Department for Transport

Unlocking the UK's High Tech Economy:

Consultation on the Safe Use of drones in the UK

Moving Britain Ahead

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Foreword

The arrival of any new technology and market brings with it benefits and challenges for society. When it comes to drones, they offer exciting opportunities for business and the public sector to improve services, create high tech jobs and have significant potential to boost the economy across the whole of the UK. This kind of potential led to PwC recently valuing the global market of drone service applications at £102bn by 2025[1].

In the UK, drones are already being used by the Police, fire services and search and rescue in emergency situations, by energy, road and rail providers to inspect and maintain our key infrastructure, and by conservation organisations to monitor natural environments. Drones are saving time and improving delivery of services in these areas, improving safety and even helping to save lives. As the technology develops, we will see drones being used in other fields to achieve similar results.

The Government's Industrial Strategy will support our ambition for Britain to become the global go-to place for scientists, innovators and tech investors, and the development of new technologies such as drones is key to that. We are already well-placed: alongside the Government's support for trials and projects, the Civil Aviation Authority has granted over 2,000 commercial operator permissions. But we want to further drive forward progress in the UK drones industry by fostering the right supportive environment. There are also many leisure users of drones, who must follow the strict laws in place, such as keeping their drone within their sight. With the photographic and videography opportunities drones present, sales of drones to this audience are increasing at pace.

But like many other technologies, drones can also be misused and challenge safety, security and privacy. Whilst the vast majority of drone users are law-abiding and have good intentions, it is likely that some are not aware of the rules that apply and inadvertently break them, risking safety, privacy and security. It also cannot be ignored that there will be some who will purposefully break the laws on drones, and potentially use drones to cause harm.

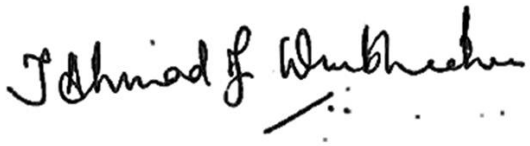
The Government's vision is for a society and economy in the UK where drones are safely and properly used in ways that improve the delivery of public and commercial services, where all leisure drone users are aware of the rules and adhere to them, and where flourishing drone service businesses are contributing to the UK economy, creating jobs and encouraging the development of important new skills in the UK.

We want to create the right conditions for new uses of drone technology to emerge and grow, placing the UK at the cutting edge of new technologies and capture a significant portion of the global drones applications market. We will not do so unless

[1] http://www.pwc.pl/en/publikacje/2016/clarity-from-above.html Figure converted from US dollars ($127bn) to UK Pounds.

we take the safety, security and privacy challenges and our duties to the general public extremely seriously.

This consultation sets out some of the next steps under consideration for doing so. As the technology and market opportunities develop, we want to proactively address these challenges, and support the growing and changing UK drones services industry.



LORD (TARIQ) AHMAD OF WIMBLEDON

Minister for Aviation, Department for Transport

21 December 2016

About this consultation

This consultation sets out the Government's ambition to realise the benefits drones can bring to the UK – by creating the conditions for the cutting edge commercial use of drones to create high tech jobs, improve services and boost the economy – whilst addressing safety, security and privacy challenges and concerns that drones present.

It puts forward a number of proposals to develop the UK's policy and regulatory framework. These proposals aim to keep pace with this fast emerging market, balancing the challenges appropriately without restricting the opportunity drones present. They are intended to ensure the global competitiveness of the UK as a home for innovation and technological investment while providing the assurance the public need.

This consultation is on the civil use of drones; military use of drones is out of scope.

The consultation covers proposals in the following key areas:

- Encouraging innovation and growth in the UK drone sector
- Ensuring safety and operation within the law
- Moving into the future with drones

We would like to hear your views on these proposals. All consultation questions are summarised at the end of this consultation document.

There are also additional questions in Annex A & Annex B for manufacturers, vendors and commercial drone users, or those considering using a drone for a commercial service.

The purpose of the questions throughout the consultation and the annexes is to provide support for policy makers by helping develop the Government's evidence base around drone technology and its applications in the UK. This evidence base will be critical when developing impact assessments for proposed legislation, which will analyse the costs and benefits of each proposed option, ensuring that enacted policies are based on strong analytical evidence.

There are currently impact assessments being undertaken on the proposed options for drone registration, mandatory guidance and drone insurance. Initial versions of these are published alongside this consultation for context. They are based on assumptions made at the time, and will undergo substantial revision and development, as the policy thinking develops as a result of this consultation.

In addition to providing the evidence base for policies, the evidence will be useful in understanding the state of the drone market in the UK at the current time and in

forecasting future trends. Through having a better understanding of this developing policy area, the Government will be better informed in future decisions on how to support or regulate the drone industry.

Who this consultation is aimed at

- Drone operators – commercial and leisure
- The aviation industry and stakeholders, including general aviation and model aircraft flyers and associations
- Drone manufacturers and other companies involved in the drone market, including the insurance industry
- Members of the public and relevant NGOs
- Higher Education Institutions and Research & Development Institutions
- Local authorities and other community bodies

Issue date and closing date

The consultation was issued on 21 December 2016. The deadline for responding is 15 March 2017.

The response

The results of the consultation and the Department's response will be published on www.gov.uk within three months of the consultation closing.

Respond online

To help us analyse the responses please use the online survey system wherever possible. The link to this consultation survey can be found at www.gov.uk.

Other ways to respond

If for exceptional reasons, you are unable to use the online system, for example because you use specialist accessibility software that is not compatible with the system, you may use a word document version of the form. Please request this document via email to: dronesconsultation@dft.gsi.gov.uk. You can then resubmit the document to that email address, or by post to: The Drones Regulation and Policy

Lead – Drones consultation; IASE 1/26, Aviation Directorate; Department for Transport; Great Minster House; 33 Horseferry Rd; London SW1P 4DR.

Consultation principles

The consultation is being conducted in line with the Government's key consultation principles. Further information is available at: https://www.gov.uk/government/publications/consultation-principles-guidance.

If you have any comments about the consultation process please contact: Consultation Co-ordinator Department for Transport Zone 1/29 Great Minster House London SW1P 4DR.
Email: consultation@dft.gsi.gov.uk.

Enquiries

If your enquiry is related to the policy content of the consultation contact: dronesconsultation@dft.gsi.gov.uk

Freedom of Information

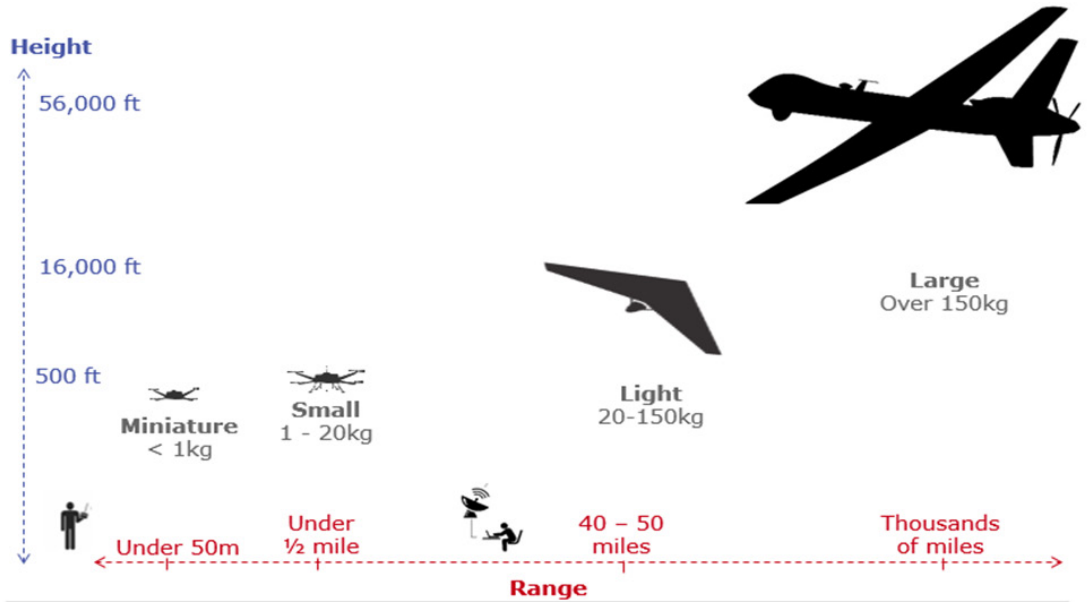
Information provided in response to this consultation, including personal information, may be subject to publication or disclosure in accordance with the Freedom of Information Act 2000 (FOIA) or the Environmental Information Regulations 2004. If you want information that you provide to be treated as confidential, please be aware that, under the FOIA, there is a statutory Code of Practice with which public authorities must comply and which deals, amongst other things, with obligations of confidence. In view of this it would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information, we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the Department. The Department will process your personal data in accordance with the Data Protection Act 1998 (DPA) and in the majority of circumstances this will mean that your personal data will not be disclosed to third parties.

1. Introduction to drones

What is a drone?

1.1 A drone is an unmanned aircraft, normally flown by a pilot from a distance, using a remote control station that communicates instructions to the drone. Drones are also known as Remotely Piloted Aircraft Systems (RPAS) or Unmanned Aircraft Systems (UAS). Those using drones are referred to as drone users, operators or pilots.

1.2 Drones come in a variety of sizes – they can be as small as your hand, weighing less than 250g or as big as a small plane, weighing several tonnes. As they increase in size, they are able to travel further. Smaller drones tend to use electric motors for propulsion, whereas larger drones tend to use combustion engines like other conventional aircraft.



How drones are used

1.3 Today, drones are already being used to improve and deliver services in our everyday life. They are proving a springboard for innovation and improvement. Scientists use them to observe habitats, support endangered species and accurately count marine populations. Infrastructure providers from energy to transport are using them for inspections of oil rigs, wind turbines, and pipelines, to rail tracks and road bridges (see Case Study 1 on page 12). Aid workers, responders and doctors use them to survey damage and provide real-time information after natural disasters and in emergency situations. The Air Accidents Investigation Branch (AAIB) uses drones at crash sites to provide oversight and collect evidence (see on page 14), as do the Police and fire brigades. Geographers use them to update maps. Farmers use them

to monitor crops and animals. The film, photography and broadcast industries use them extensively. Across these uses, drones are improving safety, saving money and delivering results more quickly than previous methods.

1.4 Smaller drones are also often bought and used for fun by members of the public. They can be used at weddings and on holiday to snap photos, or flown for the pleasure of flying. The new drone-racing sport, where drone pilots race to navigate their drone at speed around a challenging obstacle strewn course, is becoming increasingly popular.

1.5 But drones can also be used for negative or harmful purposes. Drones have been reported as being used by a small minority to smuggle harmful substances into prisons, or to invade individuals' privacy or interfere with commercial aircraft, putting lives at risk. While some misuse could be unintentional and may result from leisure drone users being unfamiliar with the technology and law, other misuse is intentional and both types can be extremely dangerous.

The law in the UK

1.6 The UK has a strong regulatory framework, including European legislation, which supports one of the safest aviation industries in the world. These regulations cover all aircraft types including drones, and contain rules on operating drones safely, alongside setting out flying restrictions over sensitive or high-risk sites such as airports and penalties for misuse. These penalties include potential fines of up to £2.5k for breaking some of these rules, and the possibility of an unlimited fine or up to 5 years' imprisonment for endangering an aircraft. The UK, through the Civil Aviation Authority (CAA), also has in place an operations permission system, which ensures commercial companies wanting to use drones or anyone wanting to test new ways of using drones do so responsibly and safely. Relevant non-aviation specific rules, including data protection, trespass and terrorism laws, also need to be complied with. A summary of some of the laws that apply and associated penalties for breaking them can be found at Annex C.

International comparisons

1.7 In comparison with other countries, the UK's risk-based and strong safety approach to aviation regulation and drones is viewed favourably. This is an advantage the Government is seeking to retain, whilst ensuring regulation is kept fit for purpose in addressing challenges and harnessing benefits. Many other foreign Governments are now also beginning to develop more drone-specific regulation. In particular, Ireland and the United States have introduced a registration policy for smaller drones in the last two years. The USA, Belgium and the Netherlands have introduced written tests for drone pilots. France is currently in the process of developing a wider drone framework. A European Regulation is also currently being revised to include all civilian drones within the scope of EU aviation safety rules.

