

<b>Title:</b> Drones and other Unmanned Aircraft Bill IA <b>IA No:</b> DfT00398 <b>RPC Reference No:</b> RPC18-DFT 4208(1) <b>Lead department or agency:</b> Department for Transport <b>Other departments or agencies:</b> BEIS	<b>Impact Assessment (IA)</b>			
	<b>Date:</b> 30/12/2017			
	<b>Stage:</b> Consultation			
	<b>Source of intervention:</b> Domestic			
	<b>Type of measure:</b> Primary legislation			
<b>Contact for enquiries:</b> Adam Martin				

**Summary: Intervention and Options** **RPC Opinion: Fit For Purpose**

Cost of Preferred (or more likely) Option				
Total Net Present Value	Business Net Present Value	Net cost to business per year (EANDCB in 2014 prices)	One-In, Three-Out	Business Impact Target Status
-£73,308,000	-£73,308,000	N/A	N/A	N/A

**What is the problem under consideration? Why is government intervention necessary?**

Drones can pose a safety risk, and awareness how the rules on safety, security and privacy apply to drones is not as widespread and thorough as it should be. Following an accident or a breach of the rules it is difficult to identify the drone owner and the police lack the sufficient powers to pursue offenders. As drone numbers increase, this poses an increasing risk of an accident and an increasing challenge as to how best ensure compliance. To address these challenges and to allow drone users to have better understanding of the rules as well as addressing public concerns, a mandatory safety and flight notification app would be a simple first step. Addressing the limitations of police powers will also empower them to better be able to pursue offenders.

**What are the policy objectives and the intended effects?**

1. Increase accountability by ensuring that drone users create notification of where and when they are flying.
2. Improved compliance with the rules and standards of behaviour amongst drone users by making sure they have the information they need to assess issues of safety, security and privacy.
3. Availability of one or more high quality apps which are held to consistent standards and provide assured information to users helping them to make good decisions and allowing a clearer awareness of how the airspace is being used.
4. Enhance the powers of the Police to be able to pursue those who are suspected of misusing drones.

**What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)**

There are four options: 1) do nothing; 2) introduce a mandatory app but do not enhance police powers; 3) enhance police powers, but do not introduce a mandatory app; and 4) introduce the mandatory use of an app and enhance police powers. Option 1 represents the status quo and would mean that the current problems of lack of compliance with the rules will continue with police limited in their powers to take action. The problem will get worse as drone use increases. Option 2 would improve safety and knowledge of the regulations for well-meaning drone users, but would not improve the police's abilities to pursue those deliberately breaking the law. Option 3 would enhance the police's ability to pursue offenders, but would not provide them with the additional information that would help them to identify where rules have been broken. Additionally apps would continue to be developed, but we would have no assurance that they are providing accurate information. Option 4 represents the preferred option as it allows us to mandate approved and verifies apps with accurate information as well as enhancing police powers and access to information.

**Will the policy be reviewed?** It will be reviewed. **If applicable, set review date:** 10/2026

Does implementation go beyond minimum EU requirements?	No			
Are any of these organisations in scope?	<b>Micro</b> Yes	<b>Small</b> Yes	<b>Medium</b> Yes	<b>Large</b> Yes
What is the CO <sub>2</sub> equivalent change in greenhouse gas emissions? (Million tonnes CO <sub>2</sub> equivalent)	<b>Traded:</b> N/A		<b>Non-traded:</b> N/A	

*I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.*

**Signed by the responsible Minister:**  **Date:** 12.7.18



# Summary: Analysis & Evidence

# Policy Option 1

Description: Introduce mandatory use of a safety app without modifying police powers

## FULL ECONOMIC ASSESSMENT

Price Base Year 2017	PV Base Year 2018	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: -10.3	High: -549.3	Best Estimate: -73.3

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£369,000	£996,000	£10,329,000
High	£10,940,000	£53,835,000	£549,286,000
Best Estimate	£3,315,000	£6,999,000	£73,308,000

### Description and scale of key monetised costs by 'main affected groups'

Costs include familiarisation costs, transition costs of installing app and the cost of time of activating the app. One off costs per business and per flight are low, so cost levels are driven by volume of firms and operators expected.

