

Airspace Modernisation Strategy

CAP 1711



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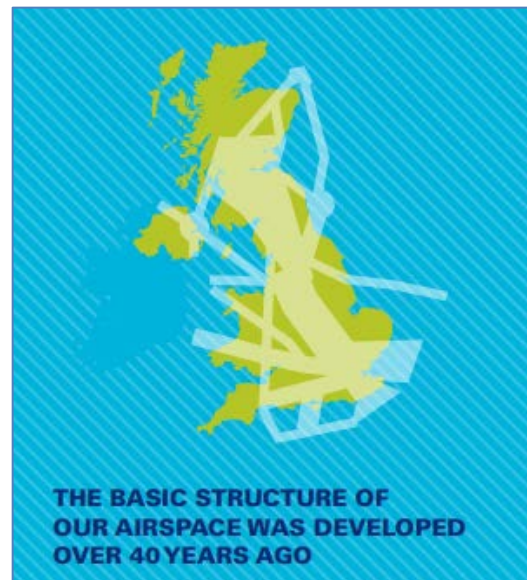
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Executive summary

1. Airspace is a crucial part of the UK's infrastructure. It must be maintained and enhanced to provide more choice and value for consumers, through the capacity for airlines to add new flights, reduced flight delays and enhanced global connections that can help boost the UK economy, while continuing to improve safety standards. Unlocking the benefits of modernisation will make journeys faster and more environmentally friendly. Better airspace design can help with the management of noise impacts and improve access for other airspace users, including the Ministry of Defence, for whom airspace is a key resource.

2. UK airspace is some of the most complex in the world, yet its design dates back to the 1950s and 1960s. The Government has set out its support and objectives for the modernisation of UK airspace in its Green Paper¹ published in December 2018 in preparation for its forthcoming Aviation Strategy. Prior to this, in October 2017, the Government tasked the CAA with a key oversight role for airspace modernisation. Consistent with our role as specialist aviation regulator and our statutory responsibilities, we are required to prepare and maintain a co-ordinated strategy and plan for the use of UK airspace for air navigation up to 2040, including for the modernisation of the use of such airspace.



¹ The Green Paper also consults on some specific new government policies to support modernisation. <https://www.gov.uk/government/consultations/a-new-aviation-strategy-for-the-uk-call-for-evidence>

3. This Airspace Modernisation Strategy responds to that requirement, setting out the detailed initiatives that industry must deliver to achieve the objectives envisaged in current government policy. It supersedes and replaces the Future Airspace Strategy (FAS), although many key elements of FAS remain relevant and are included in this new strategy. This strategy document has been developed by the CAA taking into account feedback from stakeholders.²
4. Working together, the Department for Transport and the CAA have developed a shared objective for modernising airspace. This is set out in full in Chapter 1, the Introduction. Airspace modernisation will need to be delivered and funded by a range of aviation organisations, and a wide range of stakeholders will need to be engaged throughout its delivery. The Department for Transport and the CAA are committed to working with relevant stakeholders and those tasked with delivery to ensure modernisation happens in a coherent and consistent way, giving rise to the benefits expected.
5. The strategy sets out the ends, ways and means of modernising airspace, initially focusing on the period until the end of 2024.³ The **ends** are derived from UK Government and relevant international policy and the **ways** of achieving them include new airspace design, new operational concepts and new technologies. To establish the **means** of delivering modernised airspace, such as the resources needed, this strategy requires industry-led working groups to draw up delivery plans, with delivery overseen by the CAA. One such plan will be a macro-level co-ordinated implementation plan (an airspace change masterplan) detailing which interdependent airspace changes are deemed necessary and when.

² The CAA published a draft for comments in July 2018.
<https://consultations.caa.co.uk/policy-development/draft-airspace-modernisation-strategy/>

³ 2024 corresponds to the end of the next Single European Sky Performance Scheme reference period (RP3). https://ec.europa.eu/transport/modes/air/single-european-sky/ses-performance-and-charging/performance-and-charging-schemes_en

6. We have also worked with the Department for Transport, NERL (the subsidiary of NATS that is sole provider of UK en-route and London Approach air traffic services) and the Infrastructure and Projects Authority to develop a new governance structure for airspace modernisation. The new governance structure includes a 'UK Airspace Strategy Board' chaired by the Aviation Minister. The Department for Transport and the CAA will seek to develop a vision for airspace modernisation through this new Board. Further details of the governance structure and groups are set out in Chapter 2 and a supporting Annex to this strategy document.
7. This new governance structure replaces the previous FAS groups, but many of them will remain as industry co-ordination groups that provide a useful focal point and mechanism for including representation of particular stakeholder interests.
8. The CAA must consult the Secretary of State about the preparation and maintenance of its strategy, and must give a delivery report annually. In presenting this first edition of an Airspace Modernisation Strategy to the Secretary of State, we begin this process. The CAA will review the strategy regularly in making our annual report in which we will measure progress against the delivery plans. The CAA will also take those opportunities to continue to update the strategy, bearing in mind the 2040 timescale specified by the Government, in order to accommodate new technologies or other developments. Where appropriate, the CAA may seek comments on these updates before implementing them, but will not do so in every case.



