

Summary: Intervention & Options

Department /Agency: Safety Regulation Group Civil Aviation Authority	Title: Impact Assessment of a proposal to amend the Air Navigation Order to address the regulation of Unmanned Aircraft Systems	
Stage: Final Proposal	Version: 1	Date: 30 March 2009
Related Publications: The Air Navigation Order 2005 (CAP 393)		

Available to view or download at:

<http://www.caa.co.uk/publications>

Contact for enquiries: FOP.Admin@caa.co.uk

Telephone: 01293 573914

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

Emerging Unmanned Aircraft Systems (UAS) technology is being viewed by the Police and Fire Services as a very affordable alternative to helicopter assets, where they currently exist, for certain emergency situations. Such technology may also be used by commercial companies for news-gathering, surveillance and other data and intelligence gathering purposes. As operations are very likely to involve flying Unmanned Aerial Vehicles (UAVs) in congested areas and above assemblies of persons, it is apparent that the safety of the public may be compromised unless steps are taken through government intervention to regulate the activity.

What are the policy objectives and the intended effects?

The policy objective is to introduce regulation for UAS with a vehicle component mass of 20 kg or less where the existing regulation is deemed to be inadequate.

The intended effect is to give protection to the public without adversely affecting recreational model aircraft activities.

What policy options have been considered? Please justify any preferred option.

1. No intervention.
2. A simple change to the Air Navigation Order (ANO) to remove existing weight discriminants.
3. A change to the ANO to add operational restrictions.
4. A change to the ANO to add operational restrictions and equipment criteria.

The CAA prefers Option 4 because it achieves the objective of protecting the public whilst having minimal impact on recreational model aircraft activities. It also clarifies the requirement for the aircraft to be visually monitored at all times to avoid collisions.

When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects?

The policy will be reviewed three years after implementation, unless it becomes necessary, for any clear reason, to do so earlier.

Ministerial Sign-off For final proposal Impact Assessments:

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:

Summary: Analysis & Evidence

Policy Option: 4	Description: A change to the Air Navigation Order Article 98 to add operational restrictions and equipment criteria
-------------------------	--

COSTS	ANNUAL COSTS		Description and scale of key monetised costs by 'main affected groups' The cost of a one-off permission, for example a trial UAS operation, is £100. For a multi-operation permission the cost is £200. Numbers of applications are difficult to predict but it is estimated that there could be an annual requirement for 50 applications for a multiple operations permission.
	One-off (Transition)	Yrs	
	£ Nil	10	
	Average Annual Cost (excluding one-off)		
£ 10k		Total Cost (PV)	£ 85k
Other key non-monetised costs by 'main affected groups' Operators will be required to prepare and present a safety case covering their operations. Application for a permission will impose a small administrative burden on the applicant but this is considered to be small and will be kept to a minimum by simplified and proportionate application processes.			

BENEFITS	ANNUAL BENEFITS		Description and scale of key monetised benefits by 'main affected groups' None Identified.
	One-off	Yrs	
	£ N/A		
	Average Annual Cost (excluding one-off)		
£ N/A		Total Benefit (PV)	£ N/A
Other key non-monetised benefits by 'main affected groups' The General Public: public safety will be better assured by CAA oversight of small UAV operations. Industry: the reputation of the emerging UAS industry will be protected from potentially irresponsible operators.			

Key Assumptions/Sensitivities/Risks
 While it is impossible to accurately assess the number of permissions that will be requested, a 'best guess' estimate of 50 has been used as a baseline. In 2007 20 applications for permission for Aerial Work operations of UAVs in the range 7-20 kg were received by the CAA. Industry sources and inquiries from potential operators are indicating significant interest in UAVs below 7 kg.

Price Base Year 2009	Time Period Years 10	Net Benefit Range (NPV) £ 0 to -85k	NET BENEFIT (NPV Best estimate) £ -85k
-------------------------	-------------------------	---	--

What is the geographic coverage of the policy/option?	UK			
On what date will the policy be implemented?	2009			
Which organisation(s) will enforce the policy?	CAA			
What is the total annual cost of enforcement for these organisations?	£ negligible			
Does enforcement comply with Hampton principles?	Yes			
Will implementation go beyond minimum EU requirements?	No			
What is the value of the proposed offsetting measure per year?	£ N/A			
What is the value of changes in greenhouse gas emissions?	£ N/A			
Will the proposal have a significant impact on competition?	No			
Annual cost (£-£) per organisation (excluding one-off)	Micro 200	Small 200	Medium 200	Large 200
Are any of these organisations exempt?	No	No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices)		(Increase - Decrease)	
Increase of	£ 85,000	Decrease	£ Nil
		Net Impact	£ 85,000

