomous capabilities. Other responses were concerned with the difficulties of enforcing minimum age regulation.

Question 3: Do you agree with the Government's proposal that a minimum age of 18 should be introduced for SUA (small drone) operators?

If no, why not?

- 5.13 Many respondents disagreed with a minimum of age of 18, feeling that it would be too high. However, as mentioned above, some of these respondents mistakenly thought that a minimum age of 18 would restrict anyone under the age of 18 from piloting a drone.
- 5.14 A recurring theme in many of the responses was that the age required to hold a license for a range of other vehicles is less than 18, and thus 18 seems disproportionately high. However, others recognised that comparisons are not

particularly valuable because the operator and pilot roles do not exist for other types of vehicle.

- 5.15 Many highlighted that age does not necessarily correlate with competency or responsibility. Some felt that a large majority of 16 year olds, for example, could display similar levels of competency.
- 5.16 A number of respondents also felt that a minimum operator age of 18 may discourage younger people from becoming involved with SUA flying, either because they may not have access to a suitable or willing operator or because it may decrease a young person's interest if an adult is required to be associated with the hobby.

Question 4: Do you believe that the introduction of a minimum age of 18 for SUA (small drone) operators will have a positive or negative impact?

Why?

- 5.17 There were a broad range of views displayed in the responses to this question, with some respondents feeling that impacts of a minimum age of 18 for SUA operators could be both positive and negative.
- 5.18 Many respondents identified the positive impacts as being more responsible and mature. Respondents felt that there would be greater understanding and adherence to regulation, which would lead to an increase in safety and security. Answers also recognised that legal accountability and access to insurance would be easier to achieve. Respondents often felt that another positive impact would be that those above the age of 18 would take a more responsible approach to drone operations which would, in turn, reduce the general misuse of drones and lead to increased trust in the SUA sector across the UK. Conversely, a few responses felt that the additional regulation would serve to exaggerate safety risks associated with SUA flying.
- 5.19 Of those who were concerned that a minimum operator age would lead to negative impacts, many felt that such a restriction may discourage younger people from becoming involved in SUA flying if an elder person was required to act as their operator. Some also felt that it could possibly stop young people from starting a business relating to SUAs, whilst others felt it could stifle innovation and economic growth of the sector.
- 5.20 A segment of responses also felt that such a restriction would have little or no impact. Some were concerned that it would not be enforceable, whilst others were concerned that a lack of communication surrounding the regulation would lead to many fliers disobeying the regulation through ignorance. A few respondents also felt that further quantitative analysis of risks is needed before further regulation could be justified.

Restrictions on small drone flights near aerodromes

- 5.21 Many respondents welcomed the current interim 1km restriction zone around protected aerodromes as a first step in providing protection against a collision between an SUA and manned aircraft.

5.22 In general, there were mixed responses regarding possible extensions of the interim zone. Model fliers and other leisure users often voiced concerns that too much restriction may prohibit people from flying an SUA locally. Aerodromes and airlines, however, were concerned that the current interim 1km restriction zone still leaves SUAs and manned aircraft at risk of a mid-air collision and therefore are in favour of extending the current restriction zone.

Question 5: What other areas do you feel the review should cover?

5.23 This question related to a review of restrictions around aerodromes which the CAA will carry out. Many respondents, however, used this question to voice concerns or suggestions surrounding SUA flying more generally.

5.24 In the consultation, suggested questions which the review would cover were proposed as:

- What the minimal acceptable vertical separation between and drone and an aircraft should be;
- How the surrounding geography around specific airports could impact on this restriction;
- Areas where drones are likely to be used (such as public parks) which are near protected aerodromes, and could be issued with a permanent exemption;
- Whether additional aerodromes should be added to the list of protected aerodromes;
- Whether the restriction has had any impact on the number of drone sighting and Airprox reports near aerodromes; and
- The number of permission requests generated, and what percentage were accepted or rejected.

5.25 Of those responses relating to the CAA review, answers covered a wide range of themes.

5.26 Many suggested that a priority should be the better quantification of the risk associated with a mid-air collision between a manned aircraft and an SUA. This theme was split into two areas:

- A better understanding and scrutiny of Airprox reports, as some felt that incidents with drones are being over-reported.
- A better understanding of the impact of a mid-air collision between an aircraft and an SUA.

5.27 Some respondents suggested the standardisation of a permissions system across UK aerodromes. It was felt by some that there is currently a disparity in the number of permissions being accepted or rejected by different aerodromes.

5.28 Another suggestion was to review the possibility of introducing a graded height restriction, whereby SUAs could fly closer to protected aerodromes provided that they maintained a height below a given altitude.

5.29 Other responses suggested the possibility of integrating SUAs into a modernised airspace plan, including the future development and requirement of electronic

conspicuity, to be considered. This was seen as a priority by those who were worried about low-flying planes or gliders.

- 5.30 A number of responses were also concerned with the communication of the current 1km regulation. It was suggested in multiple responses that the CAA should investigate if incidents where the 1km zone is breached are caused deliberately or because of ignorance of the rule. Relating to the communication and enforcement of aerodrome restrictions, there were a number of suggestions. Some responses asked whether the CAA could collaborate with aerodromes to develop a geo-fenced area, as well as promoting the restricted area better on flight information apps. There was also concern by those who do not wish to use apps that the restricted zones need to be better advertised on the ground, through physical 'no fly warning signs', for example.
- 5.31 Of those responses not necessarily addressing the review of the 1km aerodrome restriction, common answers included concern about SUAs flying close to national infrastructure such as hospitals, schools and prisons as well as near large events or crowds. Other themes included the communication of SUA regulation more generally, the ability of local authorities or national bodies to ban SUA flying and the promotion of dedicated SUA or model aircraft flight areas.

Question 6: Do you believe that the 1km restriction zone around a protected aerodrome is sufficient?

- 5.32 The current restriction area comprises a 1km zone from the aerodrome boundary where SUAs may not fly without permission.
- 5.33 The responses showed a mixed reaction about whether the current 1km restriction zone is sufficient.
- 5.34 Leisure and commercial drone users, in particular, tended to think that the current 1km restriction is sufficient. There was, however, consensus between airlines and airports, amongst others, that the current restriction is insufficient to protect aircraft, particularly along landing and take-off paths.
- 5.35 Some leisure drone users felt that increasing restriction zones would overly inhibit areas where drone flying could occur. There were suggestions of a graded height restriction around aerodromes to increase safety whilst allowing drone users to continue to fly their drones up to certain heights.
- 5.36 Many respondents who felt the restriction is insufficient cited that an aircraft landing using an average three degree glide slope would be below the maximum 400ft drone height outside of the current 1km restriction and therefore at risk of a mid-air collision with a drone. Respondents who detailed this analysis included airports, airlines, pilots and other affiliated organisations.
- 5.37 A few respondents highlighted that leisure drone users may experience a false sense of safety and security when abiding by the 1km restriction zone. Some pointed out that abiding by the regulation might mean that fliers pay less attention to their proximity to manned aircraft.

Question 7: Do you feel that a restriction zone of a different shape would be more appropriate?

If no, why not? If yes, state the shape and its dimensions and why.

- 5.38 The current restriction area comprises a 1km zone from the aerodrome boundary where SUAs may not fly without permission.
- 5.39 Of those who thought that the current aerodrome restriction is insufficient, there was strong support for a restriction zone of a different shape.
- 5.40 Many felt that a different shape had the potential to better protect landing and take-off paths whilst not overly restricting the areas to the side of a runway, where planes are unlikely to be flying low to the ground.
- 5.41 Common shapes that were suggested included a rectangle or oval shape, mirroring the orientation of the runway. Another shape which was frequently suggested was an area similar to a Military Airfield Traffic Zone, which comprises a core circle with rectangular extensions over take-off and landing paths. Other shapes which were suggested in order to protect take-off and landing paths included 'bow-tie' or 'egg-timer' shapes.
- 5.42 Some respondents held the view that site-specific factors such as the size of aerodrome, the number of runways, local terrain and the frequency of use should be taken into account, resulting in individual aerodrome assessments and unique area restriction zones.
- 5.43 Those respondents who were in favour of maintaining the same shape, commonly cited reasons such as simplicity, consistency between aerodromes and ease of communication. Responses often reasoned that these factors would increase compliance with the regulation and improve enforcement.

Model Aircraft Flying Associations

Question 8: Do you have any other proposals for solutions to minimise the impacts on safe model aircraft flying we could consider?