9. Chapter 1 of this strategy introduces the need for airspace modernisation and describes its objective, and the approach taken in this strategy.
10. Chapter 2 sets out the roles and responsibilities of the Department for Transport, the CAA, NERL and other relevant stakeholders in the new governance structure.

11. Chapter 3 sets out the ends that modernised airspace must deliver, all of which are derived from UK and international policies and laws. All the CAA's responsibilities in the Air Navigation Directions must be carried out having regard to section 70 of the Transport Act 2000. We therefore describe the ends to be achieved under the following headings consistent with our obligations:
- maintaining and enhancing high aviation safety standards
 - securing the efficient use of airspace and enabling integration
 - avoiding flight delays by better managing the airspace network
 - improving environmental performance by reducing emissions and by better managing noise
 - facilitating defence and security objectives.
12. In Chapter 4, 15 initiatives are identified focusing on the period until the end of 2024 as the primary ways of modernising airspace. They cover five areas of airspace infrastructure:
- upper airspace (above c.25,000 feet)
 - terminal airspace (complex lower airspace around airports from c.25,000 feet to c.7000 feet)
 - airspace at lower altitudes (below c.7000 feet)
 - uncontrolled airspace
 - the UK's communications, navigation and surveillance (CNS) infrastructure and air traffic management.
13. The 15 initiatives are summarised in Table 1 below showing the obligations⁴ and timeframes.
14. Chapter 5 identifies that there are a number of current foreseeable 'unknowns' that could change and reshape the context for this strategy. While the current initiatives are enablers for further work to accommodate new airspace users such as drones, there are areas in which the

⁴ Under the EU (Withdrawal) Act 2018 the Government is in the process of bringing EU aviation law into UK law, with certain responsibilities reassigned to the Secretary of State or the CAA.

Government has signalled it may develop new or amended policy positions, or new technologies that we think are becoming ubiquitous and may impact on how airspace is designed or used. There will be a need to consider the economic and financial models that will be used to deliver the services required by new types of airspace users. This could result in changes to current CAA or other charging mechanisms. We note what these gaps or emerging policies are, and note that they may shape future iterations of this strategy and associated delivery plans.

15. The means of delivering airspace modernisation – such as the resources needed to bring in changes – must rest with the industry organisations that will use airspace. For example, the CAA can set out, within this strategy, why airspace redesign is needed and the policy ends it must achieve, but we cannot do that airspace change ourselves. Timelines and delivery plans must be set out by the organisations that will undertake this design, and integrate the concepts and technologies.
16. The need for these plans is addressed in Chapter 6. We explain that the CAA and Department for Transport, as co-sponsors of airspace modernisation, have tasked NERL with leading the FASI South programme to create, by June 2019, a single co-ordinated implementation plan for airspace changes in Southern England. This will be followed by further commissions for the creation of masterplans covering modernisation of the rest of UK airspace.
17. In Chapter 7 we set out our assessment of progress towards completion of each major initiative and the supporting designs, operational procedures and technology enablers. This has been done in the form of a ‘RAG’ status. Seven of the 15 initiatives are assessed as on track overall, with eight requiring attention.
18. A number of risks are also presented which should be considered and managed through the new governance structure.