### Other key non-monetised costs by 'main affected groups'

Costs of time and app purchase to non-commercial users. Costs are voluntary

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0	NQ	NQ
High	0	NQ	NQ
Best Estimate	0	NQ	NQ

### Description and scale of key monetised benefits by 'main affected groups'

No monetised benefits due to uncertainty regarding scale, value and how attributable the benefits of Privacy, Security and Safety to other airspace users and wider society. This is part of a wider programme to ensure that the benefits of drones through efficiency, safety and effectiveness are felt throughout the economy.

### Other key non-monetised benefits by 'main affected groups'

Benefits are twofold: avoiding the costs of unsafe drone use, by improving information available to all drone users, and the benefits that come from increased drone use, which is only possible with the safe development of the market. These benefits are less fully realised than in other options due to inability of policy to effectively enforce existing and forthcoming regulations.

Key assumptions/sensitivities/risks	Discount rate	3.5%
<p>Costs are dependent on assumptions regarding future drone market growth. The wide range from High to Low cost scenarios, illustrates considerable uncertainty in this regard. We hope to strengthen these assumptions in the course of the consultation, as they are currently based on crude extrapolation of publically available data. At the margin, benefits of regulation exceed costs, and therefore risk only extends to measurement of impact rather than policy viability.</p>		

## BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs:	Benefits:	Net:	
N/A	N/A	N/A	N/A



# Summary: Analysis & Evidence

# Policy Option 2

Description: Expand police powers but do not introduce mandatory use of a safety app

## FULL ECONOMIC ASSESSMENT

Price Base Year 2017	PV Base Year 2018	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: NQ	High: NQ	Best Estimate: NQ

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0		0	0
High	0		0	0
Best Estimate	0		0	0

### Description and scale of key monetised costs by 'main affected groups'

No costs to business as costs of compliance with existing and forthcoming regulations is considered in assessment of those regulations, assuming 100% compliance.

### Other key non-monetised costs by 'main affected groups'

N/A

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0		NQ	NQ
High	0	N/A	NQ	NQ
Best Estimate	0		NQ	NQ

### Description and scale of key monetised benefits by 'main affected groups'

No monetised benefits due to uncertainty regarding scale, value and how attributable the benefits of Privacy, Security and Safety to other airspace users and wider society. This is part of a wider programme to ensure that the benefits of drones through efficiency, safety and effectiveness are felt throughout the economy.

### Other key non-monetised benefits by 'main affected groups'

Benefits are twofold: avoiding the costs of unsafe drone use, by improving enforcement of existing and forthcoming rules, and the benefits that come from increased drone use, which can only be realised with the safe development of the market. These benefits will be less than in option 3, where drone users are provided with information on local flying rules and potential hazards to enable them to operate in the safest way possible.

Key assumptions/sensitivities/risks	Discount rate	3.5%
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Assessment of other regulation assumes 100% compliance and this change is intended to ensure that assumption is realistic. We have therefore not estimated costs arising out of this policy as they would be considered in the analysis of impact of the regulations the additional powers enable the police to enforce.

## BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs:	Benefits:	Net:	
N/A	N/A	N/A	N/A



# Summary: Analysis & Evidence

# Policy Option 3

Description: Introduce primary legislation to mandate and regulate app use, and strengthen police powers

## FULL ECONOMIC ASSESSMENT

Price Base Year 2017	PV Base Year 2018	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: -10.3	High: -549.3	Best Estimate: -73.3

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£369,000	£996,000	£10,329,000
High	£10,940,000	£53,835,000	£549,286,000
Best Estimate	£3,315,000	£6,999,000	£73,308,000

### Description and scale of key monetised costs by 'main affected groups'

Costs include familiarisation costs, transition costs of installing app and the cost of time of activating the app. One off costs per business and per flight are low, so cost levels are driven by volume of firms and operators expected.