- 5.44 Many responses to this question were from model aircraft fliers who expressed their dissatisfaction that model aircraft fall under SUA regulation. Model aircraft fliers and in particular, members of the British Model Flying Association (BMFA), frequently highlighted the safety record and the strict self-regulation which the BMFA operates under. There was a strong feeling that model aircraft fliers should not be subject to the same regulation as drone fliers, particularly within a club environment. Some respondents suggested further categorisation of model aircraft and other SUAs.
- 5.45 Several model fliers proposed that members of associations should not be restricted to flying below 400ft. Some also recognised and welcomed the exemption to this regulation which the CAA provided on 30th July 2018 for members of model aircraft flying associations.
- 5.46 There was general consensus between model fliers that there should be no additional requirement to register as an operator, providing an individual is a member of an existing model flying organisation. There was also concern that the future requirement to register as an operator dictates that an operator number would have to be attached to the model aircraft, disrupting the accuracy of the model.

- 5.47 As many members of model aircraft associations have previously passed, for example, a BMFA qualification, respondents suggested that there should be no additional requirement to complete another online test.
- 5.48 Whilst the majority of respondents agreed that fliers must belong to an association to have access to exemptions, a small number of respondents felt that model fliers should not have to belong to a club due to location restrictions or personal preference.
- 5.49 However, there was also criticism of granting exemptions to model aircraft fliers. Some respondents felt this would be discriminatory against fliers of other SUAs. Some also highlighted that the demographic backgrounds of model aircraft and drone fliers are very different and proceeding with an exemption for one group would result in the social exclusion of specific groups. Some of those respondents who disagreed with possible model aircraft exemptions also highlighted that model aircraft pose the same physical threat to aircraft as other forms of SUA. A few responses argued that multi-rotor drones are safer than model aircraft due to advanced technologies such as 'detect and avoid' and 'fly home' capabilities.
- 5.50 The benefits of joining a club were recognised by both model aircraft fliers and other SUA users. Responses often highlighted the strong safety culture, the transfer of skills and the communication of regulation which occurs in a club environment. Many recommended that the Government promotes expanding both the number of allocated club areas and their use in order to support these values. Some non-model fliers did underline that they feel some clubs have been unwelcoming to SUAs which are not model aircraft and there is a current limitation for them accessing these benefits.

6. Detailed Summary of Responses from Section B - A Draft Drone Bill

Flight Information Notification Systems (FINS)

Question 9: Do current drone information apps provide enough support to ensure the safe and appropriate use of drones?

- 6.1 Many respondents believed that current apps do provide enough support to ensure the safe and appropriate use of drones. Leisure and commercial users in general showed the most support for current drone information apps.
- 6.2 Some of those who believed current apps provide enough support thought they have lots of useful data to aid drone flight, such as airspace restriction information.
- 6.3 Those who did not think current apps provided enough support showed a range of concerns. Some explained current apps are inconsistent in their data, while others said they do not link to manned aviation and are not used widely enough.
- 6.4 There was a common theme that drone apps would be particularly unnecessary at fixed flying locations, for example, at drone club grounds or large events.

Question 10: Do you think there is a need to mandate the use of a FINS(s) for certain types of drone activity?

Question 11: Should the Government explore options to achieve similar policy aims, but without mandating the use of a FINS(s)?

Question 12: Do you agree with the requirement to use a FINS as outlined by the Government?

- 6.5 There was overall disagreement to use a FINS as outlined by the Government, and in general, support for the Government finding alternative ways to achieve its aims. Despite this, some respondents did believe a FINS should be mandated for certain types of drone operations. Those respondents that do not fly drones generally showed more support for implementing a FINS, while leisure and commercial drone pilots showed the least support for the idea.
- 6.6 Many respondents highlighted practical concerns with FINS implementation, saying it was too complex and restrictive for drone users. Some also highlighted the challenges in accessing phone signal in parts of the UK, and the difficulties ensuring compliance with the law. There was a consistent view that current laws regulating

drones are sufficient, and options should be looked into that have less of a regulatory and financial burden.

- 6.7 Those in support of the FINS believed it could be used to improve accountability and safety in some scenarios, including near airports or for certain types of commercial drone use.
- 6.8 There was a common view that any FINS system would need to 'link in' in some way to manned aviation management, in order for the benefits to be fully realised.

Question 13: What do you think should be the maximum mass of a drone for which its user should have to use a FINS(s), if such a requirement were to be introduced?

- 6.9 There was strong support for making 20kg the maximum mass of a drone for which a user should have to use a FINS. There were a number of reasons for this, including that heavier drones are normally used by professionals, and that above 20kg there are additional safety requirements and regulations to adhere to, which provide additional assurance.
- 6.10 Those who thought a heavier maximum weight should be implemented repeatedly explained that this was because heavier drones pose a higher safety risk.
- 6.11 There were also some respondents who believed that all weights of drone should have to use the FINS.

Question 14: Should there be a requirement to file a pre-flight notification on the FINS(s) before flying a drone?

- 6.12 Responses were not in favour of the requirement to file a pre-flight notification on the FINS before flying a drone. Model aircraft users showed the least support for this proposal, while the strongest support came from those who do not fly drones.
- 6.13 The pre-flight notification was highlighted by some as an unnecessary complexity due to difficulties ensuring compliance, getting phone signal, and the view that current regulations are sufficient. Those against the requirement to file a pre-flight notification said it would affect their ability to fly spontaneously, and that it is difficult to forward plan flights due to variability in the weather.
- 6.14 There was a view that a pre-flight notification could be helpful for certain drone operations or in certain locations, such as for commercial use or when flying in restricted airspace. But many believed it should only be used if there was an appropriate safety or security justification.

Question 15: What do you think should be the minimum allowed time, prior to take-off, for filing a pre-flight notification on the FINS(s)?

- 6.15 There was a fairly consistent view that it should be possible to file the pre-flight notification at the point of take-off.
- 6.16 Some respondents believed that longer lead times may reduce compliance with the FINS and be too restrictive for drone users, hindering spontaneous flight. However,

there were also those who suggested the pre-flight notification should allow time for others to appropriately plan and prepare based on the update.

- 6.17 Another common view was that the type of drone operation should dictate when to file a pre-flight notification.

Question 16: What do you think should be the maximum allowed time, prior to take-off, for filing a pre-flight notification on the FINS(s)?

- 6.18 There was substantial support for the option that the system should allow a pre-flight notification to be filed a year or more in advance of flying a drone.
- 6.19 Many responses highlighted that when the notification needs to be filed will depend on the type of drone operation, and suggested that consistent drone use at a particular geographical site should be allowed a semi-permanent notification.
- 6.20 Conversely, some respondents highlighted that plans for drone flights often change, due to the weather and spontaneity of drone operations. This hinders significant forward planning and would make it a challenge to ensure the FINS data remains accurate even when plans have changed.
- 6.21 Other common views were that it is not always possible to get phone signal, and that there would need to be enough time between filing the notification and the flight taking place to allow others to adequately plan and prepare based on the new information.
- 6.22 There was also a strong view from others that the pre-flight notification and FINS itself was not required.

Question 17: It is proposed that drone pilots should not have sole responsibility in relation to the use of a FINS. Do you agree?

- 6.23 Respondents supported the Government's proposal that drone pilots should not have sole responsibility. Drone users showed slightly more support for this policy, than non-drone users.
- 6.24 Although many believed that drone pilots should have responsibility, as they are directly in control, there were concerns they should not be held accountable for the accuracy of information on the FINS, or its availability.

Question 18: Should there be a duty on FINS providers to display accurate information?

Question 19: Should it be an offence for a FINS provider to display inaccurate data to drone users?

- 6.25 There was support from respondents that FINS providers should display accurate information, and that it should be an offence for a FINS provider to display inaccurate data. Individuals who are not drone users showed the greatest support for this proposal.
- 6.26 Ensuring accountability and the safety of drone operations were given as some of the reasons for this requirement, with others believing there should be a minimum

standard for accuracy. Many believed that without accurate data the FINS would be redundant, as without data accuracy there could be no reliance or trust in the information being provided.

- 6.27 Alternatively, there were many respondents who thought accurate data would be difficult to enforce, and making it an offence would be disproportionate. Some highlighted human error as inevitable and others believed the type of error should determine if it is an offence.

Question 20: What do you believe should be approved for the public to use?

Question 21: In your opinion what should the FINS(s) cover?

- 6.28 There was strong support for having a single FINS, covering the entirety of the UK.
- 6.29 Respondents gave a variety of reasons for this choice including that this would make the FINS more consistent, simple and easier to manage. There was a view that drone users will likely travel or wish to fly near borders, which would mean the added complication of using multiple FINSs in a regional FINS approach.
- 6.30 Those in support of multiple FINSs said it would increase choice and flexibility, as well as competition amongst providers. Another reason given for supporting multiple FINSs included an improved, detailed display of the local area in the system.
- 6.31 There was a consistent view the FINS should be free. Some respondents used their answer to this question to simply register their general objection to the FINS policy.