Case Study 1: Use of drones by Costain in infrastructure projects

Costain is recognised as one of the UK's leading engineering solutions providers and over the past few years has been exploring the benefits of using drones to improve their surveying capabilities, make efficiency savings, and reduce the risk of their operations on a number of highways, rail and oil and gas infrastructure projects.

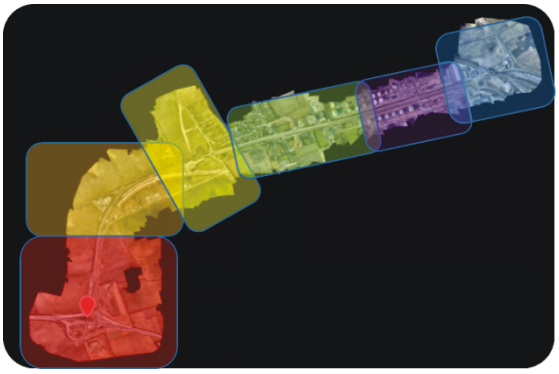
High Level 2D view and close up 3D analysis

By using drones rather than helicopters to survey a construction site near Hinkley Point, Costain saved 50% in costs, and captured the required data in less than 4 hours, rather than 2 days. The risk of individuals working onsite in a potentially dangerous environment was also removed.

Data that was captured allowed 2D and 3D maps of the site to be built, which were used to plan site set up, logistics, and determine drainage channels – crucial requirements that must be complied with before contractors are able to access the site.

The Future – The importance of flying drones beyond visual line of sight (BVLOS)

Carrying out inspections or capturing data over longer or larger infrastructure, such as power lines, would require multiple take off and landings to comply with visual line of sight regulations (as explained in paragraph 1.9 onwards). This is demonstrated in the picture, where the 6km site required 6 separate surveys. Landing and taking off are the parts of any flight with the most risk, and due to the extra operational aspects (such as identifying landing sites every 1km), it is currently not always commercially viable to use drones for projects larger than this. In the future, once technology has developed to safely allow BVLOS operations, drones flying BVLOS could reduce the total duration on site from 1 day to 2 hours, allowing data to be uploaded the same day for processing and reducing costs.



How might drone use develop in the future?

1.8 At the moment recreational and commercial drones in the UK must be flown within visual line of sight of the person operating them, to ensure safety and avoid collisions, unless a CAA) exemption applies. The CAA will only permit flying beyond visual line of sight if the user can demonstrate that other measures are in place to ensure safe flying – an example of this could be teams of spotters in radio contact with the operator.

1.9 In the future, we expect to see smarter technology allowing drones to fly further safely. Several companies are already working on developing 'sense and avoid' technology that will allow drones to automatically detect and avoid other things flying around them. Traffic management systems for drones, akin to that used to safely manage airspace in the UK, are also being considered, including by the UK Government (see Chapter 6). Together, these new technologies will mean that drones can be safely flown further and beyond the visual line of sight of their operators.

1.10 Being able to fly beyond visual line of sight safely opens up new opportunities for drones to be useful. A drone might fly the length of an electricity cable held by pylons to check for damage after a storm, or be used to travel larger distances to deliver medicine or essential goods to communities that are hard to reach, on islands or after natural disasters. But it could also open up or increase the opportunity for people to use drones for harmful activities.

1.11 Other future uses of drones are still to be devised. We want to ensure that our policy and regulatory framework does not present a barrier to such development and prevent the UK from realising the potential benefits such technological innovation can bring, whilst also continuing to guard against the misuse of drones.

Case Study 2: Use of drones by the UK Air Accidents Investigation Branch (AAIB)

The UK AAIB has been operating drones to assist at aircraft accident sites to assist with their investigations for over 2 years. They have been used at 23 different accident sites varying from fields to major airports.

Use of a drone to supervise the coast guard recovering wreckage

Drone technology has developed significantly in recent years. The price of lightweight quadcopter drones has come down, and the capability of drone imagery and processing software has improved.

Drones can be used to obtain accident site imagery much more quickly – within minutes of arriving at an accident site - and at a much lower cost than hiring a commercial helicopter or using laser scanning equipment. Images and video from the drone can be viewed live on the ground, and a drone can be easily re-launched to take additional footage.

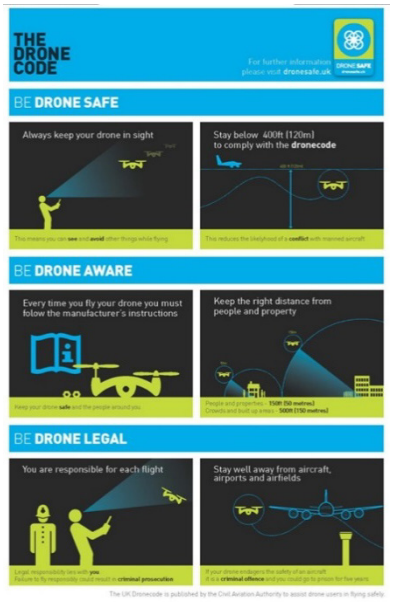
Unlike aeroplanes or helicopters, drones can be flown close to trees and wreckage without disturbing them with rotor downwash to obtain close-up images that would have been difficult to obtain by other means, such as the tops of broken trees and wreckage below a cliff in poor weather. A drone can operate in low visibility and low cloud conditions and improve the safety provision for the onsite investigation team. The picture above shows a drone being used to locate wreckage and to supervise HM Coastguard personnel descending on ropes to recover it.

3D image of an accident site created from 59 overhead, overlapping drone images

Sophisticated photogrammetry software can be used to process drone images to create 3D visualisations of an accident site, geo-referenced maps, and to enable measurements of a site to be taken that can be up to 1 cm accuracy using drone imagery alone.

The combination of drone imagery and photogrammetry software provides the AAIB with a very useful new tool and link in accident site documentation and analysis, at a much lower cost than hiring a commercial helicopter or using laser scanning equipment.

Case Study 3: The Dronecode and educating users on the rules.



The Civil Aviation Authority (CAA) is spearheading an education and communication programme on the rules and regulations drone operators must follow – be they commercial or leisure users.

The campaign, which intensifies at key periods in the year such as leading up to Christmas, aims to simplify the rules and regulations in an easy and digestible format – stressing key points such as staying below 400ft, within line of sight, and 150ft from buildings.

Working with manufacturers and retailers, the Dronecode is distributed and displayed at points of sale, and each new drone from the major manufacturers (capturing over 80% of the UK market) contains a copy of the Code.

Engaging with future drone pilots.

Alongside targeting existing users, the CAA is engaging with the pilots of the future. Build and operate drone workshops are conducted in schools across the country, educating young people on how to use drones responsibly and within the law – as well as on the many practical and operational drone uses in our industries.

And by targeting schools near to our airports and aerodromes, the CAA is raising further awareness of the importance of operating drones safely around such important airspace.

Raising awareness in innovative ways

Recognising that many people use drones because of the photography and videography opportunities, the CAA is currently running a competition in conjunction with Visit Britain to raise awareness of the Dronecode whilst showcasing Britain's landscape. Only photos which meet the Dronecode are accepted. The competition closes 31st January 2017.

2. The Government's approach to drones in the UK

2.1 The Government believes the safe and responsible use of drones can bring significant benefits to the UK, but if misused, can pose challenges and risks and dangers. This consultation, as part of the Government's wider programme, is helping to balance these.

The opportunity for the UK

2.2 As highlighted in Chapter 1, drones can be used in a variety of ways to improve public and business services being delivered and this is already happening in the UK. As set out in Case Study 1, engineering firms can make significant savings in costs and time – and in some cases use drones in environments that would be dangerous to humans. Qualified, insured professionals are now using drones to conduct safety inspections of some of the UK's energy infrastructure which would otherwise have to be turned off to allow human inspections, improving safety, saving time and reducing costs for customers paying for energy.

2.3 There are other projects in the pipeline. Ordnance Survey is looking at how drones can be used to improve the quality of map data. Some airports are trialling the use of drones to patrol perimeter fences and airlines are considering the use of drones to conduct safety inspections of planes more quickly and effectively. The Maritime and Coastguard Agency is scoping how to use drones to improve search and rescue operations. Network Rail and Highways England are planning further drone use to improve the monitoring and maintenance of train tracks and roads, which could reduce how long local transport links are closed for improvements. Logistics companies are exploring how drones can be used to improve delivery of key goods to local, isolated communities.

2.4 The potential positive uses of drones in the UK are vast; more are being developed all the time. But a new industry and market could bring more to the UK than new and improved services. Given the benefits the use of drones can bring by improving services already being delivered and reducing the cost of other services, the value of the drones market is highly estimated. The Teal Group's 2015 market study[2] estimates the global aerial drone market over the coming decade to grow from £3.22bn to £11.27bn in 2025, totalling £74.85bn[3] in the next ten years. A May 2016 PwC report[4] estimated the emerging global market for business services using drones at over £102bn[5].

[2] http://tealgroup.com/index.php/teal-group-news-media/item/press-release-uav-production-will-total-93-billion
[3] Figures converted approximately into pounds
[4] http://www.pwc.pl/en/publikacje/2016/clarity-from-above.html
[5] Figure converted approximately into pounds

2.5 This means new drone businesses bring with them economic advantages for the UK as a whole. They can be found all over the UK, delivering benefits and boosting local economies, stimulating growth. They also contribute taxes to the public purse and lift the UK's GDP.

2.6 New start-ups are also creating more job opportunities as they grow. The AeroSpace and Defence Industries Association of Europe estimated in 2014 that 'the potential for jobs [across Europe] from drones could be as many as 150,000 by the year 2050'[6]. This estimate was supported by others giving evidence to the House of Lords EU Internal Market, Infrastructure and Employment Sub-Committee in 2014[7].

2.7 The UK Government wants to see more of these economic benefits and jobs being developed in the UK and believes the UK is already well positioned to capture a large share of the global market. We already have a significant share of the registered drone operators in the EU and globally, and our proportionate, risk-based regulations are viewed favourably by industry.

The challenge

2.8 Any new and emerging technology brings with it challenges, particularly when the pace of change is rapid. In the case of drones, there is already a robust regulatory framework that applies to their use, which gives Government a significant head start in adapting to this new technology. However, despite this framework, there have been widely-reported incidents where drone users are breaking the rules and challenging aviation and public safety, and the security and privacy of the public.

2.9 The Government has already begun a programme of action to address some of these challenges (see Case Study 3 on page 15 and other detail set out from paragraph 2.16 onwards), and this consultation sets out further ways of doing so. In particular, the Government is considering solutions to identify these challenges:

Aviation and public safety

2.10 The Airprox reports have documented increasing numbers of reports of drones apparently coming into close proximity with other aircraft[8]. This has risen from 6 such incidents in 2014 to 29 in 2015 and 56 so far this year to October. It is sometimes extremely challenging to verify that the object seen was in fact a drone, but any report is investigated by the Police and relevant authorities. There are also reports of injuries to the general public resulting from careless drone use and of the safety rules contained in the relevant Air Navigation Order being broken. These rules set out such things as height limits above which small drones weighing over 7kg must not be flown. More details on these rules are summarised in Annex C.

[6] As reported in the European Commission's April 2014 communication to the European Parliament and Council entitled 'A new era for aviation' and 'Opening the aviation market to the civil use of remotely piloted aircraft systems in a safe and sustainable manner'. See http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0207&from=en

[7] http://www.parliament.uk/business/committees/committees-a-z/lords-select/eu---internal-market-sub-committee-b/news/civil-use-of-rpas-report-published/

[8] The UK Airprox Board's primary objective is to enhance air safety in the UK, in particular in respect of lessons to be learned and applied from Airprox occurrences reported within UK airspace. An Airprox is 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. Airprox Board reports can be found here: https://www.airproxboard.org.uk/Reports-and-analysis/Annual-Airprox-summary-reports/

Privacy

2.11 In comparison with safety concerns, the Government currently has less quantitative evidence that drone users are inadvertently or purposefully breaking privacy and data protection laws. However, the Police do receive reports of drones allegedly being used to breach data protection laws and the privacy of individuals, which is an issue of concern for the Government. The Government expects public service, commercial and leisure operators to operate drones responsibly and comply with the relevant legal requirements.