### Other key non-monetised costs by 'main affected groups'

Costs of time and app purchase to non-commercial users. Costs are voluntary

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0	NQ	NQ
High	0	NQ	NQ
Best Estimate	0	NQ	NQ

### Description and scale of key monetised benefits by 'main affected groups'

It is possible that the mandated apps policy could one day form a rudimentary drone traffic management system, but at such an early stage these benefits cannot be quantified or defined. Further, there are no monetised benefits due to uncertainty regarding scale, value and how attributable the benefits of Privacy, Security and Safety to other airspace users and wider society. It is part of a wider programme to ensure that the benefits of drones through efficiency, safety and effectiveness are felt throughout the economy.

### Other key non-monetised benefits by 'main affected groups'

Benefits are twofold: avoiding the costs of unsafe drone use, by improving information available to all drone users, and the benefits that come from increased drone use, which is only possible with the safe development of the market.

Key assumptions/sensitivities/risks	Discount rate	3.5%
<p>Costs depend on forecasts future drone market growth based on crude extrapolation of historic CAA data. We have assumed the time taken for familiarisation, initial set up and ongoing app use. We hope to strengthen our assumptions through consultation, At the margin, benefits of regulation exceed costs, and therefore risk only extends to measurement of impact rather than policy viability. Assessment of other regulation assumes 100% compliance and this change is intended to ensure that assumption is realistic.</p>		

## BUSINESS ASSESSMENT (Option 3)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs:	Benefits:	Net:	
N/A	N/A	N/A	N/A





# Evidence Base (for summary sheets)

## Introduction

We live in an era of unprecedented change: to our businesses, our economies and our societies. Technological advancement has become a key driver of this change.

The emergence of drones – unmanned aircraft – and the uses they enable are good examples of where innovative new technologies are being rapidly grown to deliver new products and services to a range of industry sectors.

The potential economic value of drones is huge. PwC estimates the value of global market for drone applications at over \$127bn by 2025 (<http://www.pwc.pl/en/publikacje/2016/clarity-from-above.html>) with the impacts for safety, efficiency and effectiveness creating further additional economic benefits.

With new technologies come both benefits and risks. The government is committed to ensuring the development of drone services occurs in a responsible, safe way. The Government recently conducted a public consultation on the safe use of drones and several new policies to enhance drone safety and enable the future market to evolve successfully.

One of these proposals was the mandatory use of an app to receive airspace safety information and make a notification of a flight. Such apps already exist, for example, Drone Assist from NATS, which in July 2017 had well over 20,000 registered users and was gaining around 2,000 to 3,000 users each month. While Drone Assist is considered to be of high quality and accuracy, we do not have formal assurance that the information provided from the app is indeed accurate. In future when more developers create their own apps, this uncertainty will be multiplied. By creating standards that apps must meet, we will be able to control the quality of apps and then be able to mandate that drone users use only approved or licenced apps.

Several other countries for example, Germany, Austria and Denmark have all or will soon introduce the mandatory requirement that drone users use an approved safety app designated by the national authority. It is these countries hope that these apps will improve safety and compliance with the rules as well as serving to enhance enforcement.

We have also had consultation with police services to understand how they enforce drone regulations and take action to pursue offenders. From these discussions it is clear that the police are limited in actions they can take due to the nature of the regulation. They cannot insist on seeing drone registration documents or, in the case of commercial users, ask to see relevant documents. Nor can police seize drones or enter and search premises or instruct a pilot to ground a drone where there is a safety or security concern.

While drones do offer many opportunities for businesses and customers who receive their services, as well as being an exciting leisure activity, we must treat them as aircraft with the associated concerns to public safety. Introduction of a mandated safety apps will serve to increase drone users' knowledge and accountability, by translating complicated airspace regulations into easily interpretable visual markings on a map of a drone user's local area. However, we also envisage that this system of mandated apps and pre-flight notification could be the precursor to a rudimentary drone traffic management system one day, which could see efficiency, productivity and safety benefits for business too. Improving police powers will ensure that those who seek to break the laws can be pursued and penalised effectively.