Question 22: Besides poor signal, no battery on the electronic device, maintenance or crashing do you think there are other scenarios which could restrict access to the FINS(s)?

What scenarios?

- 6.32 Respondents felt that there were other scenarios that could restrict access to the FINS. Model aircraft flyers especially felt this was the case.
- 6.33 Some highlighted that the lack of a smart phone or other such electronic device on which to operate the FINS would be a limiting factor. Others believed that there may be interferences from external sources, such as the weather or network congestion, which could affect access to the FINS. There was a consistent view that a cyber-attack, specifically a 'denial of service' attack, could restrict access.

Question 23: If real time access to the FINS(s) cannot be gained do you believe the drone flight should be allowed?

Question 24: Do you think there should be an exception from using real time data on the FINS(s) if access is restricted by:

- poor signal;
- no battery on the electronic device;
- the FINS crashing; or

- the FINS being offline for maintenance?

- 6.34 There was general support for allowing drone flight even without access to the FINS, especially from those who use drones.
- 6.35 There was support for allowing drone flight in all scenarios presented in question 24. However, being exempt from using the FINS in real-time due to a lack of battery received the least backing.
- 6.36 Respondents who do not fly drones consistently disagreed with the exemptions.
- 6.37 There was a consistent view that although the FINS has possible safety and security benefits, it was not imperative to carry out a safe and secure drone flight. There were also concerns that stopping flights from taking place where the FINS could not be accessed would be too restrictive on drone users, and that ultimately the pilot should determine if it is safe to fly, rather than relying solely on a FINS or other machine. Many believed exemptions should be allowed in scenarios that are outside of the drone pilot's control, such as access to mobile signal.

Question 25: If real time access to the FINS cannot be gained, how should this be managed?

- Allow drone flight in certain scenarios
- Allow drone flight using offline maps and data from FINS(s)
- Allow drone flight in designated geographically zoned low risk areas, but not in higher risk areas
- Other

- 6.38 There was more support for allowing drones flights in designated low risk areas, but not in those that are more hazardous; a view held especially by commercial drone users.
- 6.39 There was a consistent view from respondents that flight should still be allowed when access to the FINS was not possible. However, some believed that a small number of particular drone operations should not be allowed to fly where a FINS could not be accessed.
- 6.40 Many respondents also thought existing laws were sufficient for drone use if access to the FINS could not be gained. The view was again reiterated that ultimately responsibility for a safe drone flight lies with the remote pilot, and not a FINS or other machine.

Question 26: Which organisation do you believe is best suited to manage and regulate the FINS(s)?

- Civil Aviation Authority (CAA)
- NATS (the UK air navigation service provider)
- Department for Transport
- Other

- 6.41 There was strongest support for the CAA managing and regulating the FINS because, amongst other reasons, they are the regulators and they have good understanding and experience.
- 6.42 Of those who supported NATS, respondents often said it was because they already provide air traffic services and already have an app available.

Question 27: In line with government strategy, should anonymised drone data from the FINS(s) be shared with the industry to drive technological development?

- 6.43 A consistent view was that the Government should provide anonymised drone data from the FINS to industry. Some of the reasons for this included a drive for development, technology and safety in the sector.
- 6.44 Others expressed privacy concerns about data sharing and believed the information should only be used for its original purpose, or be shared with consent.
- 6.45 Providing the data free of charge was a popular request.

Question 28: For the purposes of carrying out their function, to which organisation or organisations should a FINS provider have to provide data if requested?

- Department for Transport
- Civil Aviation Authority
- police
- Intelligence and Security Services
- Border Force
- National Crime Agency
- HM Prison and Probation Service
- Other

- 6.46 There was most support for the CAA and police being able to receive data from the FINS provider.
- 6.47 There was a collective response that organisations should be able to receive information for safety, security and crime prevention purposes. However, some argued that this was futile, as anyone with criminal intent would not use the FINS, which would limit any benefits the system could provide for crime detection and investigation.
- 6.48 There were those who had privacy concerns about sharing data and others who believed that the necessary safeguards would need to be put in place, such as requiring a court order or appropriate justification for needing the data.

Question 29: Do you agree it should be an offence for a FINS system provider to withhold information from a specified organisation if a valid request for data is made?

- 6.49 There was fairly strong support for this proposal, especially from model aircraft users. Amongst other reasons, it was suggested this measure would be useful for accountability and a FINS provider withholding information would make the system less effective.
- 6.50 There were those who had concerns around privacy and thought this information should only be provided following a court order. Other respondents gave the view that providing data should require appropriate justification and be judged on a case-by-case basis.
- 6.51 Some respondents wanted more clarity on what a 'valid request' was.

Question 30: Do you believe certain organisations should have some level of instant, or near instant, access to all data on the FINS(s)?

Question 31: Which organisation do you believe should have some level of instant, or near instant, access to all data on the FINS(s)?

- police
- Intelligence and Security Services
- Border Force
- National Crime Agency
- HM Prison and Probation Service
- Other

- 6.52 There was support for allowing certain organisations a degree of instant access to data on the FINS, especially from those who do not fly drones. There was most support for the police having instant access to data on the FINS, followed closely by the Intelligence and Security Services.
- 6.53 Some of the reasons for supporting this policy included crime prevention, safety and the need to act quickly. Many of those against this believed it was an unnecessary power, had concerns with data privacy and thought there would be a lack of compliance with the FINS.
- 6.54 Some respondents also believed the CAA should have instant access to data to prevent safety incidents from occurring in real-time.

Question 32: Do you believe there should be a charge to the drone user in order to use a FINS?

Question 33: If a FINS provider decided to charge for using the system, should the Government maintain the ability to control the maximum cost that could be charged?

- 6.55 Respondents in general strongly opposed the idea of a charge for using a FINS. In the event of a fee, they also opposed the idea of the Government controlling the maximum amount a FINS provider may charge.
- 6.56 Those against a fee gave a number of explanations, including that it would be a barrier to some using drones and that there are already enough costs associated

with using a drone. A common theme was that individuals would be less likely to use the FINS if they had to pay.

- 6.57 Some respondents stated that if a charge was implemented then it should be small, and government control would be needed to stop providers overcharging for the service.

Question 34: Do you think there is a need to have a Special Administration Regime to manage the risk of insolvency for FINS providers?

- 6.58 There was some support for implementing a Special Administration Regime amongst respondents. However, a large proportion of respondents also answered 'don't know' to this question.
- 6.59 Amongst those who did answer, common responses included that there should be a Special Administration Regime in the scenario where there is only one UK-wide FINS provider, and that in the event of insolvency, a FINS service would need to be maintained.
- 6.60 Finally, there were also some responses that a special administration regime was an unnecessary layer of bureaucracy. Others also raised the concern that FINSs should not be run by a private company or companies.

The following questions were for technology providers or companies considering being involved in the development of a FINS, to increase understanding of this new market.

Question 35: If an approach is chosen that uses multiple FINSs, in your opinion would it be better to have:

- All FINSs transfer information to a single back end system; or
- Multiple FINSs transferring information between each other directly.

Question 36: How would you consider funding a FINS?

- Charge the drone user
- Charge the industry
- Use adverts
- Have additional add-ons that can be purchased
- Other

Question 37: Would you anticipate a yearly subscription fee for users of the FINS(s)?

How much?

Question 38: Are you a technology provider or a company considering being involved in the development of a FINS? (This question was moved to the beginning of the online survey respondents completed).

Question 39: Would you consider bidding for the work to provide a FINS?

Question 40: Would you be interested in attending a Government focus group session with other potential sector technology providers?

- 6.61 There were a few respondents who said they were a technology provider, or a company considering being involved in FINS development. Only those who answered 'yes' to this question received the option to answer questions 36-40.
- 6.62 In a multiple FINS approach, there was support for a back-end system to transfer data. A range of reasons were given for this including it would reduce complexity and it would be easier to verify data. Some of those against this idea thought direct transfer of data between FINS providers would avoid a single point of failure for the system.
- 6.63 To fund the FINS, charging the industry had the most support, while using adverts had the least. There were some technology companies who believed the Government should pay the costs for operating a FINS.
- 6.64 Many respondents did not anticipate a yearly subscription fee for using the FINS. Those that did anticipate a fee made suggestions that their income would instead be based on a regulated return of capital, or there would be a fee based on a per flight basis, or that any fee initially should be low to encourage use.
- 6.65 There was a large range in anticipated fees, ranging from tens of pounds to thousands of pounds. There was an even split between those who would consider bidding for the work and those who would not, and general support for attending a Government focus group session.

Question 41: Should the Government work with model aircraft flying associations to consider ways in which the policy could be shaped to minimise the impact of any new legislation relating to FINS(s) for this group?