2.12 Drone operators that collect personal data must comply with the Data Protection Act 1998 (DPA) unless a relevant exemption applies. The requirements of the DPA are overseen by the Information Commissioner's Office (ICO) and the ICO can take enforcement action against people who breach the DPA by requiring them to change their practices, by imposing fines or by prosecution for unlawfully obtaining or accessing personal data. The ICO remains engaged with the Government on privacy issues.

2.13 Drone operators using camera drones in a similar way to CCTV should be aware of the surveillance camera code of practice[9]. The Surveillance Camera Commissioner is responsible for encouraging compliance with this.

2.14 Other laws to protect individuals from harassment may also apply to drone operators.

Security & criminal uses of drones

2.15 The Government is keenly aware of the potential use of drones for criminal purposes. This has been highlighted by the use of drones on a number of occasions to convey illicit items into prisons, and there is potential for drones to be used in other ways to aid and abet or undertake criminal activity.

2.16 Drones could also be used in other ways to challenge security and cause harm. As with all types of threats, the Government keeps the risks of the use of drones for terrorism or other criminal purposes under review, informing a response and policy development where necessary.

Enforcement

2.17 Where the law is being intentionally broken, it can be challenging to trace the operator of the drone in question. However, despite this there have been some successful investigations and prosecutions by the Police recently. For example, in July 2016 a drone pilot was given a 14-month prison sentence for trying to fly drugs into prisons.

What the Government is already doing

2.18 A cross-government drones work programme has been set up to deliver the Government's vision. Led by the Department for Transport, the programme also includes key participation from the Home Office, CAA, Department for Business, Energy and Industrial Strategy and the Ministry of Defence, amongst others.

[9] https://www.gov.uk/government/publications/surveillance-camera-code-of-practice

2.19 The Government is focussing effort in the following areas:

- Stimulating drone innovation and enterprise in the UK
- Ensuring safety and operation within the law
- Moving into the future with drones

Stimulating drone innovation and enterprise in the UK

2.20 **The 'Pathfinder' Programme:** The Government has developed a drone 'pathfinder' programme, a series of partnerships between Government and industry in key sectors, testing and trialling how drones can be innovatively and ambitiously used to improve services across a range of sectors. The aim is to tackle barriers to allow drones to be safely and efficiently flown beyond visual line of sight, enabling their full potential to be realised. This will allow UK businesses to maximise the opportunity that using drones presents, delivering benefits for the public.

2.21 **Working with industry to drive progress:** An Industry Action Group, chaired by Professor Iain Gray, Cranfield University, facilitates crucial dialogue between the Government and the UK drones industry and users, to help drive safe and innovative use of the technology.

2.22 **Facilitating a supportive innovation environment:** Innovate UK has provided over £24 million in funding to nearly 100 drone projects, and drone service companies are also being supported by our Catapult centres – a network of world-leading centres designed to transform the UK's capability for innovation in specific areas and help drive future economic growth. New drone innovations and applications are also being supported and developed by the UK's world-class research universities.

2.23 **Supporting world class testing facilities:** The West Wales UAS Environment testing centre is the gateway to a unique environment created in the UK to both facilitate and accelerate the growth of the drone industry. Drone and 5G testing facilities will also form part of the Westcott Centre in Buckinghamshire that is currently under development. The Westcott Centre will be a new Venture Park equipped with the latest 5G and UAV tech testing facilities, alongside an incubation facility and innovation centre to support the creation and development of new tech companies.

Ensuring safety and operation within the law

2.24 Whilst some drone users may be knowingly flouting the rules (either maliciously, or unaware of the full consequences breaking the rules might have for their safety and the safety of others, or the possible penalties), the Government believes the vast majority of drone users breaking the rules are, in fact, unaware of them or doing so by accident.

2.25 This appears to be backed up by a recent CAA commissioned online survey of 500 members of the public who own or use a drone for leisure purposes, or who are considering doing so[10]. Only 36% of survey respondents who had bought a drone were made aware by the manufacturer or vendor of the CAA's Dronecode (see Case Study 3 on page 15) when buying their drone. The Dronecode summarises and communicates more simply the flying rules contained in the Air Navigation Order which are applicable to leisure drone users. And whilst 54% of drone owners in the survey were aware of the Dronecode, few could recall specific rules when asked.

[10] http://dronesafe.uk/wp-content/uploads/2016/11/CAA_Consumer_Drone_Users_report.pdf

Whilst this survey looked at the aviation-specific rules, which are safety-focused, the findings also have potential privacy and trespass implications as this suggests a large proportion of leisure drone users may not be aware of the distance restrictions that apply to drones with cameras, and outlined in the Dronecode.

2.26 Safe flying of drones should be carried out regardless of whether the operator is a leisure or commercial user. But it is accepted that the aviation and general public safety risks posed by these different users are likely to be different. This is because before any commercial use of a drone can be undertaken, the law requires that the operator or company applies to the CAA for permission to do so, backed by a safety case. The majority of commercial drone operators are likely to be aware of this requirement, and are more likely to read specialist drone media and be part of professional networks that share best practice and information. Alongside a tendency to use more expensive drones and not wishing to damage their company's reputation and business, this incentivises them to understand and adhere to the rules. This is reinforced by the health and safety approach which is engrained into the culture of larger organisations and companies, ensuring that such companies are aware what legal requirements there are and adhere to them.

2.27 The Government's assumption is that the large majority of breaches of safety, privacy and data protection laws would happen because some leisure drone users are unaware of the laws that apply – although we recognise the good practice and standards that most model aircraft and drone groups advocate amongst their members. The Department for Transport is working with the CAA in raising awareness amongst all users, commercial and leisure. However, the Government is conscious that there may be some users who are maliciously breaking the rules, and we must put in place measures to help combat this.

On safety, we are:

- **Raising safety awareness:** Funded by the Department for Transport, the CAA has been carrying out activities to raise awareness of the basic safety requirements and laws amongst leisure drone users. This includes a 'Dronecode' safety awareness campaign, engaging with schools, undertaking research into leisure drone users and engaging with manufacturers and vendors to issue safety leaflets at the point of sale. See Case Study 3 on page 15 for more detail.
- **Improving the application of geo-fencing:** Geo-fencing is software and data contained in the drone that can restrict it from flying in certain areas, such as airports. It is also known as geo-limitation. The Government is working with manufacturers to more effectively implement geo-fencing restrictions in the UK. Whilst competent software engineers may still be able to override these geo-limitations, for most leisure drone users geo-limitation works as a safety net, stopping them from inadvertently breaking the rules and risking safety and security. The Government and CAA have also already been contributing to work by the European Aviation Safety Agency (EASA) to assess the capability of geo-limitation and make recommendations for further implementing this technology.
- **Improving communication of the law:** The CAA's safety campaign has seen leaflets communicating safety rules and the penalties included in drone packaging, increased media coverage and awareness of the rules and penalties, and the launch of a new dronesafe.uk website to better communicate this to the public and drone users. See page 15 for more detail. As part of this NATS, the national air traffic control service, has launched a free safety app 'Drone Assist'

which can be used by drone users as guidance for where they shouldn't fly, due to airspace restrictions or ground hazards.

On privacy we are:

- **Updating guidance:** The regulator responsible for upholding rights set out in the Data Protection Act 1998, the Information Commissioner's Office (ICO), has produced guidance for drone users which makes it clear that drones with cameras could pose a privacy risk. In 2015, the ICO updated its code of practice on surveillance cameras and personal information to include drones. The Camera Surveillance Commissioner's 'Surveillance camera code of practice' can also apply to use of drones by relevant authorities. In September 2016, the Dorset, Devon and Cornwall police became the first police forces to have their drone use certified by the Surveillance Camera Commissioner through his third party certification scheme[11]. Going forward, the Government intends to explore how it could work with a variety of organisations, such as the ICO and Surveillance Camera Commissioner, to develop and communicate best practice guidance on how public bodies should use drones.
- **Raising awareness:** The CAA's safety awareness campaign has benefits for privacy awareness too. In particular, the campaign highlights the rule that drones with cameras should not be flown within 50m of people, vehicles or structures or 150m of congested areas or crowds. Whilst the rule was introduced for safety reasons, it also has benefits for privacy.

On security we are:

- **Assessing and mitigating the risks:** There is a cross Government counter-drones group whose purpose is to review the risk and explore mitigations. Across government there are various coordinated strands of work relating to improving our defences against drones, with a focus on sensitive and important locations and events.
- **Enhancing security in prisons:** In response to the use of drones to smuggle certain drugs and other objects into prisons, a new offence was created, making it illegal to land a drone in a prison or to use a drone to drop articles into a prison including certain psychoactive substances (see Annex C for further detail). Anyone convicted of using a drone to do so can be punished with a sentence of up to two years. The Prison Service is also trialling and evaluating a range of methods to counter the threat posed by drones across the prison estate.

On enforcement of the law:

- **Working together to enforce the rules:** The Police have formed a special drones working group to share best practice and tackle enforcement issues. This focus has begun generating results and we have begun seeing successful prosecutions of breaches of the law using drones. Alongside this, the DfT has developed a memorandum of understanding[12] with the CAA, the Home Office and the Police with regards to the policing and monitoring of drones, and developed guidance to constabularies across the UK[13].

[11] https://www.gov.uk/government/case-studies/surveillance-cameras-on-drones
[12] http://data.parliament.uk/DepositedPapers/Files/DEP2016-0743/160915_MOU_between_DfT_CAA_HO_Police.pdf
[13] http://www.npcc.police.uk/Publication/NPCC%20FOI/Operations/175%2015%20NPCC%20Response%20Att%2001%20of%2001%2026102015.pdf

Laying the foundations for a developed drone market

2.28 We want to build a technological and regulatory environment which helps foster the development of the drones market in the UK and does not stifle innovation. This involves regular review and reform of the regulation, to ensure that as more drones are flown in the UK, or new ways of using drones are developed, or once drones are being safely and regularly flown beyond visual line of sight, the regulation remains fit for purpose. Due to the rapid pace of change in the drones market, we have already begun work to scope out some of the building blocks required to enable a future developed UK drone market.

2.29 As a key part of this regular review and reform – of which this consultation is part – the Government has also been undertaking work to better understand the public's views, explore some of the risks, and establish strong relationships with the UK drone industry.

Engaging the public in dialogue on drones:

2.30 In early 2016, the Department for Transport, Ministry of Defence and Sciencewise engaged in a series of workshops with members of the public across the UK regions to understand the public's views about drones. The report of these 'Public Dialogues' is being published alongside this consultation today.

2.31 The dialogues highlighted that public opinions of drones are mixed. Whilst the members of the public involved in these dialogues were understandably concerned about the anonymity of drone use, how to ensure safe use and avoid misuse, and enforce the law, they also overall became more positive about drones as they learnt of the useful and beneficial ways they can be used.

Aviation safety research:

2.32 The Government, in collaboration with the British Airline Pilots Association (BALPA) and other partners, is undertaking research and modelling to better understand the risk posed to manned aviation by drones, and thereby be better able to mitigate it. These research pieces are currently underway, and will be completed within the next 3 months. The Government is also collaborating internationally to share learning and best practice.

Addressing the challenges of the future with manufacturers and others:

2.33 Through our Industry Action Group and special engagements with manufacturers and others, the Government is collaborating with industry to ensure challenges such as privacy, safety and security are addressed and factored into the development of future drone models and drone services.

A drone traffic management system:

2.34 In response to the forecast future growth in the use of drones, the Government has started work to establish what a drone traffic management system might look like. Such a system should replicate the safety standards of manned aviation traffic management for drones. It could also enable the next stage of drone innovation, such as flying beyond visual line of sight, more quickly. If the UK can be one of the first countries to deliver a drone traffic management system, this could provide a strong comparative advantage. It could also position the UK as centre of expertise, which could be exported across the world. Chapter 6 of this consultation contains more details on a drone traffic management system, and seeks input from potential users of the system.

3. Summary of consultation proposals

3.1 The Government's work in the areas set out above is far from over. Whilst progress has been achieved, drone use is increasing and the drones market as a whole is rapidly growing and changing.

3.2 This means that integral to the Government's drones programme must be a frequent review of current policy and regulation in the areas outlined above to assess the fitness of these in achieving the Government's vision. The outcomes of these regular reviews will then form a rolling programme of reform and action to keep pace and be responsive to new developments.