## Problem under consideration

Drones are a new and emerging technology, which offer exciting opportunities to businesses, and are also of interest to leisure users, labelled a 'must have toy' for Christmas 2015. However, drones can also pose a safety risk to aviation and members of the public - there have been several reports of drones flying very close to planes and airports, increasing the risk of a collision. There have also been reports of drone compromising the security of secure locations by flying in restricted areas, for example near nuclear sites and military facilities. Drones can also cause privacy issues where they are flown without due consideration for those on the ground for example near schools or private residences. As the



numbers of drones in our skies increase, this poses an increasing challenge as to how best to ensure compliance with the law and safety, security and privacy considerations.

These problems are difficult to act upon by law enforcement officers because they have a limited understanding of who is flying in a particular location at any particular time. This means that even if a drone is reported as flying unlawfully it can be extremely difficult to trace it back to the operator or responsible owner. Additionally the Police have limited powers to investigate and enforce the laws on drone misuse.

## Rationale for intervention

Improved information awareness and accountability is a necessary step to ensure that drones are used responsibly. A mandated airspace information and notification app is thought to be a simple and practical solution to this which will allow users to access the information they need on airspace restrictions, make others aware of their flight and get information about other flights.

This notification process will also increase the accountability of drone users by creating a record of when and where they were flying. This notification, along with our proposed improvements to police powers, will aid the police in pursuing those who break the rules, gaining convictions and demonstrating that the laws are being enforced.

There are several apps that already exist and provide accurate information. However, we do not have a full assurance that the information provided in these apps is accurate or that the apps are being used. By mandating that these safety apps are used we will be improving knowledge of airspace information and compliance with the rules. We will also develop standards that apps can be measured against and which they must meet in order to be approved. These standards will ensure that the market is driven to create the best possible service to customers, providing accurate information to aid in safe drone flying.

The rationale for intervention to increase police powers is clear. Police officials have informed us of the difficulties that they face and in what areas they need to have enhanced powers to fully be able to pursue offenders. This will help to ensure that existing and future regulations regarding drones are effectively implemented and have the intended policy outcomes.

## Policy objective

1. Increase accountability amongst drone users by ensuring that they create notification of where and when they are flying.
2. Improved compliance with the rules and standards of behaviour amongst drone users by making sure they have the information they need to assess issues of safety, security and privacy.
3. Availability of one or more high quality apps which are held to consistent standards and provide assured information to users helping them to make good decisions and allowing a clearer awareness of how the airspace is being used.
4. The law on the use of drones will be more readily enforced and offenders will be punished. Successful prosecutions will have a deterrent effect, increasing safety and security. The enhancement of the powers of the Police to be able to act pursue those who are suspected of misusing drones will be the mechanism to achieve this. Powers required include: stop and search, powers of entry, instructing a pilot to ground a drone, requiring operators of drones to present required documentation and a requirement to produce documentation and name of those in charge of drone at a certain time.

**Enforcement:** We expect there to be penalties for not using a mandated app in the required way (i.e. by not filing a pre-flight notification), as well as penalties for not complying with a police power (i.e. refusing to ground a drone when a police constable asks you to). We expect the police to be the ones to enforce these laws, as well as already existing drone laws in the Air Navigation Order. The Bill will give the police the power to issue penalties on the spot for some of these offences, or take a prosecution to the magistrate's courts.



## Description of options considered

0. Do not introduce a safety app or enhance police powers (do nothing)
1. Introduce mandatory use of a safety app without modifying police powers
2. Expand police powers but do not introduce mandatory use of a safety app
3. Introduce mandatory use of a safety app and expand police powers