Key: Annual costs and benefits: Constant Prices (Net) Present Value

Evidence Base (for summary sheets)

1 Introduction

- 1.1 The ANO currently makes provision for “Small Aircraft” (not more than 20 kg mass) to operate with minimal constraints. No permission is required to operate a Small Aircraft that is not employed in Aerial Work. In particular, for aircraft of 7 kg or less there is no requirement for any permission, approval or exemption to be issued whatever it is used for. In most cases the only obligation on a person operating an aircraft of 7 kg or less is not to endanger persons or property, and the only means of the CAA exercising regulatory control is to issue a Direction prohibiting flight of the aircraft on the basis that such a flight would be a cause of danger. The CAA can only issue a Direction if it is aware that a flight is planned and it becomes apparent that such a flight would be a cause of danger.
- 1.2 These Small Aircraft provisions were originally designed to facilitate the operation of model aircraft flown for the enjoyment of their owners, and have been satisfactory in that context. However, in recent years there have been significant developments in the use of unmanned aircraft for non-recreational purposes and many of these aircraft fall within the Small Aircraft definition. In May 2007, a UK Police Force announced its intent to use a UAV (under 1 kg) for surveillance purposes over built-up areas. This proposed police operation and associated public statements that such aircraft are “not required to comply with CAA rules” has raised a number of concerns:
- a) Model aircraft enthusiasts generally operate away from centres of population (for safety and to avoid complaints about noise), and fly well within visual range (as the purpose of the flight is to see the aircraft fly). Conversely, the most common purpose for the operation of a UAV is to observe human activity; such activity might possibly not be in the direct view of the operator. There may therefore be an intention to fly a UAV close to people and/or buildings/property, potentially at night as well as in daylight. This suggests that the safety risks associated with such operations will potentially be very different to those associated with model aircraft.
 - b) Other organisations or individuals (including private security firms, investigators, journalists, paparazzi etc.) may follow the precedent of the police and start to use other small aircraft (up to 7 kg) over centres of population.
 - c) Operation of UAVs near major incidents involving the emergency services (by the news media companies as well as the emergency services themselves) may cause a hazard to police aircraft and Helicopter Emergency Medical Service (HEMS) aircraft.
- 1.3 This kind of operation was not envisaged when the existing ANO Articles were written and so a need has arisen to review the adequacy of the current legislation with a view to identifying any necessary amendments.
- 1.4 Unmanned Aircraft System (UAS) means the UAV and the command and control systems required to operate it, including the UAV pilot or the UAS commander, as appropriate. The UAV is the flying component of the UAS.

2 Proposal Development

- 2.1 The CAA, utilising its internal regulatory development process and liaising with external stakeholders, studied the problem and drafted the proposed changes to the ANO. The draft proposals were agreed through management and committee approvals in accordance with current Better Regulation principles before being published for consultation.

- 2.2 On completion of the public consultation, the proposal was reviewed in light of comments received and adjustments made accordingly before being subject again to the CAA internal management process for regulatory development. Managerial agreement was reached within this process leading to the intention to proceed with the amendment to the legislation.
- 2.3 During the internal regulatory development process it was identified that comprehensive guidance to potential operators is required. The CAA intends to publish, via its existing [CAP 722](#) (Unmanned Aircraft System Operations in UK Airspace - Guidance), a set of guidelines that assist operators in producing operating procedures that mitigate any safety risks associated with flying small surveillance aircraft in proximity to people and property.