3.3 We have already delivered a first wave of reform and action as laid out above. This public consultation that you are now reading is being undertaken to explore and inform the future waves of reform and action the Government should take, as part of a rolling programme.

3.4 This consultation is focused on civilian use of drones, and military use is out of scope.

3.5 The proposals and calls for evidence in this consultation continue the three themes of the work the Government has already undertaken, reflecting a first review of policy and regulation to assess its effectiveness in *Stimulating drone innovation and enterprise*, *Ensuring safety and operation within the law* and *Laying the foundations for a developed drone market*. The Government is seeking input on the combination of measures required, the design and impact of each measure itself, as well as evidence to inform the future direction of other policy areas.

Chapter 4: Stimulating drone innovation and enterprise

Proposal A: Evaluating the UK's drone testing site provision and processes

3.6 This is a call for evidence to establish if the current drone testing sites in the UK meet the needs of the start-up and small-medium enterprise (SME) drone services industry developing here. A series of options for improving the UK's testing site provisions, including the implementation of 'Drone Innovation Zones', are presented. The call for evidence is intended to develop policy to support the development of new safe and beneficial drone services, and the growth of the UK drone industry.

Proposal B: Pilot competency, training and licensing

3.7 This is a proposal to establish a clear and sophisticated framework of standards of pilot competency and qualifications for all operations, anticipated to be mostly commercial, to reflect the increasing diversity and varying levels of complexity in these operations, taking a risk-based approach and potentially in future enable repeat commercial operations if carried out by suitable qualified pilots. This would be undertaken whilst collaborating internationally to develop a common standard for a

formal remote pilot's licence, for future drone complex operations that go beyond visual line of sight. This proposal is intended to allow safely and securely for more complex operations to proceed, give certainty to business and users regarding appropriate competency qualifications and further the establishment of a drone pilot profession.

Proposal C: Insurance

3.8 This is a proposal to ensure appropriate insurance cover for any incidents that may occur. The options for action under this proposal are intended to ensure adequate insurance coverage as the market develops, providing certainty for drone businesses and the public.

Chapter 5: Ensuring safety and operating within the law

Proposal D: Improving drone user awareness of the law

3.9 There are three key options for action within this proposal.

3.10 Option 1: Mandating the Issuing of Guidance: This is an option to mandate that drone manufacturers and/or vendors issue official guidance on safety and legal flying requirements at point of sale and/or drone activation. The option is intended to reach all drone users and improve safety, privacy and security.

3.11 Option 2: How the guidance could be improved: This sub-section asks respondents what information should be covered by official guidance for drone users and how best to communicate it. The intention is to improve safety, security and address privacy risks.

3.12 Option 3: Reduce the complexity of rules for drones: This is an option to amend the flying rules for small drones to simplify them and ensure consistency. This option is intended to enable more effective communication of this law to drone users, thereby improving compliance with safety and privacy laws.

Proposal E: Improving deterrents

3.13 This is a call for evidence as to whether the current penalties for breaking laws relating to drones should be increased, and whether a new offence for the misuse of drones is required. The intention behind this call for evidence is to deter the misuse of drones and incentivise compliance with the law, in particular safety and privacy.

Proposal F: No Drone Flying Zones and Enforcement

3.14 This is a call for evidence as to how drone flight restrictions could be better enforced. The intention is to improve the restriction of drones flying in sensitive or dangerous areas, and empower the enforcement of safety, security and privacy at a local level.

Chapter 6: Laying the foundations for a developed drone market

Proposal G: Registration

3.15 This is a proposal to introduce a registration scheme for all owners and their drones weighing 250g and above, whether bought new or second-hand or home-built. The proposal is intended to set in place the foundation for a future framework for drone

regulation; create a culture of accountability amongst drone users; aid enforcement; and enable direct targeting of leisure drone users on the law and safe flying. The large data sets this policy would produce will also be used to inform future policy-making and risk assessments.

Proposal H: Airspace management and electronic identification of drones

3.16 This is a proposal that drones should be electronically identifiable, in order that they can be identified in flight. Potentially, this capability could be extended to include identification of the aircraft by persons on the ground, allowing the reporting of drones being misused to the Police. As a first step towards this, the Government is exploring other ways of achieving similar impacts, such as the use of flight notification apps. The work in this area is intended to ensure accountability, improve safety for all airspace users, and aid enforcement.

Proposal I: Drone Traffic Management

3.17 This part of the consultation sets out what the principles for designing and operating a drone traffic management system in the future could be. The Government and its industry partners are seeking input on these to influence the next stages of development of such a system. A drone traffic management system would be intended to ensure safety, and enable complex drone operations.

4. Stimulating drone innovation and enterprise in the UK

Proposal A: Testing drones in the UK

4.1 Currently the UK has a flagship drones testing centre in the West Wales UAS Environment, which offers a large testing area of segregated airspace and varying geographical features. A 5G tech testing Venture Park called the Westcott Centre is also in the process of being developed. It is also possible for an individual to set up a testing site, by applying to the CAA for permission to do so.

4.2 Despite this, a number of UK based drone SMEs have highlighted to Government that they struggle to identify and access appropriate testing sites that enable them to test their drones and technology effectively and affordably, particularly where they were testing new sense and avoid and communication applications. The ability to test counter-drone technology, such as drone detection systems, may also be hampered by this.

4.3 Some of the SMEs who engaged in discussing this issue with Government had managed to find local indoor and outdoor testing facilities, but others felt a more central 'national testing centre' site in England, with segregated airspace, would be welcomed. Other countries such as Australia, Spain and the USA have adopted this approach. Another suggestion was to improve awareness and accessibility of the range of existing facilities whether private and not in segregated airspace or public military bases with segregated airspace that are available commercially.

Approach

4.4 The Government believes an adequate testing environment for drone service start-ups and SMEs in the UK is crucial to its aim of supporting the innovation and growth of a UK drone services industry.

Consultation Question 1. Is the UK's current testing site provision for drones adequate? Why?

4.5 The Government is considering some options for further improving the UK's testing environment provision. These are:

- **Proposal A, Option 1:** Relax certain rules in the remote, rural areas of certain parts of the UK that meet certain characteristics on a case-by-case basis, following careful risk analysis and the implementation of mitigations, such as signage, for example. These areas could perhaps be marked as 'Drone Innovation Zones' on maps or in the safety apps many drone operators use. The purpose of these 'Drone Innovation Zones' would be to more easily allow for ambitious, new testing in geographical areas where any risks to safety are naturally much reduced.

- **Proposal A, Option 2:** Encourage the development of a series of regional, smaller test sites across the country to develop a network.
- **Proposal A, Option 3:** Explore whether it is possible to build a new larger national drone testing centre to complement the existing facilities at Parc Aberporth and Llanbedr in West Wales for aircraft of all sizes and hireable by the hour. This could be done by exploiting areas that already have segregated airspace, attaching it to areas of learning; or picking a new area entirely.
- **Proposal A, Option 4:** Explore options for integrating drone testing facilities into other Robotics and Artificial Intelligence testing centres.

4.6 There are benefits and disadvantages to each option. The Government is therefore interested in receiving responses to the following:

Consultation Question 2. Which of the above Proposal A, Options 1-4 is your preferred option and why?

Consultation Question 3. What other options could you suggest?

Proposal B: Pilot competency & licensing

4.7 In the traditional aviation industry, pilots' licences are well-established international qualifications which ensure high safety standards and flying ability. Some countries, such as Poland, have echoed this process for drone pilots and set up a formal operator qualification system for them. Other countries, including the UK, have systems in place for ensuring some level of pilot competency. But whilst they have similar intentions and impacts, they are not termed 'licensing' due to the requirements of the International Civil Aviation Organisation (ICAO)[14], which requires a licence to include a medical examination.

4.8 For most drone pilot operations a medical examination is not considered necessary, although as drone operations become more complex and fly further afield than before this will likely change. As such, at an international level, such as ICAO, countries are discussing the development of standards for a more widely recognised drone pilot's licence, sometimes referred to as a Remote Pilot's Licence (RPL), in order to be ready for these future developments. These standards are scheduled for publication in March 2018. The Government and the CAA are involved in leading discussions and efforts internationally (at the European Aviation Safety Agency (EASA) and International Civil Aviation Organisation (ICAO)) to develop standards for this drone pilot's licence or remote pilot's licence. Given the international nature of the aviation market and the likelihood that the drone market will mirror this, the Government considers that aligning standards internationally for pilot competency in the form of a drone pilot's licence will be beneficial to the UK when trading and working internationally.

4.9 Whilst this work continues, there is more that could be done to create and introduce clearer standards of competency for different types of drone use in the UK, and a clearer process for reaching and validating these standards.

In the UK today

4.10 In the UK today, there are several pilot competency requirements which are relevant to drone operators, although no formal drone pilot qualification exists:

- For leisure users flying drones of 20kg or less, there are no mandated knowledge or competency requirements, but there is a requirement to behave responsibly.
- For drones weighing 20kg or less that are commercially operated, operators must provide evidence of pilot knowledge and competency. The CAA requires commercial drone pilots to have demonstrated their competency either via assessment by a CAA-approved National Qualified Entity (NQE) or with other supporting evidence.
- For drones weighing more than 20kg but no more than 150kg, drone pilots are required to display a level of competence appropriate to the type of activity being performed. In many cases this will require them to be trained to a level of competence equivalent to that required for manned pilots operating in the same airspace.

[14] The International Civil Aviation Organization (ICAO) is a UN specialized agency, which manages the administration and governance of the Convention on International Civil Aviation (Chicago Convention). ICAO works with the Convention's 191 Member States and industry groups to reach consensus on international civil aviation standards and recommended practices and policies.

- For any drones above 150kg, EASA is responsible for their regulation and sets competency requirements for drone pilots which would be equivalent to those for pilots of manned aircraft. The CAA has responsibility for overseeing this.

Approach going forward

4.11 The Government's intention is to ensure that as drone technologies develop and drones become more prevalent, drone pilot standards adapt to meet these requirements and that adequate training and qualification standards are in place.

4.12 The Government believes having a clearer and more extensive set of competency standards would provide clarity for businesses as to the level of qualification they should expect from pilots for different types of operation, and solidify safety and competency standards across the sector. A set of common standards could also be used in future to streamline the application process to the CAA when asking for permission to test certain uses of drones or undertake a commercial use of a drone.

Call for Evidence: What levels of pilot competency are required?

4.13 Current levels of competency categories in the UK have been laid out on the previous page. The Government currently envisages that these general categories of leisure use of drones weighing 20kg or less, commercial or workplace use of drones weighing 20kg or less, use of drones of more than 20kg but no more than 150kg, and use of drones above 150kg would be maintained.

4.14 However, within these broad categories, the Government is inviting proposals for competency requirements, categorised by the risk involved in different types of drone operations. Once a gradient of competency levels is clearly defined, the Government will explore with industry how to validate these competency levels.

Consultation Question 4. Are new competency standards and qualifications needed? Why?

Consultation Question 5. What should the new standards and qualifications be?

Consultation Question 6. How should the new standards and qualifications be taught and tested?

Proposal C: Insurance

4.15 Drones of 20kg and above currently require third party liability insurance under EU law unless they are state aircraft, belonging to the military, customs or police services (EU Regulation 785/2004). In addition, all commercial drones, no matter their weight, require insurance. Leisure users of drones under 20kg do not currently require insurance. The EU Regulation in question also defines limits for the minimum amount of third party liability insurance required, based on the mass of the aircraft on take-off.

4.16 In March 2015 the House of Lords EU Committee report published a report on the civilian use of drones in the EU and highlighted several issues around insurance, including that some operators and businesses found it difficult and expensive to purchase insurance, and that the minimum amount of public liability cover (currently set at approximately €660,000 for drones under 500kg) required by European law should be raised. Since then the Government has also been made aware by some stakeholders that the mandated insurance coverage may not sufficiently cover operator error. We are also aware that the insurance industry is proceeding with caution into the drones sector, due to the lack of data on drones and the potential serious risks they could pose. Some insurers have stopped including cover for the use of a drone in larger, all-encompassing policies, such as house insurance.

Approach

4.17 As drone use increases, the Government wants to ensure that the drone insurance market can adapt to match the pace of change and new situations in which drones are used. This is vital for the protection of those negatively affected by an incident, as well as to give businesses and individuals confidence that they have adequately insured themselves.