**Option 1** to do nothing represents the continuation of the status quo. As the number of drone users continues to rise, it is likely that the number of reported near misses with aircraft, violations of security and privacy and a generally other dangerous activities will do so too. The use of safety apps will not be mandatory so drone users will continue to fly without having to check local safety information or make notifications of their flights. Drone users will continue to lack an appropriate and verified source to inform them of the rules in an efficient and easy way, and other airspace users will continue to have lack of visibility of where drones are flying. The police will have limited abilities to pursue offenders and there will be a low rate of convictions. As the number of drones increase, so the challenges for the police will also increase. Public perception that government is not taking action to deal with the perceived menace of drones and that laws are unenforceable will persist and even increase. On the positive side, safety apps already exist and NATS, for example, will likely continue to develop the capabilities of its Drone Assist app without Government intervention. However, there will not be a coordinated central standard for these apps and, while some apps may be accurate and of high quality, other apps could be developed which claim to offer the same capabilities, but in fact provide wrong information. This could even lead to a reduction in safety standards if drone users think they are acting responsibly by using an app, but the information they are using is inaccurate.

**Option 2** would provide us with an assurance that the apps that are mandated for use are of high quality, providing good information to users allowing them to make decisions. The app would also allow users to make notifications providing some level of accountability. For cooperative, responsible drone users this will result in an increase in safety. However, there will still be a number of users who do not use the mandatory app and continue flying recklessly and breaking wider rules that apply to drones, as they will continue to be seen as unenforceable as police lack the powers to actually take action. With the maintenance of their existing powers, the police will still be limited in how they can act to pursue those who break the rules. The police will not have the power to question an operator or demand evidence that they have used the app or made notification. Police will still lack the powers to ask a drone operator to land a drone while they are questioned and will not have the powers to stop and search suspected individuals. This option may increase safety in users who are already well intentioned, but the aim of dissuading and pursuing those who deliberately break the rules will not be achieved, resulting in continued reckless behaviour.

**Option 3** will allow police to carry out more actions in pursuit of those breaking the laws, however they would not have the benefit of the extra information provided by notifications made using the app. As for Option 1, existing apps may continue to develop, but we will have no control or guarantee that these will be of high quality or accuracy, or that those who most need the help and guidance of an app to understand the rules will not use them.

**Option 4** will allow the most benefit and will combine information availability, accountability of flying, improve the information that the police can use to pursue offenders and improve their powers to take action on that information. This is the preferred option as it is felt that this option will offer the greatest benefit and the two aspects, police powers and the mandated app, will achieve their maximum effect when they are both implemented and working together.

## Monetised and non-monetised costs and benefits

For this consultation stage IA we have monetised the familiarisation, transition and ongoing costs for commercial drone users being mandated to use an app. For leisure users we do not provide quantified estimates due to our low confidence in the forecasts upon which these are based. All costs are estimated for a standard 10 year appraisal period in 2017 prices. We assume this policy comes into effect in 2021, appraising the costs from 2021-2030.





We have not monetised the impact of app standards on app providers as this is entirely dependent on the final regulations that will be shaped by the consultation. Analysis of this impact on the (currently very small) market will be provided in the final stage IA.

We have identified and described the benefits of the bill, however due to their nature and the inability to attribute the impacts directly to the bill, these have not been monetised.

We assume zero impact of improving police powers. These powers simply improve enforcement of existing and forthcoming regulations, the impacts of which are assessed assuming 100% compliance. To assess the impact again here would lead to double counting.

## **Monetised Costs**

### **Impact on commercial drone users.**

Costs considered include familiarisation costs, transition costs of installing app and the cost of time of activating the app each time a flight is made. One-off costs for each business and each flight are low, so cost levels are driven by volume of firms and operators expected.

#### **Familiarisation costs- £1,737,000**

Familiarisation costs in this context include time for each firm to read and process the regulations, decide what needs to be done and to choose an appropriate app that complies with the regulations and suit their needs. Given the relatively small number of options for action, we have assumed this process takes between 30 and 90 minutes with a central estimate of one hour.