3 Public Consultation

- 3.1 A public consultation was carried out by the CAA through its website and also directly with organisations most concerned with the proposal. The objective of this consultation was to seek industry views on whether regulatory intervention was required for UAVs under 20 kg (particularly for UAVs of 7 kg or less) and, if deemed necessary, to amend the ANO accordingly, but without adversely affecting the operation of model aircraft.
- 3.2 A total of 27 comments were received, the majority of which supported a change to the ANO to improve the adequacy of the regulations to help ensure the protection of the public. Opinions differed though in how this should be achieved and the CAA has taken note of these views and adjusted the proposal to accommodate them without substantially altering the content or intent of the proposal. The revised proposal will have the additional benefit of being able to reduce the regulatory burden and impact on the operators from that previously envisaged. The Comment Response Document was published on the CAA website on 3 February 2009. A summary of the comments and responses is at [Annex 2](#).
- 3.3 Building on the results of the consultation, the proposed amendment to the ANO Article 98 required under Option 4 has been adjusted to accommodate better the particular requirements of the recreational model aircraft operators. In the original proposal, the model aircraft operators wishing to continue to conduct flights with a camera attached to their small aircraft would be deemed to be carrying out surveillance or data acquisition and would have been affected directly by the amended regulation. They would have needed to seek permission for each flight or alleviation, possibly through a blanket permission, granted on the basis of membership of an approved club such as the British Model Flying Association (BMFA). This was not considered to be a practical solution and a different approach has been introduced.
- 3.4 By adding some prescriptive separation and operating criteria into the regulation, based on existing permissions and model aircraft operating best practice, a clear distinction can now be drawn between recreational and other flying when the purpose is to conduct surveillance or data acquisition. When such flying is conducted outside of the separation criteria, then no permission needs to be sought. However, when such a flight is intended to capture data closer to people or property, then tighter control is needed to ensure that the safety of the public and property has been adequately considered and allowed for. This will require operators to seek approval from the CAA before conducting such flights. As part of the approval process, the CAA will consider the submissions of operators who will need to demonstrate how they intend to mitigate the risks through air vehicle standards, operational procedures, qualifications, training and risk assessment. Guidelines for such applications will be provided and will tailor the requirements to the nature of the intended operation.
- 3.5 Following the consultation, the Options were reviewed. Option 4 remains the preferred option but has been revised to include the introduction of a new Article 98A detailing the separation requirements and other factors for the use of Small Aircraft equipped to undertake surveillance or data acquisition.

4 Other Factors Considered

- 4.1 ANO Article 98 specifies limitations for the operation of Small Aircraft exceeding 7 kg, and requires that permission be obtained for any flight for the purposes of Aerial Work. Recent experience, such as facilitating the Parc Aberporth UAV events, has shown the use of permissions under this Article to be a satisfactory and flexible means to regulate UAVs in the range 7-20 kg being operated for Aerial Work. It has also shown that operational restrictions are adequate for this type of aircraft at present and that there is no need to consider requiring formal airworthiness certification for aircraft under 20 kg.
- 4.2 This is further supported by the current regulatory approach to heavier UAVs, which is to approve an industry body or other competent body to qualitatively assess the safe operation and airworthiness of UAVs between 20 and 150 kg. Therefore introducing an airworthiness code for UAVs below 20 kg would be disproportionate and inconsistent with the approach to heavier UAVs.
- 4.3 While, currently, UAVs under 20 kg are subject neither to any airworthiness requirements nor to any operational limitations, the increased number of such UAVs coming to market and the applications to which they may be put gives rise to legitimate concerns over public safety. The permission of the CAA is required to operate a UAV for Aerial Work, but only if it is in excess of 7 kg. As, for the reasons stated above, it is not considered appropriate to introduce airworthiness requirements for such UAVs, operational limitations are the only means by which their use may be controlled.
- 4.4 ANO Article 164 provides exceptions from application of the provisions of the Order for certain classes of aircraft including Small Aircraft. As a consequence of the proposed change to Article 98 and the introduction of a new Article 98A, Article 164 will also require minor amendment to reflect this. This amendment is detailed at [Annex 1](#).

5 Options Analysis

5.1 Option One

Description – No Intervention

This option would have left the responsibility for public safety with the operator of a UAS in accordance with ANO Article 74 (endangering). Such an operator would only have been aware of this responsibility if he were aware of the ANO and this could not be assumed as a UAS may be sold to persons without any aviation knowledge or experience.

Costs

In the event that the operator of a UAS endangers a person or property in contradiction to Article 74 of the ANO, the investigation and subsequent prosecution will generate costs. It may be expected that growth in the industry will lead to a rise in the number of investigations and prosecutions and their associated costs.

If there is no intervention and the status quo is maintained there would be a cost to the general public's safety following any associated flying incidents. Any incident could cause death or injury, which has an associated cost. As use of UAVs is anticipated to increase in future, these costs could increase over time.

Benefits

Nil.

Net Impact

This option of "no intervention" would not have provided an adequate assurance of public safety, in that UAVs could potentially impact with people, property and other airspace users (including police aircraft and HEMS helicopters operating in the vicinity of an incident).