4.18 The Government is looking at two options for taking action:

- **Proposal C, Option 1:** Work with Industry to encourage best practice. The Government already has some engagement with the drone insurance industry, and has recently launched a specific Drones Industry Action Group. Following the consultation, the Government could explore with industry options for addressing the arising issues and potentially develop an industry agreed and improved standard for drone insurance. Drone operators could then protect themselves by only purchasing drone insurance delivering industry-endorsed standards.
- **Proposal C, Option 2:** Create an Enabling Power in Primary Legislation. Creating an enabling power in primary legislation would allow us to put in place improved insurance requirements on top of the EU requirement, but more tailored to the drone market, following consultation with stakeholders and the public. This proposal is now explored in more detail.

Proposal C, Option 2: An enabling primary power to set UK drone insurance requirements

4.19 A primary power giving the Secretary of State for Transport the ability to make secondary legislation relating to drones insurance requirements would give the Government the ability to address some of the issues being raised about insurance. The Government believes that this proposal could offer the Government a comprehensive and flexible approach to adapt and amend the requirements for drone insurance as the market develops, ensuring anyone negatively affected by a

drone incident is properly protected, whilst not overregulating. Depending on the outcome of this consultation and further analysis, the Government could seek to implement this at the earliest opportunity, consulting on draft primary and secondary legislation alongside it.

4.20 This approach would allow the Government to regulate certain aspects of drone insurance requirements. Some of the areas the Government is interested in considering for improvement are:

a. The levels of public liability insurance required; such as raising the minimum amount of public liability cover required by commercial drone operators.

b. Completeness of Insurance Policies; the House of Lords report also identified that the quality of certain insurance products was in doubt. Anecdotal evidence suggests that user-error may not be covered under traditional policies leaving scope for the insurance to be rendered useless.

c. Tailoring insurance requirements to reflect the risk profiles for different commercial uses, which may be considerably different for each segment of the market.

d. The relationship between risk and Maximum Take-Off Mass (MTOM): this may mean that insurance requirements could be put in place which reduce unnecessary burden on smaller / lower risk drone users.

e. How to use insurance requirements to encourage self-regulation of the drones market, particularly by leisure users. This could include mandating all owners of drones of a certain weight to have insurance. Insurance companies could then set safety requirements to mitigate their risk assessments.

Consultation Question 7. Do you support: Proposal C, Option 1: Working with industry to develop best practice, Proposal C, Option 2: The creation of an enabling primary power to set UK drone insurance requirements, or neither? Why?

Consultation Question 8. In which of the above areas a-e would you be supportive of action being taken? Why do you support action in the areas you have picked and not in others?

5. Ensuring safety and operation within the law

Proposal D: Improving leisure drone user awareness of the law

5.1 As laid out in Chapter 2, the Government has already funded the CAA to deliver a safety awareness campaign, aimed at improved leisure drone user awareness of the law. This campaign has promoted the CAA's safety 'Dronecode' to a wider audience using more innovative campaign methods, such as the current #400ftBritain drone photography competition and an upcoming schools STEM[15] engagement programme. The campaign is aimed at leisure drone users, as it is likely that many of these leisure users are not aware of the rules and legislation that apply to small drones. In the CAA's online survey of members of the public who own or use a drone for leisure purposes (or who are considering doing so), 54% of drone owners, 39% of drone users and 71% of those considering buying a drone who took part in the survey claim to have heard of the 'Dronecode', unprompted by any further detail of what the code was or what it comprised.

5.2 The CAA has recently revamped its Dronecode to better communicate the rules to users and launched a new drone safety website – www.dronesafe.uk – to make the guidance more accessible to the everyday leisure drone user and the public. The CAA is also using the opportunity to re-engage with manufacturers and vendors to ask that they include the Dronecode in drone packaging or hand it out when it is sold. However, whilst many major vendors and manufacturers do so or point towards it online, it is not compulsory to do so, so some do not. Equally, it is not clear how many of those who receive the Dronecode actually read and digest it. They may therefore not be aware of their responsibilities when flying drones, which could be leading to safety, security or privacy incidents.

5.3 Given this, the Government is seeking input in this consultation as to how this situation could be addressed, to improve current guidance and education for users and thereby reduce incident numbers.

Approach

5.4 The Government is considering several options for how guidance on safe and legal flying could be better delivered to drone users:

- **Proposal D, Option 1:** Explore options for mandating official guidance delivery by manufacturers and/or vendors, whilst continuing and building on the CAA's safety campaign.

[15] Science, Technology, Engineering and Mathematics

- **Proposal D, Option 2:** Improve the format of the guidance to make it more comprehensible and educational, perhaps presenting it as a video or even including a short knowledge test.
- **Proposal D, Option 3:** Reduce the complexity of the laws laid out in the Air Navigation Order 2016 which govern how small drones in the UK must be flown.

5.5 A combination of the options above, alongside other measures in this consultation, could be pursued.

Consultation Question 9. Other than those already described here, what other options could the Government consider to improve leisure drone user awareness of the law?

Proposal D, Option 1: Voluntary vs mandatory issuing of guidance

5.6 As laid out above, the CAA has been intensifying its drone safety awareness campaign, achieving good levels of media coverage of the Dronecode and working with manufacturers and vendors to deliver the Dronecode direct to drone buyers. However, it is unlikely these methods are reaching all leisure drone users.

5.7 There are options for further developing the CAA's safety awareness campaign to improve it, such as potentially working with manufacturers to create a 'Dronecode approval mark' if the Dronecode is being issued by this manufacturer or vendor.

5.8 However, the Government is also open to exploring options at a national and EU level to mandate the inclusion of official guidance on safe flying with drones sold in the UK. This approach would put a burden on manufacturers and/or sellers to ensure that their production and logistics processes include issuing the official guidance, but it would ensure that drone buyers in the UK are exposed to this safe flying guidance.

How it could work

5.9 The Government would ensure the production of guidance to be delivered to drone buyers, and manufacturers and/or sellers would be able to issue this physically, or electronically, using the most appropriate and commonly accessible means available. The Government and/or Regulators would review and update the guidance if changes to the law had been met, with a subsequent phase-in of the new guidance by manufacturers/sellers.

Consultation Question 10. Would you support a requirement to issue guidance on flying your drone safely and legally by manufacturers, sellers, or both? Why?

Additional questions for manufacturers and vendors on this proposal are to be found at Annex A.

Proposal D, Option 2: How the guidance could be improved

5.10 The Government would also like to improve the effectiveness of the guidance in raising awareness amongst drone users with regards their obligations under the law and how to fly safely. The Government could perhaps expand the guidance to cover issues wider than safety, including more detail on security, privacy and data protection obligations. The Government proposes to explore delivering this guidance in more impactful ways such as through e-training modules or video tutorials.

Consultation Question 11. Have you read any official drone guidance (such as the CAA's Dronecode, the Informational Commissioner Office's guidance or any other official guidance on drones)?

Consultation Question 12. What guidance have you read?

Consultation Question 13. How can the content and formats of official guidance on drones be improved?

Whether to include age-related guidance

5.11 The Government is also exploring whether there is a need to produce age-related guidance to improve the awareness of risks to safety amongst parents and adults responsible for children when flying drones. This could take the form of:

i. A section of the educational material being specifically aimed at parents and adults with supervisory responsibilities for children.
ii. Labelling on drone packaging to state ages for which the drone might not be suitable. This option would require significant engagement between Government, industry and stakeholders to understand the risks for different drones and agree either:
    - An age below which most drones are not recommended for use
    - A more substantial categorisation of drones and a matching of appropriate ages at which each category of drone might be flown solo.

5.12 There is a risk with option (ii) that those who are older than the recommended minimum age for flying a certain type of drone make the assumption that due to this, they will be more than able to fly a drone and become more complacent about their responsibilities. It would have to be made clear that just because a person might be 'of age' to fly a certain type of drone, that this does not make the task a simple or easy one. Those flying drones need to take their responsibility seriously, adhere to the rules, practice flying carefully and be vigilant to the environment and potential hazards around them at all times. However, this might not be enough to counter their assumptions.

Consultation Question 14. Do you support the creation of official guidance specifically aimed at helping parents and adults responsible for supervising children fly drones safely? Why?

Consultation Question 15. Do you support the creation of a labelling system on drone packaging stating the age suitability? Why?

A knowledge or situational awareness test for leisure drone users

5.13 There is currently no competency requirement or knowledge assessment for leisure users of drones. Given that leisure users of drones are often very new to the world of aviation, they are often unaware of the rules and how challenging flying a drone can be. The safety of other airspace users and the general public is dependent on leisure drone users adhering to the rules and understanding the risks.

5.14 The Government is therefore considering whether on top of the educational guidance on the rules that already exists, there should also be a knowledge or situational awareness test (similar to the driving theory and hazard test) that leisure users could or would have to undertake. Such a test could either be voluntary, or wrapped up into a mandatory registration process (as proposed in Chapter 6 of this consultation). There would likely be a similar threshold of exclusion to registration, i.e. drone owners/users of drones weighing below the drone registration threshold would not be required to take such a test.

Consultation Question 16. Would you support for leisure users the introduction of a knowledge test, situational awareness test or both? Why?

Proposal D, Option 3: Reduce the complexity of the small drone flying rules

5.15 Currently, users of small drones weighing 20kg or less must obey the rules set out in Articles 94 and 95 of the Air Navigation Order 2016 (ANO 2016). The requirements of these provisions have largely been in place since 2010 as they were contained in the Air Navigation Order 2009. They have allowed a vibrant drone industry to develop while protecting other airspace users and people on the ground.

5.16 The Government is considering how the ANO 2016 might be amended to improve regulatory oversight of drones, and in doing so aid communication of the rules to drone users. These amendments would be in line with our key principles for regulation, with regulations that are: proportionate, risk-based, easy to understand, and focused on the operator taking responsibility for the safety of their operation. We would also try to harmonise UK regulations with those being developed in other countries and at the European Aviation Safety Agency (EASA) and International Civil Aviation Organisation (ICAO)-level.

5.17 Changes we are considering include:

A. Amending article 95 to set out more general operating requirements for all small drones.

Article 95 currently applies to 'small unmanned surveillance aircraft'. The requirements, which include that they should not be flown within 50m of people, buildings or other structures, were devised when cameras on drones were not as common. Now nearly all drones have cameras, making specific requirements for these drones less important. The new operating requirements would cover altitude limits (below), any differing requirements for different weight classes of small drones, and other general requirements.

B. Reducing the complexity of the altitude limitations for drones, in general and when near licensed aerodromes and heliports.

The current regulation states that all drones weighing more than 7kg must not generally be flown over 400ft, and this is also advised for smaller drones in the Dronecode, for safety reasons, although it is not a legal requirement. In an amendment of the ANO, Option B could also include amending this altitude limitation to ensure that it does apply to all drones weighing 7kg or less too.

This option would also include making clear that the maximum operating heights for drones should be related to their proximity to airfields or heliports, as follows:

- Beyond 5km from a licensed aerodrome or heliport – not above 400ft
- Within 5km of a licensed aerodrome or heliport – not above 150ft, or the highest obstacle in the area (if higher than 150ft), or
- Within the boundary of a licensed aerodrome or heliport – outdoor drone flights are not permitted without the prior approval of the aerodrome or heliport operating authority.

Consultation Question 17. Are you supportive of changes to the Air Navigation Order 2016 small drone flying rules to make them simpler? Why?

Proposal E: Improving Deterrents

5.18 As laid out in more detail in Annex C, there are laws that already apply to drones in key areas of risk, with corresponding penalties.

5.19 However, despite these, we are seeing breaches of the law happen. As laid out in previous sections, this is likely due to a large proportion of small drone leisure users being unaware of the law. However, there may also be a minority of drone users who are breaking the law because they feel they won't be caught, or feel that the penalties are low enough to make it worth the risk.

5.20 Current rules and penalties include:

- A person convicted of recklessly or negligently acting in a manner likely to endanger an aircraft or any person in an aircraft could be punished by an unlimited fine or by imprisonment for a term not exceeding 5 years or both.
- A person convicted of recklessly or negligently causing or permitting a drone to endanger any person or property could be punished by an unlimited fine or by imprisonment for a term not exceeding two years or both.
- A person can be fined up to £2.5k if convicted of breaking the rules set out in the Air Navigation Order, such as:
  - Users must not fly drones with cameras within 50m of any vehicle, structure or person without permission
  - Users must not fly drones over or within 150m of any congested area or large crowds of people without permission.
  - Users must not fly drones above 400ft or within certain categories of airspace without permission if the drone weights more than 7kg.