Firm level costs are calculated by multiplying this time cost by the ASHE estimate of a £12.49 median hourly wage for all workers. Using such a general wage value represents the diverse nature of drone using firms throughout the economy, ranging from sole trader photographers, to multinational oil companies, part time and full time operators and a range of operations throughout the country in urban and rural settings. High (£18.85) and low (£8.97) estimates represent the top and bottom 25% of workers. This wide range represents the uncertainty we have in determining the exact figure for this assumption. Wages in future years are increased by forecast GDP/capita growth (using OBR short and long term estimates), to represent productivity increases and real opportunity cost. Costs also include a 20.9% non-wage staff cost which is not inflated by GDP growth. Firm level costs are then multiplied by the number of firms newly exposed to regulations. Due to expected growth in the drone market, this means that both these familiarisation costs and the one-off costs below have an impact beyond the first year of implementation, so these costs have been applied to our forecasts of numbers of new firms and drones respectively.

#### **One off costs- £1,579,000**

For each drone operating firm there are additional transition costs of time taken to install the necessary apps, and the cost of app purchase.

For labour costs we follow the same approach as above to determine hourly costs, and multiply that by an assumed time taken to install apps and input company data for each drone. Central estimate for the total time taken is 8 minutes, with high and low estimates of 15 and 3 minutes respectively. For small firms where a single drone and user are present, this will be an over estimate. In other firms there may be several users per drone, and this estimate represents each user installing the app. For very large firms with many drones and many users, we assume enterprise software management will reduce the time taken per user. Given the wide range of businesses affected and potential approaches to installing apps we include ranges represent significant variation in this figure. The central estimate gives a per drone cost of £2.07 in 2021, increasing each year in line with GDP/capita growth in wages.

The cost of apps will be one of the factors regulated. The range used for our scenarios includes free apps, which may supplement income via advertisements, or a subscription model, £3 representing a small one off fee, that might appeal to both commercial and leisure users, and £15 which represents the cost of an enterprise quality app, designed for commercial applications. These costs are applied at a drone level with £3 used as the central estimate.

The above per drone costs are multiplied by our forecasts of total number of drones (see risks and assumptions for more information on these forecasts) to give final estimates of £1,579,000, £6,589,000 and £81,000 for central, high and low scenarios respectively.





## Ongoing costs- £69,993,000

The regulations create a requirement for users to use a mandated app each time they operate their drone. In this context, each operation refers to a flight or series of flights lasting no more than 3 hours. The time this is expected to take each time is almost negligible, simply requiring users to take out their phone, open the app, click to create a flight notification and to take note of any ensuing warnings. Our central estimate for this process is one minute per operation, with high and low estimates of 3 minutes and 30 seconds respectively. These high and low estimates account for potential need to interact in a more significant way with the app (in case of warnings being indicated), and experienced users and streamlined apps allowing the process to be done even more quickly.

The time required for each operation is then multiplied by hourly wage calculated above to give a 2021 per operation cost of £0.26 in the central scenario and £0.09, £1.17 in the low and high scenarios respectively. Although this is very small, our central estimates of drone use anticipate 8.2 million drone operations in 2021 increasing year on year to over 47 million in 2030. The very small unit cost, therefore generates significant time costs of total costs over the appraisal period.

In addition to the cost of time, there is a monetary cost of any ongoing subscription fees for the selected app. In the central case we have assumed a £12 annual fee, with the high scenario costing £45 and no recurring fee in the low scenario. We have low confidence in these estimates at this stage, but we will have a firmer grasp on potential charges for the final stage IA after consultation.

The combined ongoing costs sum to £69,993,000 in the central case, with £538,347,000 and £9,961,000 in the High and low scenarios respectively.

## Total Monetised costs

Table: Monetised cost to business

Scenario	Low	Central	High
Familiarisation Cost	£287,000	£1,737,000	£4,350,000
One-off Costs	£81,000	£1,579,000	£6,589,000
Total Transition Cost	£368,000	£3,316,000	£10,939,000
Ongoing costs	£9,961,000	£69,993,000	£538,347,000
Total	£10,329,000	£73,308,000	£549,286,000

## Non-Monetised costs

### Non-commercial users

For non-commercial drone users we can follow the above approach, replacing the average wage figures with non-working value of time using the Department for Transport's standard assumption provided in the Webtag data book. This value gives much lower familiarisation, transition and per operation costs of time, however we believe the number of leisure users far outnumbers the number of commercial users. When the USA had concurrent Commercial and leisure drone registers, the number of leisure users outnumbered commercial users by approximately 20 to 1.