- 6.66 There was support for the Government working with model aircraft flying associations, especially from model aircraft flyers themselves. Commercial drone users showed the least support for this proposal.
- 6.67 A number of reasons were given as to why the model aircraft community should be consulted, such as their safety record, experience, and the impact it would have to their operations. There was also a consistent view that the FINS should not apply to model aircraft users.
- 6.68 Those against this option had a common view that model aircraft users should not be treated any differently, and that the views of all drone users should be considered.

Police powers

Question 42: Do you agree that the police require new powers in relation to the misuse of drones?

- 6.69 In general, there was strong support for new police powers specific to drone misuse. Respondents felt that specific police powers would lead to more successful prosecutions. Many felt this would lead to increased responsibility and awareness associated with drone operations which would, in turn, improve the public perception of drones.
- 6.70 Some respondents, whilst in favour of police powers, were concerned that the police do not have the resource to enforce or use any further powers. Others recognised that education and communication of regulation need to be promoted alongside the new powers in order to effectively increase responsible drone flying. Some felt that an educative approach should be prioritised above a legislative approach.
- 6.71 Furthermore, there was a group of respondents who were against the introduction of specific police powers. These respondents felt that new powers would be disproportionate to the risks posed by drones. Many felt that providing the police with increased powers would serve to solve a problem which does not exist.
- 6.72 Some were further concerned that the powers could negatively affect responsible drone users rather than targeting those who use drones maliciously. There was a feeling that any amount of powers would not stop those intent on breaking the law.

Question 43: Do you agree that the police should be able to require the production of evidence from drone users:

- Where there is reasonable suspicion of an offence being perpetrated;
- Or where compliance with a legal requirement is being checked?

- 6.73 Many respondents agreed that the police should be able to require evidence from drone users in both scenarios, with answers frequently highlighting that those fliers complying with regulation would have nothing to be concerned about. Some answers also highlighted that such a measure would deter users from flying irresponsibly or dangerously.
- 6.74 Comparisons were often made between production of evidence in this scenario and the need to produce a driving license when driving a car. Many respondents felt that this proposal is therefore proportionate.
- 6.75 There was some concern, however, that this power would not be exercised due to lack of police resourcing, meaning the effect of such a power would be minimal. Other respondents were also concerned that members of the police do not have sufficient knowledge or training of current legislation to effectively use new powers.
- 6.76 There was also concern that a member of the police would not be able to judge the height of an SUA and therefore judgement as to whether an offence is being committed or not could be highly variable. Respondents were concerned with the term 'reasonable suspicion' with some feeling that this could lead to an abuse of power due to vagueness and disparity in judgement.

Question 44: The proposal is that for those unable to produce the relevant evidence at the request of a police constable, they will have 7 days in which to produce it at a police station.

Do you agree with the proposal to grant a 7 day grace period to produce this evidence?

- 6.77 Whilst many agreed in principle with the idea of a grace period, there was a mixed view in the responses about the length of time a grace period should be.
- 6.78 Many respondents felt that the period should be dependent on the evidence required. For example, if information regarding operator numbers was stored online, some thought that this information could be accessed immediately. Similarly, many highlighted that flight logs could also be accessed instantaneously through an app. Conversely, insurance documents left at home would take longer to produce.
- 6.79 Some felt that if the evidence required was an operator certificate or a remote pilot acknowledgement of competency then this should be provided immediately. The justification for this was commonly that during flights, pilots of manned aircraft have to carry their license with them at all times. Others suggested that the police should have immediate access to a database with operator certificate numbers and remote pilot competency acknowledgements which would bypass the need for a seven day grace period in this situation.
- 6.80 A number of respondents were concerned that by granting a seven day grace period, it would give offenders time to delete or amend evidence, or even to carry on offending.
- 6.81 Many argued that the submission of evidence should be able to be achieved electronically to allow those with extenuating circumstances, or those who would be away from the area to provide the evidence with little inconvenience. Similarly, many were in favour of an online submission approach due to the restrictive nature of police station hours or distance.

Question 45: Do you agree the police should be able to obtain information to check that the following have complied with the law:

- A drone user;
- A drone operator;
- A remote pilot; and/or
- The person who made the drone available for use?

- 6.82 There was general support for this power, particularly for the drone operator and remote pilot roles. Respondents tended to be a little confused about the function of the remaining two roles.
- 6.83 Many cited that this would aid enforcement and encourage regulation adherence. Others suggested that companies should be fined if they employ an individual who is not a PfCO (Permission for Commercial Operations) holder.
- 6.84 However, responses often displayed disagreement over who should be responsible in particular situations. There was concern that an operator may be unfairly punished if a remote pilot (having borrowed the operator's drone) deliberately disregarded regulation without the operator's knowledge or permission.

6.85 A few respondents did oppose the proposal. Some were concerned that the police are not sufficiently educated about drone regulation and this might result in mistakes. Others were concerned with privacy and self-incrimination.

Question 46: Do you agree that the police require powers to instruct a remote pilot to land a drone, if there is a reasonable suspicion of the commission of an offence?

6.86 There was strong support for this power across individuals and organisations. Many felt that this was a sensible and rational first step before the remote pilot could be questioned further by the police.

6.87 However, there were some concerns. Many felt further defined guidance is needed regarding what constitutes as 'reasonable suspicion'. Answers also detailed that the police would need further training regarding legitimate situations.

6.88 Others were concerned that pilots could be forced to land too quickly in an unsafe manner or in a way which breaches the ANO. In relation to this, some were concerned that the police would attempt to land the drone themselves with no or little training. Some answers therefore suggested that the police require the pilot to instruct the drone to 'return home' rather than land as this could improve safety.

6.89 A few responses felt that this power is unnecessary, citing that too much regulation already exists and that the power could interrupt safe and legitimate flying unnecessarily.

Question 47: Do you agree that the police require powers to instruct a remote pilot to land a drone if a constable believes that:

- It will protect persons from harm, harassment, alarm or distress;
- It will protect persons occupying any premises from nuisance;
- It is causing an annoyance relating to the occupation of a premise;
- It will protect public order;
- It will protect property from damage;
- It would assist in exercising the functions of a police constable.

6.90 There was support for police powers to instruct the landing of a drone because of all the above reasons. Many felt that this would improve the responsibility of those flying drones and also encourage fliers to be respectful. Some highlighted that this may help to make the drone image more positive.

6.91 Some respondents did feel, that some of the above reasons were more significant than others. Some felt that 'annoyance' or 'nuisance' justifications were less valid reasons than 'harm' or 'damage'. Many reasoned that some of the justifications fell into civil, rather than criminal offence categories and therefore felt that the power was disproportionate to the criteria.

6.92 In addition to this, some thought that terms needed further clarification to avoid doubt due to vagueness. Some felt that without clarity, the police could be overburdened

with requests to force the landing of drones due to very minor inconveniences, which would deploy resources away from higher priority matters. A few respondents were also worried that ambiguity could lead to an abuse of power and that appropriate safeguards would be needed.

- 6.93 Commercial pilots were worried that this would disrupt legitimate operations which could have an effect on their business.
- 6.94 Some respondents felt that the criteria for this power should be added to, for example, if livestock or wild animals were being subject to undue distress.
- 6.95 A small number of respondents felt that this power should be enhanced to allow the police to physically intervene or use counter drone technology to ensure co-operation, particularly if it was felt that the drone may be causing harm.

Question 48: Do you agree the police should have the power, when a drone and/or its components are suspected of being involved in the commission of an offence to enter and search premises with a warrant?

- 6.96 Many respondents agreed with this power, feeling that those abusing the regulation would be subject to appropriate punishment. Many thought that drone users would be encouraged to abide by the law.
- 6.97 A few responses did voice concerns. Some felt that the police should be limited to asking for evidence to be presented to them. Others thought that the police could abuse this power.
- 6.98 Some were concerned that this power would be ineffective due to current powers already existing to apply for a warrant in the event of an offence.

Question 49: Do you agree the police should have the power, when a drone and/or its components are suspected of being involved in the commission of an offence, to seize and retain the drone and/or its associated components?

- 6.99 There was strong support for this power. Many felt that this action would suitably address the commission of an offence by allowing police to gather evidence and would discourage drone users from committing an offence in future. Many felt that this is a proportionate measure as the police are already authorised to seize computers, for example, to retrieve evidence.
- 6.100 There was some concern that some of the terms laid out are a little ambiguous. For example, some responses felt that 'suspected of being involved' needed specific criteria, whilst others were concerned about what 'specific components' mean.
- 6.101 Other responses highlighted that this power should have relevant safeguards such a warrant, a time limit to retain the drone and an associated receipt.
- 6.102 Others were concerned with the treatment of the SUA in police custody due to the relative cost of the equipment. Many felt there needed to be assurances that the equipment is stored and handled carefully. Some respondents highlighted that the batteries used to power many drones require specific storage and that damage to an SUA could result if this was not done properly.