5.21 A more detailed summary of the main UK laws applying to the use of drones of no more than 150kg is laid out in Annex C of this consultation document.

Approach

5.22 The Government is exploring several options laid out in Proposal D for improving drone leisure user awareness of the law, but a potential option could also be to increase the level of penalties. The Government is also considering whether there the new nature of drone activity means that the legislation already in place is not sufficient in covering all types of negative misuse of drones. If so, then the Government could consider amending already existing legislation to cover this activity, or even create a new offence for such activity in order to deter and address misbehaviour.

Call for evidence

Consultation Question 18. Do you support increasing deterrents for breaking any of the small drone laws in the Air Navigation Order 2016? Why?

Consultation Question 19. Is there a need to amend current legislation to better enable prosecution relating to drone misuse? Why?

Proposal F: No Drone Flying Zones and Enforcement

5.23 There are already aviation safety rules and restrictions in place in the UK which prohibit the flying of aircraft, including drones, over certain structures and people on a permanent or temporary basis. Drone users with cameras on their drones must also fly at least 50m away from people and also from vehicles, vessels, and structures that are not under the control of the person flying the drone. Drones with cameras must also not be used to overfly or fly within 150m of congested areas or large crowds of people, unless they have a permission issued by the CAA to do so. Drones weighing over 7kg must also not generally be flown above 400ft in height. In addition to complying with the aviation-specific rules, a drone user must also fly their drone at a height which is reasonable in all circumstances to avoid a potential claim for trespass or nuisance.

5.24 The CAA and Secretary of State for Transport have legal powers to protect key infrastructure such as nuclear power stations, prisons, key royal residences and parts of central London. Some of these restrictions can be temporary, for example all flying was prohibited in and over central London whilst President Obama visited, and others are permanent restrictions. These restrictions are communicated by the CAA, and the Police monitor compliance and prosecute breaches.

5.25 At a local level, local authorities often have the power to set bylaws which can be adapted to regulate the use of drones in a park or other areas within the authority's jurisdiction. Private landowners, such as the National Trust, may also set their own rules for drone use on their land.

Government's Approach

5.26 The Government believes more needs to be done to enforce the current flying restrictions, given the breaches of drone flying restrictions that are occurring and may increase in future. The Government has already begun this work with the CAA's education campaign for drone users, which is raising awareness of the rules, and by reaching out to manufacturers to explore options for geo-fencing.

5.27 In addition to these actions, in this section of the consultation the Government would like to explore better ways of physically enforcing the flying restrictions that apply to drones.

How to improve enforcement of flying restrictions

5.28 The Government has identified the following options for actions:

- **Proposal F, Option 1:** Working with stakeholders to better communicate on the ground where flying restrictions apply, such as around airports and prisons, as 'No Drone Flying Zones'. This could include designing and issuing standardised 'No Drone Flying Zone' or drone flying restriction signs for use by public bodies and organisations.
- **Proposal F, Option 2:** Making information of flying restrictions more readily available and accessible to drone users, working with industry to do so, and encouraging the development of apps to alert drone users to nearby restricted flying zones. If the registration of drones were implemented, drone users could also receive updates about flying restrictions relating to specific geographical areas through this process.

Consultation Question 20. Do you support Proposal F, Options 1 and/or 2? Why? .

Consultation Question 21. Are you a public organisation or body with relevant drone flying restrictions?

Consultation Question 22. If so, would you make use of standardised signage to inform the public of restrictions on drone operations? Why?

6. Laying the foundations for a developed drone market

6.1 Like other new and emerging technology the drones market and use of drones are rapidly developing as new drone-powered solutions are discovered and flying drones for leisure 'catches on' with the public. Whilst this offers exciting opportunities to individuals, the public and private sectors in the UK, such rapid change and growth is a challenge for regulators, to ensure that regulation and infrastructure is in place in time to manage and meet these changes. This section of the consultation reflects the Government's intention to regularly review and horizon-scan for changes and developments in the drone market and develop solutions to the challenges ahead.

Proposal G: Registration of drones

6.2 The Government is considering whether to introduce a registration scheme, which would require owners to register themselves and any drones they own weighing 250g and over. Drones weighing more than 20kg already fall under the same registration requirements as those that are applied to manned aircraft, and drones weighing over 150kg are required to be registered by EU law under the European Aviation Safety Agency Basic Regulation ((EC) 216/2008). This element of the consultation is aimed at investigating the value of introducing a registration scheme which includes smaller drones, weighing between 250g and 20kg.

6.3 The USA and Ireland have both recently introduced more widespread registration requirements – in the USA all drones above 250g must be registered; in Ireland all those above 1kg must be registered. A requirement for all drones weighing 250g and over is already being discussed at an EU level, and as part of this, the Government is considering how best a registration scheme could be delivered at the national level.

Approach

6.4 The Government has identified 3 options for action:

- **Proposal G, Option 1:** Not to introduce a registration scheme for drones between 250g-20kg.
- **Proposal G, Option 2:** To introduce a registration requirement **in the near future** for all drones weighing 250g and over.
- **Proposal G, Option 3:** To introduce such a registration scheme **in the longer term**.

6.5 **Option 1 vs Options 2 or 3 – Should a registration scheme be introduced?** The Government's initial assessment is that introducing a registration scheme for small drones would bring with it advantages in both the short and longer term.

6.6 In the short-term, mandatory registration would be integral to allowing the Government to address some of the challenges posed by drones by ensuring drone

users were aware of their responsibilities, and also targeting further educational materials at them to improve their awareness and adherence to safety, privacy and security rules. A registration scheme would also give the Government and regulators valuable indications of the numbers of drones actually in the UK, which could be useful to assess risk and develop future policy.

6.7 The Government is also interested in pairing such a registration scheme with a legal requirement to notify when you are flying a drone in a certain area via an app on your smart phone. This would allow identification of drone operators where necessary. Such a process could allow any member of the public seeing someone operate a drone, or a drone flying around without a visible operator, to log into the app and check if someone has notified that a drone flight or flights will be taking place. If the drone operator had done so, and was breaking regulations, they could then be identified to the Police, and if the drone operator had not identified themselves, this would be a good indicator to the authorities and security officials around sensitive sites that the drone might be being maliciously misused and require investigation.

6.8 In the longer-term, the Government's current assessment is that registration for all drones weighing 250g and above would be helpful for forming the foundation on which a framework for regulating drones further in the future would be built, much as motor vehicles must be registered. For drones to become an accepted part of operating in society, drone operators should be willing to be registered, to be held accountable for their drone and acknowledge their responsibility to comply with the law.

6.9 In the next few years, it is also likely that drones will become 'electronically identifiable' – i.e. they will have a small 'transponder' or 'beacon' on-board which will signal the drone's identity to those on the ground or in the air around them, equipped with the appropriate scanning equipment. This capability is also known as 'electronic conspicuity' and is covered more fully in the next part of this section. Registration is a key building block to facilitating this kind of process and improving enforcement even more in the future.

6.10 Whilst at this time, the Government envisages that a registration requirement would not apply to drones below 250g in weight, this could change as the technology develops and advances. If drones weighing less than 250g become capable of flying easily beyond the visual line of sight of their operator, the Government might consider adapting any registration requirement to include any drones below 250g in weight that their owner wants to fly beyond visual line of sight. This would be to ensure that accountability can be maintained even where a physical operator cannot be identified. The Government will keep the registration policy under regular review in order to assess whether and when such a change might be needed.

6.11 **Option 2 versus 3 – should a registration scheme be introduced in the near future or in the longer-term?** Given the benefits a registration scheme would allow in the short-term, the Government is currently of the view that pursuing option 2 would be most beneficial. Whilst waiting to develop and introduce a scheme as in option 3 might allow the Government to better assess the impact of a registration policy, by collaborating with the US and Irish authorities, this would also make introduction of a registration scheme more difficult and reduce compliance with the measure, as drone ownership and operation is expected to continue to swell in the coming years. Development of a scheme in the near future also has the potential to allow UK Government to feed in requirements to other schemes under development, both at an EU-level and further afield.

6.12 The Government is keen to establish whether stakeholders and the public would support the introduction of a registration scheme now, in a few years' time, or not at all. In the sections below, the Government explores in more detail what a registration scheme could look like, before asking respondents to give their overall verdict on which option to pursue.

Proposal G, Option 2: to introduce a registration scheme in the near future:

6.13 **Who would be required to register and when**

- All drones (defined in law as 'unmanned aircraft') weighing 250g and over would need to be registered by their owner through an online portal. This weight threshold has been selected because drones below this weight pose the lowest safety risk and are often toys. The Government therefore considers that regulation of drones weighing less than 250g area would be overly burdensome and prohibitive.
- Drones weighing 250g and above are more likely to injure someone in an accident due to their greater weight, and are also more likely to have cameras, fly higher and further and for longer. Their owners would therefore require a higher level of awareness of the law and their responsibilities, and so should be included in a registration proposal. Selecting this weight threshold would also bring the UK into harmony with the US scheme and most likely also the EU.
- Drones of 250g in weight and over would need to be registered before they can be used. If a drone changes ownership, the new owner would be expected to register the drone as theirs within 10 working days, and before flying it.
- For drones already in the UK and not registered, there would be a grace period and then a set deadline before which their owners must register these drones.
- As explained above, it is possible that in the future the Government would revisit and potentially amend the scope of who is required to register, to adapt the regulation to meet changes and developments in the technology in future. One possible example of this would be to require all drones being flown beyond visual line of sight to be registered, even if they weighed below 250g.

Consultation Question 23. At what weight should a drone be excluded from registration? Please explain your reasoning.

Consultation Question 24. Should the threshold for exclusion from registration be based on a different metric (such as how high you intend to fly the drone?)

Consultation Question 25. If you think so, what more appropriate or different threshold do you suggest and why?

Consultation Question 26. Who should be made responsible for collecting and holding small drone registration details? The Civil Aviation Association or another body? Why?

6.14 Model aircraft

- This registration policy could also apply to model aircraft weighing 250g and over. There could also be an option within the registration policy to exclude model aircraft and their owners from the requirement, perhaps by exempting those belonging to model aircraft flying clubs from the requirement, as they have a recognised and long standing safety culture.

Consultation Question 27. Do you support registration requirements not applying for certain owners of model aircraft below 20 kilograms in weight? Why?

Potential Process of Registration

1 **How the information is collected:** The Government wishes to explore different options for registration. These include:

   a. Requiring owners to manually register themselves and their drones on a specified website using a simple form;

   b. Working with sellers and manufacturers to include registration as a part of their vending or drone activation process;

   c. Integrating registration processes with other drone-related mandated processes, such as the CAA permission process for commercial drones.

2 **What information registration could require. The Government currently envisages that this would include:**

   a. The owner's name, address and contact information

   b. The number of drones they own

   c. For each drone: the make and model of drone and if it has one, the product's unique identifying number. If the drone is homemade, a description of the drone and its capabilities.

   d. Whether they will be the main flyer/user of the drone or whether others will be using the drone

3 **Registration Cost:** There could be a small charge on owners for registering a drone or drones. This cost could be a one-off or periodic charge, and applied either to the owner or on a per drone basis. The charging fee could vary depending on whether an individual or an organisation is the owner, and the size of the organisation that is applying. The charging fee would need to cover the full costs of running the scheme, educating drone users about the law and potentially some of the wider costs of regulating drones. Taking a payment by credit card could also ensure that an owner's identity can be adequately verified. Detailed proposals for a statutory charging arrangement, including charge levels, would be subject to further consultation.

4 **Registration number:** Once the drone owner has inputted the information required and paid, it is envisaged they would receive a unique drone registration number for each drone they own. The owner would be required to keep hold of this number for their records. There could be a requirement to display this number on the drone or store the number electronically on the drone.

5 **Renewal of registration:** On a yearly basis, a drone owner would be required and reminded to revisit and update their registration record.