We can apply this ratio to our forecasts of commercial users to provide illustrative estimates of the number of leisure users. However these forecasts are then based on a large number of assumptions: that the ratio in the UK and that observed previously in the US is the same, that the ratio of commercial and leisure users remains constant (at least in the short term, until we can apply assumptions regarding market saturation from other sources), and that the estimate of number of drones per user, as estimated in the Impact Assessment carried out by USA for the introduction of the registration scheme is accurate for the US and holds true for the UK. Although these assumptions are not entirely unreasonable, compounding their impact with the uncertainty already inherent in the forecasts of commercial users leads us to have insufficient confidence to include these monetised costs at this stage. Evidence from consultation may strengthen our evidence base, and enable us to include these figures in the final stage IA.



## **App Providers**

At this stage the impact on app providers is unclear. Whilst the app requirements will create a burden for those wanting to operate in the licensed app market, unlicensed apps will likely continue to exist and app providers only need to comply with the regulations if they wish to become licensed. It is however likely that demand for unlicensed apps diminishes as users are unlikely to want to operate multiple apps, and the licensing scheme will be seen as a mark of quality, so it is likely that unlicensed apps will lose significant market share to those that meet the standards of registration and ensure they cover user's legal responsibilities. Overall demand for apps will increase as all users are mandated to use apps, rather than the existing opt-in nature of drone app demand. The final shape of regulations will be determined after consultation at which stage the impact on existing and potential market entrants can be appraised.

## **Non-Monetised Benefits**

### **Avoided costs of careless drone use**

The ultimate goal of this bill is to help ensure drone use in the UK grows in a safe and responsible way. In particular, avoiding an incident where the safety, security and privacy of other airspace users and wider society is threatened. It is not possible to robustly estimate the value of these benefits to society, although Airprox statistics that show near misses between aircraft and other objects, suggest that the risk of drones operated without regard for the existing guidance and rules for operation conflicting with aircraft is increasing.

A longer term goal is that the many uses of drones that can bring benefits for safety, efficiency and effectiveness are fully realised in the UK. However this will only occur if public safety and acceptance are maintained. Ensuring leisure users act responsibly is therefore one strand of a wider package of work looking to bring economic benefits from this emerging technology.

## **Rationale and evidence that justify the level of analysis used in the IA (proportionality approach)**

We have endeavoured to monetise the costs to business of the requirement to use an app. There is still some uncertainty regarding these estimates, mainly due to the underlying assumptions supporting the forecasts of commercial drone users. It was not deemed proportionate to carry out additional primary research to estimate the future growth of the market at this stage for two reasons. Firstly, at an operational and firm level, we believe the benefits to outweigh the costs, so although the sum gross cost to business is affected by the number of operators, this would not affect decision making. Secondly, it is unclear how accurate forecasts any forecasts made at this stage can be. We are considering whether there are useful avenues of research, but in the short term we are prioritising ensuring that the regulatory framework for drones enables the development of the market at whichever speed it is driven by market forces. Given the large number of uncertainties regarding the emerging drone market, the uncertainty in our forecasts and therefore potential range of costs, serves as a helpful illustration of the possible range of future scenarios. We have highlighted several areas in which assumptions can be strengthened using evidence from our consultation, and will consider other improvements we can make to our modelling in light of consultation responses. This should enable us to provide the most robust possible analysis of impacts for our final stage IA.

## **Risks and assumptions**

There are a series of assumptions that drive our estimates of the cost to business. Most significant is the estimate of future commercial drone use. Although we have been able to estimate the impact for each business and drone operation with some degree of confidence, the total impact is reliant on relatively crude forecasts of drone use. Given that at a firm or operation level we believe the benefits of the policy outweigh the costs, the sum impact does not affect the viability of the policy, but does affect estimates of the cost to business. We are seeking feedback on these forecasts and looking for alternatives in the process of the drone bill consultation.