Key Assumptions

The responsibility for public safety would have remained with the operator of a UAS who might not have been aware of the requirements of the ANO not to endanger others.

Sensitivities

It was evident in a number of responses to the public consultation and through other discussions with UAS operators that there is a desire within the UAS industry for it to gain a reputation for safe and responsible operation to guarantee future commercial success. Any threat to public safety from UAS operations is, at present, only a perceived threat as there have been no incidents of note involving very light UAVs. However, some UAVs have already been flown over people and built-up areas and it cannot be further predicted with any certainty to what extent UAS technology will be adopted and whether it will be managed responsibly.

Risks

If there is no intervention the risk is that public safety would not be assured.

5.2 Option Two

Description – A simple change to the ANO to remove existing weight restrictions

The simplest change to the ANO, to address recent light UAV developments, would have been to remove the reference to 7 kg, so that the limitations of Article 98(2) would have applied to all aircraft under 20 kg and any flying for the purpose of Aerial Work would have required the permission of the CAA. However, this would have made it illegal to even throw a paper aeroplane anywhere that happened to be within an Air Traffic Zone, or where Class A, C, D or E airspace extended to ground level. Removing the 7 kg threshold would also have had a significant impact on model aircraft (7 kg and under) that regularly fly in the airspace specified and/or above 400 ft (e.g. during model glider endurance competitions).

Aside from the question of the effects on model aircraft of removing the 7 kg threshold, such a simple change might not have achieved the required objective for UAVs up to 20 kg. This was because some of the UAV operations that might have been regulated might have been private (as distinct from Aerial Work). This led to the conclusion that there would have been a need to make a distinction in the ANO between model aircraft and UAVs. However, it might have been difficult to categorise operations reliably as for either “recreational purposes” or “non-recreational purposes”.

Costs

In addition to the estimated cost of enforcement, the introduction of this option would have required every aircraft below 20 kg undertaking aerial work to have obtained a permission imposing a small administrative burden on the applicant. It is difficult to accurately quantify the number of operators that would have been affected because they are not currently required to register their activities; however, based on the number of known operators and industry forecasts it is estimated that up to 500 operators could have fallen within the scope.

Benefits

If the CAA had oversight of UAS operations rather than maintaining the status quo as proposed in Option 1, the safety of the public would have been better assured. Additionally, the reputation of the growing UAS industry would have been protected from the actions of irresponsible operators.

Net Impact

This option would have achieved the objective of protecting the general public whilst preserving the reputation of the industry but the costs to anybody participating in recreational model flying would have been unsustainable and disproportionate.

Key Assumptions

Nil.

Sensitivities

Recreational model flying in the UK is a long-established pastime enjoyed safely by many enthusiasts. This situation has been achieved by virtue of the light touch application of regulation along with a positive working relationship between the regulator and model flying associations. Any additional burden on the model flying community would have been justifiably criticised and might have resulted in this pastime becoming accessible to fewer individuals.

Risks

Enforcement of the regulations proposed in this option would have been difficult, if not impossible, because of the wide scope of activities it encompasses.

5.3 Option Three

Description – Proposed ANO change adding operational restrictions

A third option would have been to take the view that those operating model aircraft for recreation should have no need to fly in close proximity to, or over, congested areas, but that this was the kind of UAV operation that should be regulated. Legislation could have been revised to apply operating constraints based upon proximity to congested areas such that operations close to persons, vehicles, vessels or structures would have required the permission of the CAA. The unintended consequence of this option would have been that throwing a paper aeroplane in a back garden and other such harmless activities (including model aircraft flight inside buildings) would have required a formal permission to be granted.

Costs

The current cost of permission for a one-off UAS operation such as a trial or demonstration flight is £100 per application. A permission for multiple UAS operations costs £200. It was difficult to assess the number of applications likely to be received, especially when considering the scope of activities that would have been required to obtain permission, but the total annual costs were estimated to be well in excess of £10,000. Application for a permission would have imposed a small administrative burden on the applicant.

Benefits

Similarly to Option 2, if the CAA had oversight of UAS operations rather than maintaining the status quo as proposed in Option 1, the safety of the public would have been better assured. Additionally, the reputation of the growing UAS industry would have been protected from the actions of irresponsible operators.

Net Impact

This option would have achieved the objective of protecting the general public whilst preserving the reputation of the industry but the cost burden to anybody participating in recreational model flying would have been unsustainable and disproportionate.