6.103 Some were concerned about the financial implications for commercial users if their drone is seized, and whether compensation would be available if no offence was proven to have been committed.

Question 50: Do you agree the police should have the power to access electronically stored information from the drone or its components if a constable reasonably suspects that it:

- Is evidence in relation to an offence;
- Has been obtained in consequence of the commission of an offence; or
- Is necessary to do so in order to prevent it being concealed, lost, tampered with or destroyed?

6.104 Respondents were broadly supportive of this measure and felt that this power aligned with other police powers to access information from other technology such as computers.

6.105 Some respondents felt that safeguarding measures are crucial to stop the abuse and distribution of the information. Similarly, respondents were concerned that data might not be handled appropriately or with due care.

6.106 A few responses were concerned that an SUA could be damaged if the police do not access the data correctly.

6.107 Another suggestion was that the SUA owner be presented with a copy of the information stored.

6.108 Other respondents highlighted that some SUAs such as toy drones and model aircraft do not store or record any information and the power would have no effect on fliers of these SUAs.

Question 51: Do you agree the police should have the power to require any information stored on the drone or its associated components to be duplicated in a legible form that can be taken away if a constable believes:

- That it is evidence in relation to an offence or it has been obtained through committing an offence; or
- It is necessary to prevent concealment, loss, tampering or destruction of the data?

6.109 Whilst there was support for this measure, many felt this power would be redundant because if an offence had been committed, the drone would be seized and render the need for duplication unnecessary.

6.110 Safeguarding of the power was a concern. Some felt that there should be factual evidence of an offence for this power to be legitimately used. Many felt a warrant should also be necessary. Others were concerned about data protection and privacy, and that there should be a transparent process for destroying data after a set period of time in the event of no prosecution or conviction.

6.111 Others were concerned with the possibility of self-incrimination.

Question 52: Are there other powers you feel the police should have in relation to drone misuse?

What powers and why?

- 6.112 There was a range of suggestions for extra powers.
- 6.113 Some suggested the ability to ban drone flights at very short notice, for example, at crime scenes.
- 6.114 Other respondents felt that powers should be enhanced beyond those proposed to include stop and search powers and the use of counter-drone technology.
- 6.115 Some also felt that the police should have the ability to prevent someone from either flying or owning a drone.

Question 53: These proposed powers are only being considered for police constables. Do you believe any of the proposed powers should also be extended to:

- Prison officers;
- police community support officers;
- Council enforcement officers;
- Other?

- 6.116 There was strong disagreement across stakeholders that the proposed powers should be extended to any other groups other than police constables.

Fixed Penalty Notices

Question 54: Do you agree that Fixed Penalty Notices (FPN) are a suitable alternative to prosecution for certain drone-related offences?

- 6.117 A large number of respondents answered yes to this question, in support of the use of FPNs as an alternative to prosecution for certain drone-related offences. This support was particularly dominant amongst organisations and individuals who are not currently drone users. However, even individuals who are currently drone users were inclined to support the policy, presumably recognising that anyone complying with the law would not have anything to fear from this policy.
- 6.118 There was little disagreement with this proposal. Those who did disagree with the policy raised questions about whether FPNs were the best way of effective enforcement to drone-related offenses. Counter-proposals were made, for example

that a warning should be given first before an FPN is issued, or that a points-based system like driving licences would be fairer. Others thought that more education should be prioritised.

- 6.119 Challenges were also raised as to whether it was practical and possible to prove an offence had been committed in a quick and easy way for an FPN to be issued, particularly given the weight thresholds that apply to some offences, and that it would be fair to include an ability to appeal such a fine.
- 6.120 Model aircraft flyers suggested, once again, that model aircraft should be exempt from these measures.

Question 55: Do you agree if a person is unable to produce the required evidence within 7 days of a police constable's request they should receive an FPN?

- 6.121 Responses to this question from drone users and non-drone users were noticeably different. Non-drone users were much more likely to agree that if a person is unable to produce the required evidence within 7 days of a police constable's request they should receive an FPN.
- 6.122 A number of respondents thought that extensions should be given in exceptional mitigating circumstances, such as the request to produce documents being made just before the operator is due to travel abroad or go into hospital. Some participants commented that the period of time should be longer, with some suggesting 14 days would be more reasonable.
- 6.123 To mitigate this, some suggested that operators should be able to submit the required evidence electronically, or that the police should have access to a live database of registration information. This could also reduce the administrative burden on the police.
- 6.124 Similar to some responses given to the previous question, a small number who disagreed felt that in general, FPNs were not appropriate, and measures such as issuing warnings, or prosecuting the operator, were preferable.

Question 56: Do you agree that drone users not complying with a police instruction to land a drone should receive a FPN?

- 6.125 Overall, responses to this questions were fairly mixed. Some respondents felt that landing a drone immediately upon police instruction may not always be safe, and that an experienced, trained remote pilot may be able to judge this better than the police. Some were concerned that starting a conversation with a remote pilot could cause a distraction and create a safety risk. Furthermore, some suggested that the police should only be able to make such a request if they were adequately trained, and some questioned where the liability would lie if a drone that landed at the police's request were to cause damage. Others noted that it should depend on the police's reason for instructing the drone to be landed, i.e. do they have reasonable grounds for suspecting an offence is being committed?
- 6.126 In contrast, some felt that if a drone user did not comply with the police's request to land their drone then more severe consequences would be appropriate, such as

prosecution. A noteworthy example was made that if a drone is being flown for commercial use (e.g. taking photographs) but breaching the ANO, a comparatively small FPN would not be a sufficient deterrent as the pilot may prefer to pay the fine and continue flying.

Question 57: Do you agree that the FPN cost should be between £100 and £300?

6.127 Overall, the majority of respondents did not agree that the FPN cost should be between £100 and £300. Organisations were more likely to agree with the proposed amount compared to individuals, with strong levels of support coming from airlines and airports.

Question 58: The power to issue FPNs is only being considered for police constables. Do you believe the power to issue a FPN should also be given to:

- police community support officers;
- Council enforcement officers;
- Other?

6.128 Overall, there was a significantly negative response to the proposal to give police community support officers the power to issue FPNs. Respondents were even less likely to support the proposal to give such powers to council enforcement officers.

6.129 These trends were fairly consistent across all respondents.

7. Detailed Summary of Responses from Section C - The Future: Counter-drone technology and modelling the uptake of drones

Counter-drone technology

Detecting drone activity

- 7.1 In the consultation, it was proposed that drone detection technology should only be used where it is necessary and proportionate for one or more of the following operational purposes, and in line with the following principles:
- In the interests of national security;
 - For the purpose of preventing or detecting crime;
 - For the purpose of safeguarding the economic well-being of the UK;
 - In the interests of public safety;
 - For the purpose of preventing death or injury to a person;
 - For the purpose of preventing damage to property; or
 - For the purpose of maintaining prison security or good order and discipline.

Question 59. Do you think the operational purposes identified for the use of drone detection technology are appropriate?

- 7.2 The majority of respondents believed that the operational purposes identified for the use of drone detection technology were appropriate. However, a number of participants commented that they were too vague, and could be subject to misinterpretation. In particular, the meaning of “for the purpose of safeguarding the economic well-being of the UK”, “in the interests of public safety” and “for the purpose of preventing damage to property” were questioned.
- 7.3 A number of participants suggested that “protecting other airspace users” should be added to the list of operational purposes. Several respondents commented that the type of site at which drone detection technology can be used should be defined e.g. only around prisons, aerodromes or military sites.
- 7.4 Some raised concerns about the potential impact on responsible drone operators and model aircraft flyers, several commenting that the proposal was disproportionate to the level of risk posed by drones. Concerns were also expressed about the potential

for drone detection technology to create an infringement to privacy, and to create a “nanny state”.

Question 60. Do you think the safeguards identified for the use of drone detection technology are appropriate?

Question 61. Are there other safeguards for the use of drone detection technology you think we should consider?

Question 62. Do you think there is anything else that should be done to assist organisations in meeting the defined safeguards?

7.5 The proposal in the consultation recognised that to ensure the appropriate use of drone detection technology, a number of safeguards must be put in place. The following safeguards were proposed:

- Drone detection technology limited to use by trained operators;
- A clear purpose and scope for use of the technology, and operational policy specific to each site which is in line with appropriate legislation (for example, a defined code of practice);
- Where applicable, a full risk assessment conducted in line with Health and Safety legislation;
- A Memorandum of Understanding with the relevant regulatory bodies to be put in place where appropriate, covering dispute resolution mechanisms and resolving difficulties arising from malfunctioning or misuse of the technology;
- Any data captured from drone detection technology managed (including storage and transference) in accordance with the appropriate legislation (for example, the Data Protection Act);
- The technology is only deployed in line with an operational requirement where its use is deemed necessary and proportionate in line with appropriate legislation (for example Article 8 of the European Convention on Human Rights);
- The technology has undergone fit for purpose testing to minimise incidental interference;
- Regulatory bodies with responsibility for oversight of the technology deployed are informed when the drone technology is installed and where possible, prior to its installation;
- Depending on the nature of the site or event, organisations warn the public (use of public communications, community engagement and signage) that unauthorised drone use will be monitored and enforcement action may be taken; and/or
- There is appropriate insurance in place.