Table 1 Summary of 15 initiatives

	Initiative		Obligation and timeframe*
Upper airspace	1	Direct Route Airspace: deployment of additional waypoints to the existing route network	EU legislation (by 2022)
	2	Free Route Airspace: removal of all fixed routes so aircraft can fly fully optimised routes	EU legislation (by 2022)
	3	Advanced Flexible Use of Airspace: new airspace designs, procedures and technology to increase options for airspace configurations, to support the efficient use of airspace and to best meet military requirements while being cognisant of civil airspace users.	EU legislation (by 2022) UK strategic ambition Known and emerging defence requirements (2018–2030)
Terminal airspace	4	Terminal airspace redesign in Southern England	EU legislation (by 2024)
	5	Terminal airspace redesign in Northern England and Scotland Fundamental redesign of the terminal route network using precise and flexible satellite navigation	UK Government Airports NPS in the London terminal airspace (by 2024)
	6	Queue management: streaming traffic into and out of the terminal and absorbing delays in the upper airspace	EU legislation (by 2024) EU Master Plan ambition
Lower altitude	7	Satellite navigation route replications: replication of existing arrival and departure routes to satellite-based navigation standards	ICAO upgrade programme priority EU legislation (by 2024)
	8	Satellite navigation route redesign: redesign of new arrival and departure routes using satellite-based navigation standards	EU legislation (by 2024)
Uncontrolled airspace	9	Review of Flight Information Service provision in the UK	EU legislation (from 2022)
	10	Airspace classification review: including a review of air traffic services provision in uncontrolled airspace	EU legislation (from 2022) ICAO standards
	11	Electronic surveillance solutions	Fully interoperable electronic conspicuity solution (ongoing, likely CAA mandate in 2022–2024)
CNS and ATM infrastructure	12	Cross-industry plan for the efficient use of radio-frequency spectrum	Indirectly from EU legislation (ongoing)
	13	Cross-industry plan for the full adoption of datalink communications	EU legislation (from 2019)
	14	A satellite-navigation implementation plan	EU legislation (2020–2024)
	15	Air traffic management	EU legislation (by 2024)

* Under the EU (Withdrawal) Act 2018 the Government is in the process of bringing EU aviation law into UK law, with certain responsibilities reassigned to the Secretary of State or the CAA.

Chapter 1

Introduction

Chapter summary

This introductory chapter sets out:

- the need for airspace modernisation
- what has been achieved so far
- how modernisation is supported by changes in government policy
- a shared objective for modernising airspace
- how this Airspace Modernisation Strategy document is structured.

The context for airspace modernisation

- 1.1 Demand for air travel has grown strongly in recent decades, and the Government expects that demand will continue to rise significantly between now and 2050.⁵ Growth in demand for air travel means increasing pressure on our airspace. The strategic case for airspace modernisation and the resultant benefits were set out by the Department for Transport in 2017.⁶ Those benefits include more choice and value for consumers, through the capacity for airlines to add new flights, reduced flight delays and enhanced global connections that can help to boost the UK economy, while continuing to improve high safety standards. Unlocking the benefits of modernisation will make journeys faster and more environmentally friendly. Better airspace design can manage noise impacts and improve access for other airspace users, including the

⁵ Beyond the horizon, the future of UK aviation, next steps towards an Aviation Strategy, HMG, April 2018.

⁶ For more information see Upgrading UK airspace, strategic rationale, Department for Transport, 2017.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/586871/upgrading-uk-airspace-strategic-rationale.pdf