Key Assumptions

In 2007 the CAA issued 20 Aerial Work permissions for UAVs in the 7-20 kg range and industry sources suggested that there was significant interest in UAVs of 7 kg and below. It was impossible to assess the number of applications that might have been received for model aircraft but it was thought to be significant. A 'best guess' figure of 50 applications, not including model aircraft, had been used as a baseline for the monetary cost calculations.

Sensitivities

Recreational model flying in the UK is a long-established pastime enjoyed safely by many enthusiasts. This situation has been achieved by virtue of the light touch application of regulation along with a positive working relationship between the regulator and model flying associations. Any additional burden on the model flying community might be criticised and result in this pastime becoming accessible to fewer individuals. Some individuals might have decided not to comply with a new regulation if they perceived it as disproportionate or unnecessary for their activities.

Risks

Enforcement of the regulations proposed in this option would have been difficult, if not impossible, because of the scope of activities it encompasses.

5.4 Option Four

Description – Proposed ANO change adding operational restrictions and equipment criteria

In addition to the operating restrictions proposed at Option Three, consideration of all of the above factors led to the view that, as UAVs invariably carry cameras or other sensors, the ANO could be amended to add restrictions to aircraft that are “equipped to undertake surveillance or data acquisition”. Such operating restrictions must be devised so as not to unreasonably restrict current recreational use of model aircraft. The proposed change to the ANO, detailed at Annex 1, would amend Article 98 and introduce a new Article 98A dealing with the use of ‘small surveillance aircraft’ and detailing operating restrictions which are not expected to impinge on the accepted use of model aircraft. The operating restrictions prevent UAVs coming in to close proximity with people and property unless permitted by the CAA. Requiring permission allows the CAA an opportunity to oversee the UAS operations and determine further operating conditions or procedures where necessary to ensure that public safety is assured throughout the operation of the aircraft.

A further factor that has been taken into account is that recent enquiries from potential UAS operators have revealed a lack of understanding of the need for visual monitoring of the UAV whilst airborne in order to avoid collisions. This is addressed in the proposed ANO change.

Costs

The current cost of permission for a one-off UAS operation such as a trial or demonstration flight is £100 per application. A permission for multiple UAS operations is £200. It is difficult to accurately assess the number of applications likely to be received but a ‘best guess’ estimate of 50 applications for a multiple operations permission costing an annual total of £10,000 has been used. Application for a permission would impose an administrative burden on the applicant but this is considered to be small and will be kept to a minimum by simplified and proportionate application processes.

Benefits

Similarly to Option 2 and 3, if the CAA had oversight of UAS operations rather than maintaining the status quo as proposed in Option 1, the safety of the public would be better assured. Additionally, the reputation of the growing UAS industry would be protected from the actions of irresponsible operators.

Net Impact

This option would achieve the same level of safety for the general public as Option 2 and 3 but at a reduced overall cost because only UAV operators intending to fly in close proximity to people or property will be affected.

Key Assumptions

In 2007 the CAA issued 20 Aerial Work permissions for UAVs in the 7-20 kg range and industry sources are suggesting that there is significant interest in UAVs of 7 kg and below. It is difficult to accurately assess the number of applications that might be received but a ‘best guess’ figure of 50 applications has been used as a baseline for the monetary cost calculations.

Sensitivities

Recreational model flying in the UK is a long-established pastime enjoyed safely by many enthusiasts. This situation has been achieved by virtue of the light touch application of regulation along with a positive working relationship between the regulator and model flying associations. Any additional burden on the model flying community may be criticised and result in a decline in interest in the pastime. Some individuals may decide not to comply with a

new regulation if they were to perceive it as disproportionate or unnecessary for their activities. The proposal has been devised so as not to affect model flying unreasonably.

Risks

Unscrupulous operators or those who are simply ignorant of the regulations may operate close to people or property without taking the necessary safety precautions or, having obtained permission from the CAA, not conduct operations in the manner agreed.

5.5 Preferred Option

The preferred option is Option 4. This option will produce the desired improvement in the safety of the general public from operations of small aircraft without unduly restricting the accepted recreational use of model aircraft.