6 **Using registration as a means to educate drone users:** The Government wishes to add into the registration process an educational section. This could have the aim of ensuring that drone users are aware of their responsibilities according to the rules and why these rules have been put in place. This could be as simple as a list of the laws that apply and why and a requirement for the drone user to acknowledge they have read and understood their responsibilities, or a more extensive tutorial or e-learning. The best formats for educating drone users in this way are considered in Chapter 5 (Proposal D) of this consultation. The registration education process could be used as a way of more extensively educating, and testing leisure drone users on their knowledge.

Consultation Question 28. Do you support the registration process proposed? Why?

Consultation Question 29. Do you support a small charge being imposed on drone owners when registering their drone? Why?

Consultation Question 30. What do you think about the parameters for a charging scheme outlined above?

Use of personal data collected by registration

- Personal information collected during the registration process would not be made publically available. In certain circumstances, where a drone had been misused, for example, that information could be released to the relevant law enforcement authorities. Or if a drone was lost and handed into the Police, it could potentially be used to return it to the owner.
- Subject to consent being given at registration, the body holding the registration details could potentially use these details to pass on other relevant information to drone users in future, including, for example, notice of when any temporary flying restrictions for drones are in place locally (See Chapter 5 (Proposal F) for further detail).
- The Government is open to considering whether anonymised and non-identifying data, such as how many drones are registered in a local authority, could be made publically available for the benefit of local government policy planning, public awareness of local drone use and other such purposes.

Consultation Question 31. Should some anonymous/non-identifying data collected by registration (such as numbers of drones in a local area) be made publically available? What data and why?

Final assessment

Consultation Question 32. Having considered some elements of how the registration scheme would be implemented, which of the following options is your preferred option:

- Proposal G, Option 1: Not to introduce a registration scheme;
- Proposal G, Option 2: To introduce a registration scheme in the near future; or
- Proposal G, Option 3: To introduce a registration scheme in the longer term

Why?

Proposal H: Electronic Identification of drones

6.15 As more drones enter our skies we will need a more effective and sophisticated method of identifying drones and making them detectable to other drones around them, as well as members of the public and authorities on the ground. This will allow drones to sense and avoid each other when flying to ensure safety, but it will also be important in addressing the public's concerns about safety and security, the potential for invasions of privacy and misuse, by ensuring accountability and enabling enforcement of the rules governing drone usage.

Approach

6.16 We envisage a digital identification system embedded in all drones over a certain weight, which will identify the drone in the air to drone traffic management systems, other drones flying around it and other airspace users, as well as anyone 'scanning' the drone from within a certain distance equipped with appropriate 'scanning' technology. Scanning a drone would release its unique identifying number. If the drone operator was perceived to be breaking the law, this number could then be used by the Police to track the owner of the drone down via the drones registry. The device could therefore be linked with its registered owner, ensuring accountability for its actions.

6.17 The requirement for a drone to be electronically identifiable would need to be mandatory to achieve this. Such a requirement could also be more effective if implemented at a European level as the drone market is an international one, and this would enable alignment of standards. However, the Government's current understanding is that the required technology for such a digital identification system is not yet readily available, or of a size that can be fitted on to a drone. The Government anticipates that this technology is therefore a few years away from market readiness, but to prepare for the future, the Government is already involved in discussions to introduce a mandatory electronic identification requirement. The Government envisages that the eventual result of these discussions will be the implementation of a mandatory electronic identification requirement, either at domestic or European level, in the next few years The Government will keep this assessment under review as the drone market changes and develops over the next few years, to ensure such a mandatory electronic identification requirement remains appropriate and feasible.

Consultation Question 33. Do you agree with the proposed approach to implementing an electronic identification requirement? Why?

Consultation Question 34. Should all registered drones be electronically identifiable? Why?

Consultation Question 35. If no, what drones should be excluded from electronic identification and why?

6.18 As highlighted in the section covering Proposal G: the registration of drones, in the shorter-term, the Government plans to explore options for mandating the use of an 'app' to notify those around you and authorities that you intend to fly a drone in a certain area. It could also inform users whether it was permissible to fly their drone in the area they wished to, improving enforcement of airspace restrictions. Such an app notification system would have the advantages of increasing accountability, as well as finessing the application of airspace restrictions. A notification app system could, for example, be used to liaise with local airport air traffic controls to allow some restricted airspace around airports to be opened for limited operations.

6.19 The NATS 'Drone Assist' app[16] that was recently launched is an example of the kind of app that could be built and mandated for use. Whilst any use of 'Drone Assist' is voluntary, the app has the functions described above – it advises drone users of local airspace restrictions and hazards, and allows users, through use of a 'Fly Now' button, to voluntarily indicate that they are flying their drone in the area and make those also using the app around them aware.

6.20 The Government is considering the possibility of piloting the mandatory use of an app with these kinds of capabilities in one or two small geographical areas. This would mean that if a drone user wanted to fly their drone there, they would be required to use the app to notify their intention to fly, and follow advice the app gives as to whether drones should or should not be flown in a certain location, and with regards other hazards. Through the pilots the Government could assess whether such a mandatory requirement could benefit safety, security, privacy and enforcement.

6.21 Using an app like this might also enable more airspace to be opened up for commercial use, as the app could allow a greater granularity and specific application of airspace restrictions. The app could be used to verify that a commercial operator has the correct permission from the CAA to operate in this specific area, and then allow them to proceed.

Consultation Question 36. Do you support a pilot scheme mandating the use of an app to notify other app users and authorities that you are flying a drone in a certain area? Why?

[16] http://dronesafe.uk/drone-assist/

Proposal I: Drone Traffic Management

6.22 As the use of drones become more widespread, it becomes increasingly difficult to ensure that they are all flying safely together. If drones are to fly beyond where their operators can see them, they must do so whilst sharing the airspace safely with the existing airspace users, comfortably avoiding buildings, trees, power lines and other obstacles and each other. To ensure that these multiple, simultaneous and longer distance flights are safe, several countries are considering developing an equivalent of air traffic management for drone flights. Like our road or air traffic management system, the drone traffic management system will let drone operators know what they need to do to operate safely in everyday operations as well as emergency situations.

6.23 A Drone Traffic Management System, referred to as 'Unmanned Traffic Management' (UTM) throughout this section of the consultation, would be a system of both software and hardware, which ensures drone operations meet existing and future aviation safety standards, taking account of each other and within the existing physical environment.

Approach

6.24 The Government is working with industry and regulatory partners to explore developing an overall national architecture for UTM, which would ultimately set out how the system will operate, be funded and regulated. This development is currently at a very early stage, so this consultation sets out an overview and underlying principles of the UK UTM solution. The financial and organisational aspects of UTM have not yet been considered in detail.

6.25 Currently, manned air traffic in controlled airspace is managed by air traffic controllers, who communicate with pilots to keep aircraft separated ensuring that collisions are avoided and that traffic flows as efficiently as possible, making the most of the airspace available. A manned air traffic control approach would prove a very costly way of safely traffic-managing drones. A mostly automated approach would be more efficient, where the UTM system itself is capable of capturing flight data and of making many of the decisions about how to manage the airspace. It could also be cloud-based, so it could be accessible to anyone on an internet-connected device. Ensuring cyber-security would also be essential for the UTM system, and would be considered from the start of the design process.

6.26 Like traditional air traffic control, drone traffic management should take a flexible approach, allowing a wide range of aircraft with very different capabilities to share the airspace. This may require a hierarchy of priorities to be established determining which aircraft will give way to others, this would be considered as part of the design process. As well as flexibility, the system could also use common standards to enable a seamless operation between different regions and traffic management service providers.

6.27 The system would ultimately need to be able to operate in collaboration with existing air traffic management systems so that drones can move safely through controlled airspace when required, without affecting safety for manned aircraft. Alongside increasing automation and connectivity in the wider transport system, a UTM system would be a building block to the emerging integrated transport system of the future. A requirement of the system would have to be that it is capable of developing flexibly as technologies and regulations develop.

Operation of the UTM System

6.28 The UTM could have several different functions to ensure that many drones can fly safely at the same time. Its major purpose would be to help protect people's safety, privacy and property by providing information to keep drones separated from each other during flight.

6.29 This could be implemented by requiring drone operators to submit their flight plans in advance and the UTM system deciding whether to grant permission based on where they are planning to fly, information on other drone flights in the relevant area, and any other restrictions on that place and time. The system would also be able to give information to drones and operators as they fly, such as warnings, advice, and notifications.

6.30 There could be a large number of UTM-related services that support this central decision-making function. The details of these are still being considered, but they could consist of:

- A widely available high-resolution 3D map, including permanent and temporary restrictions on airspace operations, to help drone operators avoid collisions and the UTM system to understand the risk. This map could be dynamically updated using data from drones, other vehicles and ground based monitoring systems, and incorporate real-time weather data and forecasts.
- A system to allow operators to submit information about a proposed flight, for it to be assessed based on existing traffic demands, operator licence and airspace restrictions prior to a flight approval or rejection being given.
- A system to identify, track and monitor drones while in flight, linking them to the verified owner, and flagging any anomalous behaviour.
- A secure communication system between the UTM System and drone operators, for both normal and emergency notifications.
- A publicly accessible drone flight database would allow members of the public to see drones in their area in real-time or near real-time, including the purpose and intended duration of their flight. Any commercially or personally sensitive information would be safeguarded.

6.31 As the UTM system would be flexible, incorporating many different airspace users, it would have to treat different types of users differently, depending on the size, technical capabilities, purpose and operator of the drone. For example, emergency responders such as Police, Ambulance or Fire and Rescue drones would take precedence over all other drone flights.

Consultation Question 37. Do you agree with the proposed characteristics of the drone traffic management system? Why?

Underlying Principles

6.32 Global work on UTM is currently mostly focusing on development of a UTM system for all drone operations below 500ft, but ultimately a drone traffic management system would need to extend throughout airspace, integrating large-scale drone operations with current aircraft operations – possibly more drone operations than there currently are manned aircraft operations. Although a UTM system has not yet been designed, principles have been developed that would guide the development of the system. These are:

- Access to the airspace should remain available to all, provided that each aircraft is capable of meeting the appropriate conditions, regulations and processes defined for that airspace.
- For any aircraft, manned or unmanned, it must have the functional capability and equipment and the operator must be appropriately qualified to meet the established normal and contingency operating procedures for the class of airspace, aerodrome etc.
- Where new types of operation need additional considerations, conditions, regulations and processes, these should be the minimum necessary to achieve safe operation. The requirements for safe operation will be defined in regulation.
- These new types of operation must not have a negative impact on safety for other airspace users or the general public, and must not unduly impact other airspace users or service providers (such as Air Traffic Management, aerodromes etc.)

Consultation Question 38. Do you agree with the proposed underlying principles for the drone traffic management system? Why?

Electronic identification of drones

6.33 The ability to electronically identify a drone has several advantages as laid out in the previous part of this section (Proposal H), but it would also be beneficial for the delivery of a UTM system. On-board drone identification technology would allow the system to track and monitor the drone's flight, and ensure that UTM advice and instructions were followed by the drone operator. In order to use the UTM system, it would likely be compulsory for drones to have such an on-board drone identification and conspicuity technology if they wished to undertake certain drone operations, such as those going beyond visual line of sight.

6.34 The timeline for the introduction of an electronic identification requirement for drones in the near future would be considered as part of the UTM Project.

Consultation Question 39. Do you agree that it should be compulsory for a drone to be electronically identifiable in order to use the UTM system? Why?

6.35 In managing increasing use of the airspace by drones, we want to ensure the safety of all manned and unmanned aircraft.

6.36 Electronic conspicuity for low-altitude general aviation users (which incorporates aircraft identification) is currently voluntary, but is encouraged, as developed in guidance by the CAA and set out in CAP1391. If a low-altitude general aviation user were electronically conspicuous, this would allow the UTM to identify whether it was in the vicinity of any drone flights and alert drone operators and general aviators as appropriate, allowing collisions to be prevented.

Consultation Question 40. Should electronic identification for manned general aviation be mandatory? Why?

Funding

6.37 As a new service, developing and running a UTM service would incur costs. It would also need to be regulated, which would mean a central regulator would also incur costs to undertake approval and oversight functions. One option for cost recovery could be from users of the system, as they would be directly benefiting from using such a system. Whilst road users don't directly pay for the upkeep and running of traffic lights, in aviation, the airlines using air traffic control services are required to pay for it. This system works because using air traffic control is mandatory for

commercial airlines, in which case it might be necessary to make the use of the UTM mandatory for drone users wishing to fly in certain areas, beyond visual line of sight and at certain heights, along with a mandatory payment. Some elements of UTM could be provided by a competitive market, and there would also be a need to consider how best to ensure the reasonableness of charges as well as how the different areas could be licensed.