7.6 While there was strong support for the safeguards identified for the use of drone detection technology, a number of participants commented that they were “over the top”, “unnecessary”, “excessive”, and “too complicated”. Others felt that similar to the operational purposes set out in the previous question, they were too vague and left too much room for interpretation.

- 7.7 A recurring theme was that drone detection technology should only be used by government organisations or the police, not by private companies who could potentially misuse the information. Some, again, raised questions about whether this technology should be used altogether, commenting that it was “Big Brother” activity.
- 7.8 Similar to responses to the previous question, there were concerns that the use of drone detection technology could limit legitimate drone use. Drone operators highlighted that they should be notified of where and when drone detection technology was being deployed, to minimise the risk of collateral damage.
- 7.9 Only a small number of participants felt that additional safeguards were required for the use of drone detection technology. Some emphasised that drone detection technology should only be used to collect data for specific purposes, and it was important to ensure that the information collected is accurate, e.g. if detecting the height of the drone, altitude may not correspond to height above ground.
- 7.10 Some, again, suggested that the use of drone detection technology should be restricted to certain types of organisations, such as the CAA and the police, or to certain places, such as around military bases and airfields.
- 7.11 Only a small number felt that more should be done to assist organisations in meeting the defined safeguards.
- 7.12 However, few of those responding answered the question directly, and instead highlighted the need for a clear policy framework, the importance of adequate training/licensing for operators, and the importance of ensuring that counter-drone technology should only be used as part of a comprehensive mitigation strategy.
- 7.13 It was also noted that there is a need for further engagement with industry and manufacturers during the development of the framework, to communicate with drone operators and model flying clubs to educate and raise awareness, and provide clear instructions for users to adhere to.

Assessing the security threat posed by a drone

- 7.14 The consultation proposed that in order for organisations to defer authority to trained security personnel to make an assessment of threat, a number of safeguards must be put in place. Trained security personnel includes military personnel, the police, prison officers, private security managers and commercial guard forces. It was proposed that the following types of safeguards ought to be considered:
- A minimum training requirement; and
 - A site-specific operational policy informed by the Government on how to assess a drone threat.

Question 63. Do you think the safeguards identified to enable deferred authority are appropriate?

Question 64. What other safeguards would you like to be considered to enable deferred authority?

- 7.15 Only a small number felt that the proposed safeguards were not appropriate. A recurring theme in the responses to this question was concern around the

authorisation of private security managers to use counter-drone technology. Participants were concerned that these powers should be limited to Government organisations (“state agencies”) such as the military, police, security services and prison officers to minimise the risk of misuse/abuse, but also to avoid potential profiteering/commercialisation of the service. Some, again, commented that the use of counter-drone technology should be limited to certain locations, such as around military bases, government infrastructure and airports.

- 7.16 Participants also emphasised the need for rigorous training requirements for authorised operators, and several commented that there should be a requirement for training to be periodically “refreshed”, e.g. every 6 months or annually.
- 7.17 A few respondents commented that the proposal was a “knee-jerk” reaction, and “completely overkill” for “a problem that doesn’t yet exist”, that it would restrict legitimate drone use and have a detrimental effect on the hobby of model aircraft flying. A number of model aircraft flyers seemed to misunderstand the question and commented that regulation should “not punish the majority due to the actions of the few” and that “BMFA members already achieve certification for the flying of model aircraft”, questioning the need to take another test.
- 7.18 Some respondents proposed that there should be an independent oversight board to ensure that policies are being followed correctly, reviewing and scrutinising incidents where Counter-Unmanned Aircraft System (C-UAS) technology has been deployed. This function might also include a process for dealing with misuse; whether enforcing penalties for improper use, or ensuring fair compensation should innocent parties incur damage as a result of the deployment of C-UAS technology.
- 7.19 Some participants requested that information should be made easily available to the public on which organisations have been granted the authority to use counter-drone technology. Some suggested this information could be integrated into drone safety apps.

Taking responsive action to disrupt or stop the continued operation of a drone which poses a threat

- 7.20 The consultation proposed that the use of drone electronic effector technology should be only used where it is necessary and proportionate for one or more of the following possible specified operational purposes:
- In the interests of national security;
 - For the purpose of preventing or detecting crime;
 - For the purpose of safeguarding the economic well-being of the UK;
 - In the interests of public safety;
 - For the purpose of preventing death or injury to a person;
 - For the purpose of preventing damage to property; and/or
 - For the purpose of maintaining prison security or good order and discipline.

Question 65. Do you think the operational purposes identified for the use of drone electronic effectors are appropriate?

- 7.21 Although there was strong overall support for the proposed operational purposes, similar to the responses to Question 78, there was a strong view that they were too vague and subject to interpretation. In particular; “for the purpose of detecting/preventing crime” (several queried how an effector could be used for the detection of crime), “safeguarding the economic wellbeing of the UK”, “preventing damage to property” and “in the interests of public safety”.
- 7.22 Similarly, as raised in responses to earlier questions in the consultation about the use of drone detection technology, there were some suggestions that electronic effectors should only be used at pre-defined sites, e.g. prisons, airports and military facilities.
- 7.23 A considerable number of drone operators and model aircraft flyers were concerned about the safety of counter-drone technology and the potential for collateral damage, questioning where the liability would lie should they incur damage as a result of drone electronic effectors being deployed.
- 7.24 A few participants suggested that a purpose that explicitly referenced the importance of aviation safety e.g. “to protect other aircraft” should be added to the list. Other suggested operational purposes included “to protect rights to privacy”, “in the interests of animal welfare”, “to prevent public nuisance” and “consideration for wildlife”.
- 7.25 Many participants were concerned about the general safety risks of counter-drone technology, and emphasised the fact that permitting the use of technology, such as jammers, could potentially create a greater safety risk than the risk it is claiming to mitigate. However, only a few stated that such technology should not be used in any circumstances.

Question 66. Should any other studies be conducted to minimise the safety risks associated with deploying electronic effectors in the UK?

- 7.26 There were strong views from participants expressing concerns around the potential for collateral damage as a result of radio signal interference and the impact on other airspace users.
- 7.27 Many commented that there should be further research into the behaviour of aircraft once jamming technology is activated, particularly on those that do not have “return to home” functionality, such as racing drones and conventional model aircraft.
- 7.28 A number of model aircraft flyers were concerned that, unlike fully-flight stabilised drones, a model aircraft would be likely to crash very quickly at high velocity, creating a safety risk to model flyers and any third parties nearby, and potentially creating substantial financial loss to the model flyers affected. Consequently, they proposed that any jammers deployed should be narrow beam, directional devices.
- 7.29 There were also concerns around the wider potential impacts of using electronic effectors, including impact on public health, medical and security equipment, the functioning of mobile phones, pacemakers, driverless cars, critical systems at airports and for other aviation, and the potential impact on wildlife such as bees.
- 7.30 Some voiced concerns about the electronic effector technology being made available illegally, and noted the potential for it to cause significant disruption e.g. by criminals to bring down legitimate drones.

- 7.31 There were also a number of concerns around who would be legally responsible for damage caused by deploying electronic effectors, and what compensation processes are (or should be) in place if an effector causes damage (either directly or indirectly) to a drone that is operating legally/legitimately.
- 7.32 Some called for the use of geo-fencing as an alternative or complementary measure to mitigate security risks. Others highlighted that where possible, the operator should be located or notified before, or as an alternative to, deploying counter-drone technology.

Question 67. Do you think the safeguards proposed for the use of drone electronic effectors are appropriate?

Question 68: Do you think any other safeguards should be considered for the use of drone electronic effectors?

Question 69: Do you think anything else should be done to assist organisations in meeting the defined safeguards?