6 Competition Assessment

6.1 The Office of Fair Trading Competition Assessment Guidance 2007 sets out the key issues that should be addressed in the competition assessment for each of the terminal charging options. This competition assessment addresses the following questions:

- a) Does the option directly limit the number of suppliers, relative to the do minimum?
- b) Does the option indirectly limit the number of suppliers, relative to the do minimum?
- c) Does the option limit the ability of suppliers to compete, relative to the do minimum?
- d) Does the option reduce suppliers' incentives to compete vigorously, relative to the do minimum?

for the affected market. The primary affected markets are the local markets for UAVs with surveillance equipment (Option 4), as it is the market affected by the preferred option after consultation. The local markets referred to are the markets for UAV surveillance services over any populated areas or built-up environments in the UK.

6.2 The introduction of a permission system overseen by the CAA will necessarily directly limit the number of suppliers over any given local area where permission is required for surveillance-equipped UAVs to operate. This option could lead to a reduction in the number of suppliers because not all of them are likely to be able to demonstrate the necessary safety standards to achieve permission from the CAA. However, after a thorough consultation with industry and interested parties, the CAA feels that the best way to assure public safety without affecting other markets, such as the one for recreational model flying, is Option 4.

6.3 By affecting the direct number of suppliers in the market relative to the do minimum, this could also have an indirect effect on the number of suppliers if, after the introduction of permissions, the market is felt to be less easy to enter than previously. The limit on the number of suppliers in any given market could reduce the incentives to enter and therefore reduce the number of suppliers indirectly.

6.4 A direct consequence of this option is to limit the ability of suppliers to compete, as it is forecast that free competition without regulation could lead, especially in future as UAVs become more commonplace, to increased risks to public safety. The CAA feels that the most effective way to mitigate safety risks to the public is by adopting the permissions system for surveillance-equipped UAVs.

6.5 It is not felt that the introduction of the permission system should lead to a reduction in suppliers' incentives to compete vigorously. Assuming that all firms have an equal chance to gain permission, there should be no reduction in the intensity of competition in the market for surveillance-equipped UAVs.

6.6 In conclusion, this competition assessment has suggested that there could be adverse effect on competition as a result of the policy; however, the do minimum option has serious adverse public safety disbenefits which have been assessed and which are thought to outweigh the

positive competition effects. Option 4 was chosen as a result of a thorough consultation process that also assessed the administrative burdens on firms and the effects on other markets, such as the one for recreational model flying.

7 Small Firms Impact Test

- 7.1 It is envisaged that all but the largest UAS operating companies would qualify as small businesses. The proposal would introduce a cost (£200) to operators and a human resource requirement to prepare an application for a permission. The CAA intends to introduce a simple internet-based application process with a high level of automation so as to ensure that the administrative burden and any related cost to the CAA and small firms will be kept to a minimum. Additional guidance and information will be placed in **CAP 722** which is available free of charge from the CAA website.

8 Legal Aid

- 8.1 There do not appear to be any legal aid implications in the proposal.

9 Sustainable Development and Rural Proofing

- 9.1 As UAVs of the small size involved in the proposal do not usually require airfields for deployment to their task, it is not envisaged that any development issues will result from the proposal. The proposal has been assessed against the Department for Environment, Food and Rural Affairs Rural Proofing checklist. It is not envisaged that any significant development in rural areas will occur as a direct result of the proposal.

10 Carbon Assessment, Environment and Health

- 10.1 As most UASs whose UAVs are within the weight range involved in this proposal use electric motors powered by re-chargeable batteries, it is not envisaged that there will be any noticeable increase in CO₂ emissions. Where internal combustion engines might be used, for example in some UAV designs derived from model helicopters (although these appear to be very much in the minority of emerging UASs), these would be so small as to produce only very small amounts of CO₂.
- 10.2 It is not anticipated that there will be any significant increase in noise resulting from the proposal as the electric motor and propeller/rotor combinations that most UAVs of this size use are very quiet. Where internal combustion engines are to be used that might present a noise nuisance in certain circumstances, the CAA would assess the likely noise impact in the context of the operations for which a permission was being sought before deciding whether or not to grant such a permission.
- 10.3 The potential impact on health of the proposal is considered as generally insignificant. Where it would appear that a noise nuisance might be created by a UAS operation, the CAA would take that into account when deciding whether or not to grant a permission.

11 Social

- 11.1 There are not expected to be any social effects caused by this change covering: human rights, race, gender and disability equality.

12 Enforcement and Sanctions and Monitoring

- 12.1 The mechanism for enforcement through the ANO already exists, and no additional resources will be required in this regard. The CAA's Safety Regulation Group, as part of its safety oversight function, will monitor and review the effectiveness of the legislation.