The forecasts used extrapolate the growth observed from November 2014 to November 2017 in CAA commercial drone registrations using a simple quadratic form for the central estimate with linear and cubic growth rates being used for the low and high estimates respectively. We introduce a market saturation point using the SESAR 2016 European Drone Outlook Report (2016), which suggests growth is expected to significantly slow in 2020 for leisure users, and 2030 for commercial users. This means for our appraisal period we see continued increase in commercial drone use, and increasing costs in each year, up to that point, with a decrease in transition costs afterwards.

These forecasts have low analytical assurance, and are based solely on publically available information. They do not represent departmental or government expectations or targets, and are used to provide illustrative figures for this IA.

Table 1 below summarises the assumptions used for our analysis.

Table 1

<b>Familiarisation</b>	High	Mid	Low
Time taken to familiarise (Hours)	1.5	1	0.5
Time taken to make plans for implementation (Hours)	1	0.5	0.25
Time taken to select an app (Hours)	0.75	0.5	0.25
Hourly Wage of those familiarising (£)	18.85	12.49	8.97
<b>Set up</b>			
Time to install app per drone (Hours)	0.1667	0.0833	0.0333
Time to set up app per drone (Hour)	0.0833	0.05	0.01667
App purchase cost? Per user =/= drone (£)	15	3	0
<b>Ongoing costs</b>			
Time to log flight report (Hours)	0.05	0.02	0.008
Average number of flights per working day	1	0.5	0.4
Working days per week	5	5	5
Working weeks per year	48	48	48
App subscription cost (annual)	45	12	0



## Wider impacts

### **Small and Micro Business Assessment**

Small and micro businesses are not exempt from the requirement to use an app when operating drones. It is unclear what proportion of the drone operator market are small or micro businesses however, if we were to exclude them, we would fail to achieve the policy goal. Although the transition costs represent a relatively larger cost as a proportion of turnover for small firms, the very low absolute costs mean this does not appear to be a disproportionate cost. In the long term costs occur at an operational rather than firm level, meaning the costs faced by small and large firms do not disproportionately impact small firms.

### **Competition Assessment**

The impacts in this IA are not expected to impact competition as all firms using drones will face the same per firm/ operational cost.

### **Human Rights Impact**

This measure is not expected to have a human rights impact / one that could not be justified.

### **Justice Impact Test**

This measure will provide additional information about the users of drones and aid enforcement of existing drone regulations. Separate JIT is to be developed ahead of introduction of the bill.

### **Greenhouse Gases Impact Test**

This measure is not expected to impact greenhouse gas emissions.

### **Equalities Impact Assessment**

This measure is not expected to impact any particular group in a discriminatory or unfair way.

### **Wider Environmental Impact**

This measure is not expected to impact the wider environment.

### **Family Test**

This measure is not expected to impact families.

### **Health Impact Assessment**

This measure is not expected to impact health.

### **Rural Proofing Toolkit**

This measure is not expected to impact those in a rural setting unfairly.





## Sustainable Development

This measure is not expected to impact sustainable development.

## Summary and preferred option with description of implementation plan.

The preferred option is to introduce the mandatory use of an app and to enhance police powers. Introduction of a mandated safety apps will serve to increase drone users' knowledge and accountability and improving police powers will ensure that those who seek to break the laws can be pursued and penalised effectively.

There are options for introducing a mandatory app, including the organisations who will run it. It is thought that a competent authority such as the Civil Aviation Authority will be in charge of setting standards for apps and ensuring that any approved apps meet these standards. This could be done by either licencing all apps which meet the standards or by running a competitive process by which a small number of app providers are chosen to perform the service on contract. Either way the apps should be reviewed on a regular basis to ensure that they are still meeting the standards.

We expect this legislation to be reviewed approximately 5 years after implementation to ensure that it is fit for purpose, particularly whether it is keeping pace with the development of new drone technology.

The combination of making app use mandatory and strengthening police powers will enable enforcement by police officers. They will now have the power to order a drone to be landed, and request evidence that the drone user has taken the required steps regarding app use.