7.33 The consultation proposed that to ensure the appropriate use of electronic effector technology a number of safeguards must be put in place, and is giving consideration to the following types of possible safeguards when drone electronic effectors are in place:

- Drone electronic effectors are limited to use by trained, approved and/or licensed operators;
- There is a clear purpose and scope for use of the technology, and operational policy specific to each site, which is in line with appropriate legislation (for example, a defined code of practice);
- Where applicable, a full risk assessment is conducted in line with Health and Safety legislation;
- A Memorandum of Understanding with the relevant regulatory bodies is put in place where appropriate, covering dispute resolution mechanisms and resolving difficulties arising from the malfunctioning or misuse of the technology;
- Any data captured from drone electronic effectors is managed (including storage and transference) in accordance with the appropriate legislation, e.g. the Data Protection Act;
- The technology is only deployed in line with an operational requirement where its use is deemed necessary and proportionate, in line with appropriate legislation, e.g. Article 8 of the European Convention on Human Rights;
- The technology has undergone fit for purpose testing and testing to minimise incidental interference;
- Regulatory bodies with responsibility for oversight of the technology deployed are informed prior to installation of any drone electronic effectors;
- Depending on the nature of the site or event, organisations warn the public (use of public communications, community engagement and signage) that unauthorised drone use will be monitored and enforced; and/or

- There is appropriate insurance in place.

7.34 The primary concern raised was that the use of electronic effectors would impact legitimate drone use. Model aircraft flyers again raised concerns about the potential for jammers deployed in the vicinity of where they are flying to cause their aircraft to crash, creating a safety risk and financial loss.

7.35 A number of respondents again highlighted the need for system to notify the public of when and where C-UAV tech was to be used e.g. via the NATS drone assist app, detailing the range of the system and when it would be deployed, or by geofencing affected areas at applicable times.

7.36 Again, as expressed previously, there were a number of comments about who should be permitted to use the technology; there were a range of suggestions, e.g. police and armed forces only. Similarly, some felt it should only be used at particular locations, e.g. around airports.

7.37 A number noted that there should be further consultation with drone users, model aircraft associations, and continued engagement with manufacturers to ensure that measures put in place are fit for purpose and reflect the latest technological developments.

Testing drone detection technology and drone electronic effectors

7.38 The consultation proposed that testing drone detection technology and drone electronic effectors is required to enable current or further activities for one or more of the following purposes:

- In the interests of national security;
- For the purpose of preventing or detecting crime;
- For the purpose of safeguarding the economic well-being of the UK;
- In the interests of public safety;
- For the purpose of preventing death or injury to a person;
- For the purpose of preventing damage to property;
- For the purpose of maintaining prison security or good order and discipline;
- For the purpose of understanding collateral damage, i.e. the potential to impact on other systems operating in the same frequency band in the surrounding area; and/or
- For the purpose of understanding what happens to the drone once this technology is activated.

Question 70. Do you think the requirements identified for the testing of drone detection technology and drone electronic effectors are appropriate?

Question 71: Do you think the safeguards identified for both the testing of drone detection technology and electronic effectors are appropriate?

Question 72: Would you like any other safeguards to be considered to enable the testing of drone detection technology or drone electronic effectors?

- 7.39 Only a small number thought that the requirements proposed were not appropriate. However the risk of collateral damage was highlighted again, and participants emphasised the importance of notifying all relevant organisations when and where counter drone technology is being deployed.
- 7.40 Similar to responses to previous questions, participants raised concerns about the requirements being too vague and subject to interpretation.
- 7.41 Again, some questioned whether the level of risk justified the proposed measure and felt that the use of counter drone technology could be disproportionate / overreaching.

Question 71: Do you think the safeguards identified for both the testing of drone detection technology and electronic effectors are appropriate?

Question 72: Would you like any other safeguards to be considered to enable the testing of drone detection technology or drone electronic effectors?

- 7.42 The consultation proposed that the following possible safeguards could be enforced when testing counter-drone technology:
- There is a clear purpose and scope for the testing of drone detection technology and drone electronic effectors;
 - Testing is only permitted on Government authority;
 - Where applicable, a full risk assessment is conducted in line with Health and Safety legislation;
 - A Memorandum of Understanding with the relevant regulatory bodies is put in place where appropriate, covering dispute resolution mechanisms and resolving difficulties arising from the malfunctioning of technology during testing;
 - Any data captured during the testing of drone detection technology or drone electronic effectors is managed in accordance with the appropriate legislation, e.g. the Data Protection Act;
 - Depending on the nature of the testing, organisations warn the public (use of public communications, community engagement and signage) that testing is taking place;
 - There is appropriate insurance in place;
 - For drone electronic effectors, testing only takes place in a Government-defined controlled environment;
 - For drone electronic effectors, appropriate equipment is used to monitor the collateral damage.
- 7.43 Many participants used this final question to voice more general opinions about the testing of counter drone technologies and the deployment of effectors, repeating similar concerns to those expressed previously.

7.44 These concerns focused around the potential for collateral damage, ensuring there is a procedure in place to determine liability and ensure compensation, the need to notify the public (particularly drone operators and model aircraft flyers) when and where counter-drone technology is being used, and ensuring that public health and safety risks are fully considered and mitigated.

Commercial drone scenario modelling

7.45 The Government presented scenarios in the consultation for future commercial drone use. The two charts below display possible scenarios for the projected number of commercial operators and the estimated number of commercial drones.

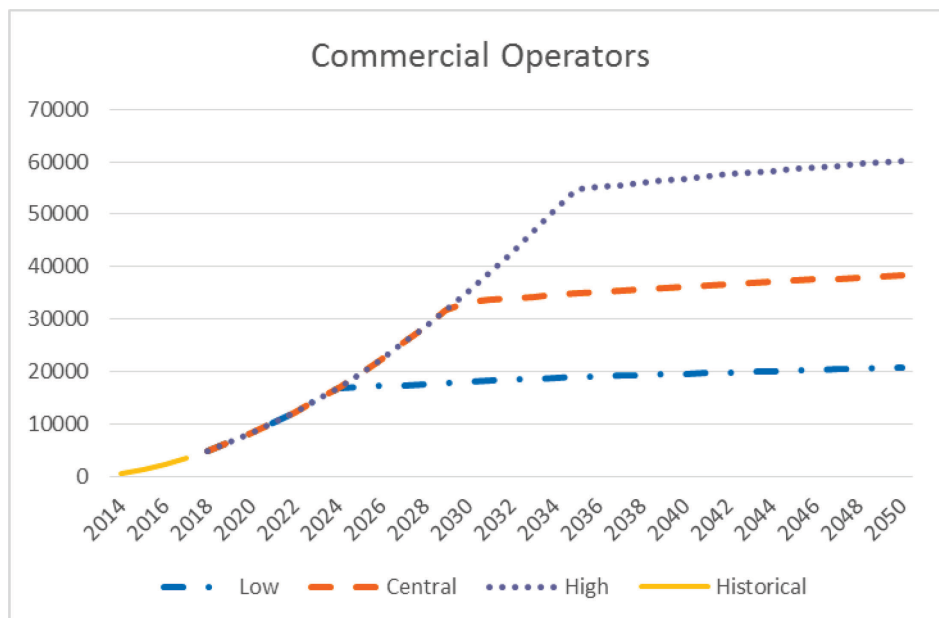


Chart 1. Scenarios for the number of commercial operators based on assumptions outlined in the consultation.

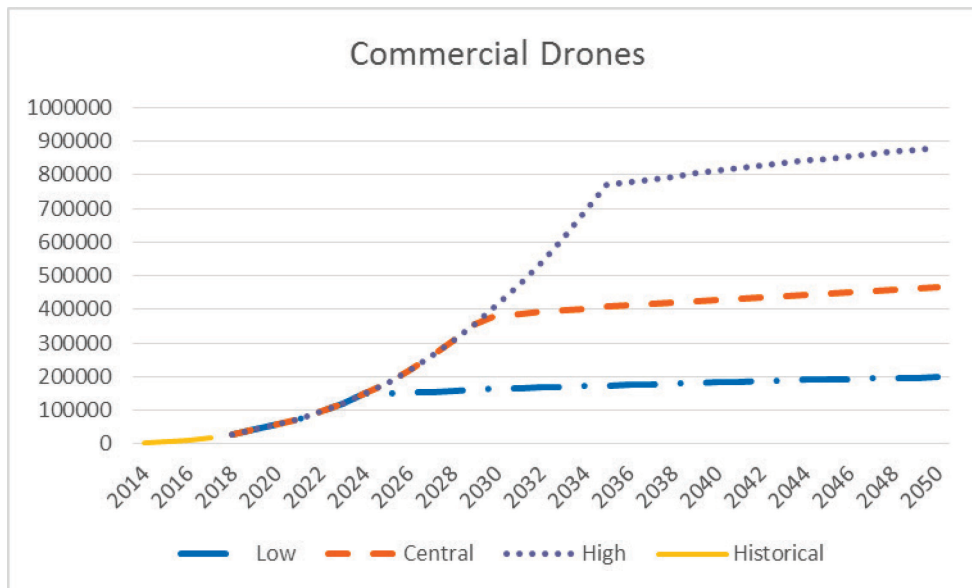


Chart 2. Scenarios for the number of commercial drones based on assumptions outlined in the consultation.