13 Implementation and Delivery Plan

- 13.1 The changes to UK legislation implemented by this IA have been anticipated by those operators of small aircraft likely to be affected who have also been consulted with. It is not anticipated that implementation will cause any unnecessary complications for such operators.

14 Post-Implementation Review

- 14.1 The CAA, as part of its continuing oversight of aircraft operations, will assess the effect of this and further amendments on the operation of small aircraft but in any case review the situation three years after implementation. Should amendments be required, the CAA will consult further on proposals that would modify or supersede the requirements proposed in this Impact Assessment.

15 European Legislation

- 15.1 The operation of Small Aircraft is not affected by European aviation legislation.

16 Summary and Recommendations

- 16.1 The CAA believes that Option 4 will produce the desired improvement in the safety of the general public from operations of small aircraft without unduly restricting the accepted recreational use of model aircraft and is minded to recommend to the Secretary of State for Transport that the ANO be amended at Articles 98 and 164 and introducing Article 98A as detailed in [Annex 1](#).
- 16.2 Option 1 was rejected as “no intervention” would not have provided an adequate assurance of public safety, in that UAVs could potentially impact with people, property and other airspace users. Option 2 would have achieved the objective of protecting the industry and the general public but the costs to the industry and anybody participating in recreational model flying would have been unsustainable and disproportionate. Option 3 would have achieved the objective of protecting the industry and the general public but the costs to the industry and anybody participating in recreational model flying would have been unsustainable.

Specific Impact Tests: Checklist

Type of testing undertaken	<i>Results in Evidence Base?</i>	<i>Results annexed?</i>
Competition Assessment	Yes	No
Small Firms Impact Test	Yes	No
Legal Aid	Yes	No
Sustainable Development	Yes	No
Carbon Assessment	Yes	No
Other Environment	Yes	No
Health Impact Assessment	Yes	No
Race Equality	Yes	No
Disability Equality	Yes	No
Gender Equality	Yes	No
Human Rights	Yes	No
Rural Proofing	Yes	No

Annexes

Annex 1

PROPOSED CHANGES TO THE AIR NAVIGATION ORDER ARTICLES

Regulation of Small Aircraft

- 98 (1) A person shall not cause or permit any article or animal (whether or not attached to a parachute) to be dropped from a small aircraft so as to endanger persons or property.
- (2) ***The person in charge of a small aircraft shall not fly such an aircraft unless he has reasonably satisfied himself that the flight can safely be made.***
- (3) ***The person in charge of a small aircraft shall maintain direct unaided visual contact with the aircraft sufficient to monitor its flight path in relation to other aircraft, persons, vehicles, vessels and structures for the purpose of avoiding collisions.***
- (4) The person in charge of a small aircraft which has a mass of more than 7 kg without its fuel but including any articles installed in or attached to the aircraft at the commencement of its flight shall not fly such an aircraft:
- (a) in Class A, C, D or E airspace unless the permission of the appropriate air traffic control unit has been obtained;
- (b) within an aerodrome traffic zone during the notified hours of watch of the air traffic unit (if any) at that aerodrome unless the permission of any such air traffic control unit has been obtained; **or**
- (c) at a height exceeding 400 feet above the surface unless it is flying in airspace described in sub-paragraph (a) **or** (b) above and in accordance with the requirements thereof.
- (5) ***The person in charge of a small aircraft must not fly such an aircraft for the purposes of aerial work except in accordance with a permission issued by the CAA.***

Small Aircraft equipped to undertake surveillance or data acquisition

- 98A (1) ***The person in charge of a small surveillance aircraft must not fly the aircraft in any of the circumstances described in paragraph (2) except in accordance with a permission issued by the CAA.***
- (2) ***The circumstances referred to in paragraph (1) are:***
- (a) ***over or within 150 metres of any congested area;***
- (b) ***over or within 150 metres of an organised open-air assembly of more than 1,000 persons;***
- (c) ***within 50 metres of any vessel, vehicle or structure which is not under the control of the person in charge of the aircraft; or***
- (d) ***subject to paragraphs (3) and (4), within 50 metres of any person.***
- (3) ***Subject to paragraph (4), during take-off or landing, a small surveillance aircraft may be flown within 50 metres but not within 30 metres of any person.***
- (4) ***Paragraphs (2)(d) and (3) do not apply to the person in charge of the small surveillance aircraft or a person under the control of the person in charge of the aircraft.***
- (5) ***In this article a small surveillance aircraft means a small aircraft which is equipped to undertake any form of surveillance or data acquisition.***