Consultation Question 41. How should a drone traffic management system be funded?

7. Summary of Consultation Questions

Please respond to this consultation by using the electronic form found on www.gov.uk where this consultation document was published. For reference, all the consultation questions are also listed below, but please note that the question numbers may differ between those referenced in this document and those on the electronic survey.

Proposal A: Evaluating the UK's drone testing site provision and processes

Consultation Question 1. Is the UK's current testing site provision for drones adequate?

Consultation Question 2. Which of the above Proposal A, Options 1-4 is your preferred option and why?

Consultation Question 3. What other options could you suggest?

Proposal B: Pilot competency, training and licensing

Consultation Question 4. Are new competency standards and qualifications needed? Why?

Consultation Question 5. What should the new standards and qualifications be?

Consultation Question 6. How should the new standards and qualifications be taught and tested?

Proposal C: Insurance

Consultation Question 7. Do you support: Proposal C, Option 1: Working with industry to develop best practice, Proposal C, Option 2: The creation of an enabling primary power to set UK drone insurance requirements, or neither? Why?

Consultation Question 8. In which of the above areas a-e would you be supportive of action being taken? Why do you support action in the areas you have picked and not in others?

Proposal D: Improving leisure drone user awareness of the law

Consultation Question 9. Other than those already described here, what other options could the Government consider to improve leisure drone user awareness of the law?

Consultation Question 10. Would you support a requirement to issue guidance on flying your drone safely and legally by manufacturers, sellers, or both? Why?

Consultation Question 11. Have you read any official drone guidance (such as the CAA's Dronecode, the Informational Commissioner Office's guidance or any other official guidance on drones)?

Consultation Question 12. What guidance have you read?

Consultation Question 13. How can the content and formats of official guidance on drones be improved?

Consultation Question 14. Do you support the creation of official guidance specifically aimed at helping parents and adults responsible for supervising children fly drones safely? Why?

Consultation Question 15. Do you support the creation of a labelling system on drone packaging stating the age suitability? Why?

Consultation Question 16. Would you support for leisure users the introduction of a knowledge test, situational awareness test or both? Why?

Consultation Question 17. Are you supportive of changes to the Air Navigation Order 2016 small drone flying rules to make them simpler? Why?

Proposal E: Improving Deterrents

Consultation Question 18. Do you support increasing deterrents for breaking any of the small drone laws in the Air Navigation Order 2016? Why?

Consultation Question 19. Is there a need to amend current legislation to better enable prosecution relating to drone misuse? Why?

Proposal F: No Drone Flying Zones and Enforcement

Consultation Question 20. Do you support Proposal F, Options 1 and/or 2? Why? .

Consultation Question 21. Are you a public organisation or body with relevant drone flying restrictions?

Consultation Question 22. If so, would you make use of standardised signage to inform the public of restrictions on drone operations? Why?

Proposal G: Registration of drones

Consultation Question 23. At what weight should a drone be excluded from registration? Please explain your reasoning.

Consultation Question 24. Should the threshold for exclusion from registration be based on a different metric (such as how high you intend to fly the drone?)

Consultation Question 25. If you think so, what more appropriate or different threshold do you suggest and why?

Consultation Question 26. Who should be made responsible for collecting and holding small drone registration details? The Civil Aviation Association or another body? Why?

Consultation Question 27. Do you support registration requirements not applying for certain owners of model aircraft below 20 kilograms in weight? Why?

Consultation Question 28. Do you support the registration process proposed? Why?

Consultation Question 29. Do you support a small charge being imposed on drone owners when registering their drone? Why?

Consultation Question 30. What do you think about the parameters for a charging scheme outlined above?

Consultation Question 31. Should some anonymous/non-identifying data collected by registration (such as numbers of drones in a local area) be made publically available? What data and why?

Consultation Question 32. Having considered some elements of how the registration scheme would be implemented, which of the following options is your preferred option:

- Proposal G, Option 1: Not to introduce a registration scheme;
- Proposal G, Option 2: To introduce a registration scheme in the near future; or
- Proposal G, Option 3: To introduce a registration scheme in the longer term

Why?

Proposal H: Electronic Identification of drones

Consultation Question 33. Do you agree with the proposed approach to implementing an electronic identification requirement? Why?

Consultation Question 34. Should all registered drones be electronically identifiable? Why?

Consultation Question 35. If no, what drones should be excluded from electronic identification and why?

Consultation Question 36. Do you support a pilot scheme mandating the use of an app to notify other app users and authorities that you are flying a drone in a certain area? Why?

Proposal I: Drone Traffic Management

Consultation Question 37. Do you agree with the proposed characteristics of the drone traffic management system? Why?

Consultation Question 38. Do you agree with the proposed underlying principles for the drone traffic management system? Why?

Consultation Question 39. Do you agree that it should be compulsory for a drone to be electronically identifiable in order to use the UTM system? Why?

Consultation Question 40. Should electronic identification for manned general aviation be mandatory? Why?

Consultation Question 41. How should a drone traffic management system be funded?

Annex A: Additional consultation questions for manufacturers / vendors

General drone data questions

Consultation Question 42. Regarding market size, how many leisure drone users do you estimate are in the UK?

Consultation Question 43. How many drones do you estimate are annually sold in the UK?

Consultation Question 44. What is the scale of future expansion in the leisure drone market over the next: 1, 5, 10 years?

Consultation Question 45. How many firms operating drones do you estimate to exist in the UK as of today, 1 years' time, 5 years' time, 10 years' time, 20 years' time?

Proposal D: Improving leisure drone user awareness of the law

Consultation Question 46. Do you already issue guidance on the Dronecode?

Consultation Question 47. If it were mandatory to include a guidance leaflet in each drone box, how much would this add, per drone, to the cost of: (for manufacturers) the packaging and quality control process, and (for retailers) ensuring all stock is compliant with regulations?

Consultation Question 48. How often do you change the packaging of your drone products?

Consultation Question 49. What are the costs of changing packaging for 1 product line?

Proposal G: Registration of drones

Consultation Question 50. Are you open to including registration as part of your: sales process and/or drone activation process? Why?

Consultation Question 51. What would you assess the financial cost to be of completing a registration process within your activation process and/or sales process?

Consultation Question 52. What would you assess the financial cost to be of completing each individual registration during the activation process and/or sales process?

Proposal H: Electronic identification of drones

Consultation Question 53. Do you think it is currently realistic for a drone to electronically identifiable?

Consultation Question 54. If yes, on a per drone basis, how much would the technology to enable electronic identification add to the cost of manufacturing and the retail price?

Consultation Question 55. Would these costs impact the viability of your business?

Annex B: Additional consultation questions for commercial drone users and those considering using a drone for a commercial service

Proposal G: Registration of drones

Consultation Question 56. If you are a company using drones to deliver services, how many drones do you currently have that fall into the 250g-20kg category?

Consultation Question 57. How many trained operators do you have per drone?

Consultation Question 58. What are your main uses for drones?

Consultation Question 59. How regularly are the drones used?

Questions for companies planning to use drones to deliver services on Proposal G: Registration of drones

Consultation Question 60. If you are a company planning to use drones to deliver services, what are your future plans for drones?

Consultation Question 61. How many drones of this weight range do you anticipate you will have in the next year, 5 years and 10 years? Why?

Questions for both groups on Proposal G: Registration of drones

Consultation Question 62. Does your company currently make use of drone service providers, or do you expect to use them in future?

Consultation Question 63. Would mandatory registration for drones make you more or less likely to purchase a drone, hire the services of a professional drone pilot, or use a drone service provider? Why?

Consultation Question 64. What is your industry area, and how do you envisage the growth rate in drone use within your industry?

Consultation Question 65. What are the main factors this will depend on?

Consultation Question 66. As an organisation providing or making use of drone services, what do you estimate to be the financial impact of a registration requirement on your firm?

Annex C: The law in the UK today

The law applicable to the use of drones in the UK includes both aviation-specific and general law. Safety is the primary focus of the relevant aviation rules which differ depending on the weight of the drone which is being flown.

Currently, the safe use of drones weighing no more than 150kg is subject to UK aviation regulation only, in particular the Air Navigation Order 2016.

The safe use of drones weighing more than 150kg is regulated by European law set out in Regulation (EC) 216/2008 (known as the Basic Regulation) and its amending acts. This Regulation, which sets the mandate of the European Aviation Safety Agency (EASA), is currently being renegotiated, and the new proposal covers all drones, regardless of weight. The Government broadly supports the proposals of the European Commission and EASA to develop clear harmonised rules to ensure the safe operation of drones across Europe and particularly the UK.

On 23 June, 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.

The Government is considering carefully all the potential implications arising for our aviation industry from the UK's exit from the EU, including the implications for the continued participation in the EASA system. Until we leave, EU law will continue to apply to the UK, alongside national rules.

A summary of the main UK laws which drone users should be aware of are captured in the table below.

A summary of main UK laws applying to use of drones of no more than 150kg		Penalties & Enforcement
Relevant to aviation and general public safety	**<u>All drones:</u>** • Users must not recklessly or negligently act in a manner likely to endanger an aircraft, or any person in an aircraft. • Users must not recklessly or negligently cause or permit a drone to endanger any person or property.	• A person convicted of recklessly or negligently acting in a manner likely to endanger an aircraft or any person in an aircraft could be punished by an unlimited fine or by imprisonment for a term not exceeding 5 years or both.

A summary of main UK laws applying to use of drones of no more than 150kg		Penalties & Enforcement
Relevant to aviation and general public safety	**Drones weighing not more than 20kg:** • Users can only fly the drone if they are reasonably satisfied that the flight can safely be made. • Users must maintain direct, unaided visual contact with the drone to monitor its flight path in order to avoid collisions, unless a CAA exemption applies. • Users must not fly drones with cameras within 50m of any vehicle, structure or person without permission • Users must not fly drones over or within 150m of any congested area or large crowds of people without permission. • Users must not fly drones above 400ft or within certain categories of airspace without permission if the drone weighs more than 7kg. **Drones weighing more than 20kg:** • Users must comply with the aviation regulations that apply to operating manned aircraft. These include the requirement for prior approval before the aircraft can be flown. The specific details of the approval will be depend on the type of operation that the drone is conducting to ensure appropriate management of risk.	• A person convicted of recklessly or negligently causing or permitting a drone to endanger any person or property could be punished by an unlimited fine or by imprisonment for a term not exceeding two years or both. • A person convicted of any of the other offences set out under the heading 'Drones weighing not more than 20kg' in the box immediately to the left could be punished by a fine not exceeding £2.5k.
Relevant to privacy	• Drone operators collecting personal data must comply with the Data Protection Act 1988 (DPA) unless a relevant exemption applies.	• The DPA is enforced by the Information Commissioner's Office (ICO). The ICO can take enforcement action against a person who breaches the DPA by requiring them to change their practice, by imposing fines for unlawfully obtaining or accessing personal data which is a criminal offence under the DPA. An individual who suffers damage because of a breach of the DPA could also make a claim for compensation.

A summary of main UK laws applying to use of drones of no more than 150kg		Penalties & Enforcement
Relevant to privacy	• Drones should be flown at a height over the property of another person which is 'reasonable' in all circumstances. Failure to do so could amount to trespass if the flight interferes with another person's ordinary use and enjoyment of land and the structures upon it.	• In the case of trespass, a civil claim may be brought against the drone user seeking compensation for any damage suffered as a result of the trespass. Alternatively, an injunction may be sought to prevent trespass in the future.
Relevant to security	• It is a criminal offence to convey a range of prohibited items into and out of prisons without authorisation. • It is a criminal offence to do anything from outside a prison that results in any article or substance (which it is not otherwise an offence to convey into a prison) being projected or conveyed over or through a boundary of a prison so as to land in a prison without authorisation. • General security and terrorism laws also apply to the use of drones.	• The maximum penalties for conveying items into and out of prisons depends on the classification of the item. For example, a conviction for conveying controlled drugs is punishable by an unlimited fine or a term of imprisonment not exceeding 10 years or both. • Unlawfully causing an article to be projected over or through a boundary of a prison is punishable by an unlimited fine or imprisonment for a term not exceeding two years.