Question 73: How many drones do you expect to operate:

- In the next year
- In 2023
- In 2028
- In the long run

7.46 In general, there was variation in the estimates of current and future drone usage, but responses show there would be an increase in drone operation both in the short and long term.

Question 74: Are the scenarios for the number of commercial users:

- realistic
- overestimates
- underestimates

7.47 The dominant view was that respondents felt the number of commercial users outlined in the scenarios were overestimates.

7.48 Reasoning behind this varied considerably. Many respondents believed that the market had already saturated or would do so in the next few years due to factors such as price, regulation, public perception, crowding in the market and technological advancements. There were a substantial number of respondents who felt that the numbers were realistic due to the potential prospects of the industry.

Question 75: Are the scenarios for the number of commercial drones:

- realistic
- overestimates
- underestimates

7.49 The dominant view was that respondents felt the number of commercial drones outlined in the scenarios were overestimates. Their reasoning for this was that trends for the number of commercial drones did not match the number of operators, due to their being a finite amount of operators, and the ability to use only one drone at a time by a given operator. A small number of respondents also felt that as technology develops, the multifunctional purpose of a single drone would increase, leading to numbers going down as there would be less reason to own multiple drones with different functionalities. However, there were many respondents who felt that the numbers were realistic due to the potential prospects of the industry.

Question 76a: Please explain why you rate the following assumption as accurate or weak:

- Growth in commercial drone users will continue according to the quadratic trend that best fits historical data.

7.50 Many of the respondents rated the assumptions as weak, but the strongest view was that respondents were unsure. A smaller number of respondents rated the assumption as accurate.

Question 76b: Please explain why you rate the following assumption as accurate or weak:

- Market saturation will most likely occur in 2030, with 2024 and 2035 representing low and high estimates respectively.

7.51 Many of the respondents rated the assumptions as weak, but the strongest view was that respondents were unsure. A smaller number of respondents rated the assumption as accurate.

Question 76c: Please explain why you rate the following assumption as accurate or weak:

- The average commercial user currently has 5.6 drones and this will rise to 10 by 2037.

7.52 Many of the respondents rated the assumptions as weak, but the strongest view was that respondents were unsure. A smaller number of respondents rated the assumption as accurate.

Question 77: What do you estimate the average number of drones per commercial user to be?

- In the next year
- In 2023
- In 2028
- In the long run

7.53 The estimates from respondents showed there would be an increase in the average number of drones per commercial user in the next few years. The estimates further suggested that numbers would stay relatively high in the long term.

Question 78: How many drones do you estimate the average non-commercial drone user owns?

7.54 In general, there was variation in the estimates from respondents of the number of non-commercial drone a user owned. Numbers estimated ranged from single digits to thousands.

Question 79: Any other comments?

7.55 This question was asked at the end of the consultation and allowed respondents to comment on anything further they felt to be outstanding. Responses to this question covered a wide range of areas. Many respondents used the space to reinforce earlier viewpoints which they felt to be the most important in their response.

7.56 Many model aircraft fliers reiterated their dissatisfaction that model aircraft are classed under the same umbrella term as other SUAs in regulation, citing model aircraft associations' safety record as well as the enhanced educational benefits supplied by the associations.

7.57 Another popular topic was the difference (if any) between leisure and commercial drone fliers and whether different regulation is required for different groups. Whilst commercial drone users were keen to access the benefits to industry of the drones sector, leisure users were concerned that future freedom to fly would be restricted if the airspace becomes increasingly commercialised.

7.58 Other answers considered the possibility of categorising SUAs and their usages further, and to adjust regulation based on differing characteristics. Conversely, some had the view that regulation is already too complex and variable and harmonisation should be encouraged.

7.59 Respondents frequently highlighted that the communication of regulations could be improved. Many responsible fliers felt that whilst they are complying with regulations, there are many who do not know the regulations. Some respondents therefore felt

that additional regulation is worthless until communication and enforcement is improved.

- 7.60 Related to this, many respondents were concerned that those intent on breaking the law would not be put off by additional regulations, and therefore enforcement needs to be improved. Answers were concerned that without enforcement, any possible onus of additional regulation would fall solely on those fliers who already act responsibly.
- 7.61 Many SUA fliers were also concerned with the presentation of drones in the UK media. Many felt that drones are unfairly connoted with danger and that a positive and innovative view needs to be fostered and communicated. Some recognised that this could be achieved through enhanced communication about regulation and enforcement, as well as the promotion of the positive outcomes of drone usage and the benefits of flying an SUA for leisure.

Annex A: Abbreviations and Definitions

A.1 The below provides a list of abbreviations and definitions which may be helpful or relevant to the response.

Airprox	A situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised
ANO	Air Navigation Order - the regulations governing air navigation in the UK
ATZ	Aerodrome Traffic Zone - the space around an airport which its air traffic controllers control
BMFA	British Model Flying Association
CAA	Civil Aviation Authority
C-UAS	Counter-UAS - technologies which can be used to disable or destroy drones or other UAVs
DPA	Data Protection Act
EASA	European Aviation Safety Authority
EC	Electronic Conspicuity - an umbrella term for a range of technologies that can transmit the position of a host aircraft to other airspace users operating compatible equipment.
FINS	Flight Information and Notification System - a system created to provide digital, interactive and real time information to improve the safety, security and accountability of drone use.
FPN	Fixed Penalty Notice
Geo-fencing	A technology which prevents drones flying in restricted areas of airspace
ICO	Information Commissioner's Office
LMA	Large Model Association
NATS	National Air Traffic Service
SAA	Scottish Aeromodellers Association
STEM	Science, Technology, Engineering and Mathematics
SUA	Small Unmanned Aircraft
UAS	Unmanned Aerial System
UAV	Unmanned Aerial Vehicle (a drone)
UTM	Unmanned Traffic Management - a system created to manage drone traffic and keep drones and other types of aircraft from colliding.

Annex B: A summary of current laws relating to SUA use

B.1 The Government is keen to enhance the communication of current regulation. A summary of the present legislation can be found below.

- All drones must be used in accordance with the rules set out in the ANO.
- The following aviation safety rules in the ANO apply to the operation of SUAs:
 - A person must not recklessly or negligently act in a manner likely to endanger an aircraft, or any person in an aircraft; and
 - A person must not recklessly or negligently cause or permit an aircraft to endanger any person or property.
- The ANO also sets out the penalties resulting from misuse, including up to five years' imprisonment for anyone endangering an aircraft.
- Specific to drones: the ANO requires small drone pilots to maintain direct, unaided visual contact with their drone to ensure the above.
- The SUA may only be flown if the remote pilot is satisfied that the flight can be safely made.
- When a small drone is equipped with a camera, there are additional requirements. The remote pilot must not fly their small drone within 50m of a person (apart from during take-off and landing), vehicle or building and must also avoid flying over or within 150m of densely populated areas. During take-off and landing, a remote pilot must not fly the SUA within 30m of another person.
- The remote pilot must also not allow any article or animal to be dropped from the SUA so as to endanger persons or property.
- In addition, SUA operators and remote pilots that collect personal data must comply with the Data Protection Act 2018 (DPA), unless a relevant exemption applies. The requirements of the DPA are overseen by the Information Commissioner's Office (ICO) which can take enforcement action against people who breach the DPA by requiring them to change practices, impose fines, or by prosecution for unlawfully obtaining or accessing personal data.
- In May 2018, the Government laid the 2018 Amendment Order, introducing into the ANO:
 - A 400ft height restriction across the UK; and

- A 1km restriction around protected aerodromes when air traffic control is operating for small drones (<7kg). Drones between 7kg and 20kg are currently restricted from flying within a 5km radius of the aerodrome.
- These provisions came into force on 30th July 2018. As with other parts of the ANO, the CAA are able to exempt remote pilots and SUA operators from these rules if it deems appropriate.
- The 2018 Amendment Order also introduced in to the ANO specific duties on SUA operators (the SUA operator is defined as the person who has the management of the small unmanned aircraft), and remote pilots of small unmanned aircraft of 250g-20kg in mass. These new requirements relate to the registration of the SUA operator and the competency of the remote pilot, which must be complied with before a small drone of this mass is flown. These registration and competency requirements will come into force on 30th November 2019.
- Regarding the commercial use of SUA, the operator may not cause or permit and the remote pilot must not fly the SUA for the purposes of commercial operations except in accordance with a permission granted by the CAA.
- Regarding indoor use of drones: the ANO is made for the purposes of regulating air navigation. As a result, flights within buildings or areas where the unmanned aircraft cannot 'escape' into the open air are not subject to the above air legislation.

CCS0119298508

978-1-5286-0955-5