Exceptions from application of provisions of the Order for certain classes of aircraft

- 164 The provisions of this Order other than articles 68, 74, 96(1), 97, 98, **98A**, 144(1)(b) and (c), 155(1) and (2) shall not apply to or in relation to:

Annexes

Annex 2

Summary of Comments and Responses to CAA Consultation conducted between 15 May 2008 and 11 August 2008

1 Introduction

- 1.1 On 15 May 2008 the CAA issued a Letter of Consultation (LOC) outlining its proposals and it invited individuals and organisations from the industry to respond. The consultation period ended on 11 August 2008.
- 1.2 The LOC was sent to 34 individual organisations including the BMFA and the Scottish Aeromodellers Association who represent the majority of recreational model aircraft operators in the United Kingdom. A number of commercial organisations already engaged in the manufacture and operation of unmanned aircraft systems were also invited to comment. The LOC was also published on the CAA consultation website for public access.
- 1.3 The LOC attracted 27 responses from professional organisations and individuals. It was apparent in a small number of responses that the responder had not read or understood the full extent of the proposals. Where possible, guidance was given to those respondents and they were invited to resubmit their comments accordingly.
- 1.4 A full list of comments and responses is available on the [CAA website](#).

2 Comment Review

- 2.1 The majority of the 27 responses to the consultation did not specifically indicate support or objection to the proposals but of those who did give an indication, the majority were in support of the proposals. All but two of the respondents gave additional comments. Furthermore, a majority of respondents, including many who were not in complete agreement with the proposals, shared the general concern about the risk posed to the public and their property by unregulated UASs and agreed that action should be taken to control the risk.
- 2.2 The greatest support came from existing operators of UASs in the 7-20 kg range, many of whom expressed concern that organisations and individuals operating aircraft below 7 kg mass are not required to present a safety case to the CAA and therefore may not be taking the necessary safety precautions.
- 2.3 Concern that the proposals may have a negative impact on recreational model flying was the most frequently given comment. Many respondents thought that the CAA's preferred option would make it impracticable for a model flyer to attach a camera to their aircraft. Respondents also pointed out that the nature of flying in a model flying club is very different to that carried out by an organisation operating a UAS under commercial pressures.

3 Summary of Comments and Responses

Item	Number of Comments	Comment Summary	CAA Response Summary
1.	8	Comments expressed concern about the impact on recreational model flying.	<p>In recognition of the lower level of risk posed by smaller, lighter aircraft, the CAA intends to proportionally reduce the requirements according to the characteristics of the aircraft and the kind of activity it is carrying out.</p> <p>The regulations will be designed to not interfere with genuine recreational flying activities.</p> <p>The CAA will amend the proposed regulations to introduce relaxations for flight away from people or property.</p>
2.	7	Comments expressed concern about the time required to process applications for ad hoc flights.	As regards the lead times for permissions to operate, it is anticipated that multiple use permissions will be granted provided that the full scope of envisaged operations for any particular UAS is declared to the CAA.
3.	4	Comments suggested the proposed regulations were difficult to enforce.	The CAA intends to work with manufacturers and the model flying associations to ensure that end-users of UAS equipment are made aware of the regulations governing their use.
4.	3	Comments suggested that flying on private land away from persons and roads and structures should be exempt.	Model aircraft operated for recreational purposes away from people or property will not be subject to regulation, even when equipped for surveillance or data acquisition.
5.	2	Comments expressed concern that model aircraft with a telemetry data link may fall into the scope for regulation when they should not.	The CAA considers that, in this context, data loggers and telemetry used to monitor the systems on board model aircraft do not constitute equipment for data acquisition or surveillance. Guidance for this will be included in CAP 722 in due course.
6.	2	Comments suggested that lighter UASs should be regulated less strenuously than heavy UASs.	Requirements for the issue of a permission to operate a UAS of less than 7 kg will be similar to those for UAS of more than 7 kg. It is envisaged that a simplified application process, in proportion with the characteristics of the aircraft and the level of risk involved in the flying activity, will be used.
7.	2	Comments stated that professional organisations take safety precautions seriously in order to protect their reputation.	Noted.
8.	1	Comment suggested that the CAA has underestimated the level of activity.	Noted. However, intended change to the proposal will reduce the regulatory burden.
9.	1	Comment suggested that existing BMFA guidance and qualifications were not designed to be for commercial use.	Noted. However, these good practice guidelines have been utilised in crafting the revised requirements.