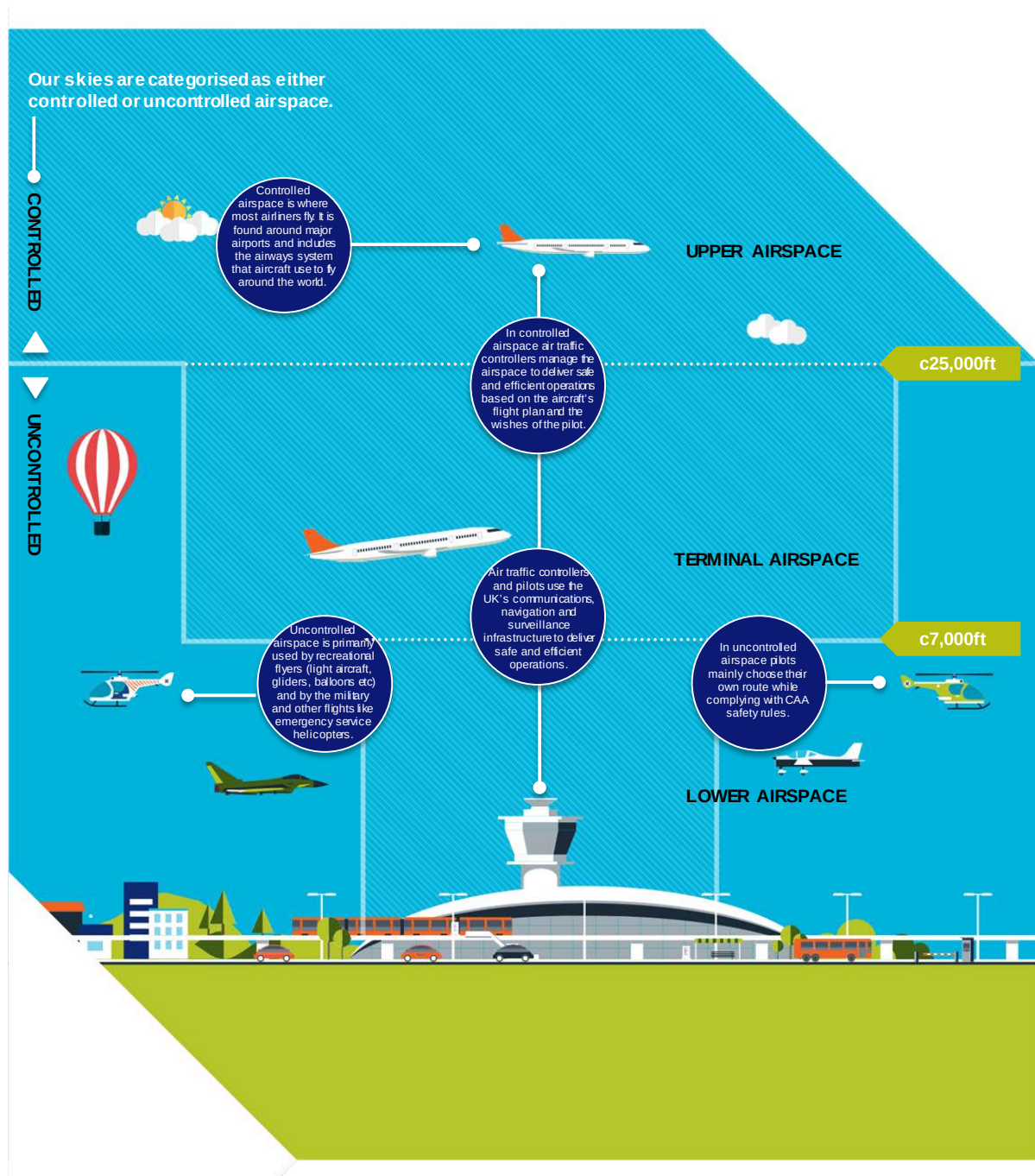
Ministry of Defence, which requires more access to airspace to support a greater number of military aircraft.

- 1.2 The UK's airspace structure is an essential, but largely invisible, part of our national transport infrastructure. It is divided into controlled and uncontrolled airspace. Aircraft in **controlled** airspace fly under the positive monitoring and direction of air traffic control to maintain safe distances between them. **Uncontrolled** airspace typically incorporates areas where aircraft are not identified and managed by air traffic control, although they may request information or a more limited service from air traffic controllers. Airspace is further divided into classifications.⁷
- 1.3 The vast majority of commercial flights operate in controlled airspace. General Aviation and aerial sports operate largely in uncontrolled airspace below 6000 feet, alongside a few commercial flights. The military also has significant requirements to use both types of airspace and occasionally also operates within the confines of segregated training or danger areas.⁸ The creation of controlled airspace may impinge on the availability of airspace for other users, and an appropriate balance is needed to satisfy both the safety needs and economic requirements of the various types of, often conflicting, operational requirements. At lower altitudes there is more of a challenge in balancing the differing requirements of a wider range of affected parties.
- 1.4 The main interested parties in the design of airspace are, at higher altitudes, NERL (NATS En Route plc, the subsidiary of NATS which is air traffic control provider for upper airspace); at lower levels, airport operators and localised air traffic services providers; and the Ministry of Defence which has an interest in upper and lower airspace for diverse purposes.

⁷ See <https://www.caa.co.uk/Consumers/Guide-to-aviation/Airspace/How-is-UK-airspace-structured/> and <https://www.nats.aero/ae-home/introduction-to-airspace/>.

⁸ Military requirements vary widely from, among other things, electronic warfare training to air-to-ground ranges or access for remotely piloted air systems (drones).

Figure 1.1 Controlled and uncontrolled airspace



Note: this diagram is representational only and does not necessarily depict the specific areas in which airspace users operate.

- 1.5 UK airspace is also a key gateway between Europe and North America, the world's busiest intercontinental air corridor, and its efficient operation is crucial for international air traffic management.⁹ It is also the case that lack of capacity leads to less ability for NATS to handle additional traffic when there is disruption in European airspace.
- 1.6 UK airspace is some of the most complex in the world, yet its design dates back to the 1950s and 1960s. Although it has been added to and adapted in response to growing traffic levels, many departure routes at major airports, for example, have been little changed for many years, even several decades. Successfully accommodating the growth in demand for air transport has meant adding significant complexity to the UK's airspace system, particularly where volumes of traffic are highest, principally over South-East England.
- 1.7 Many air routes and air traffic management practices are not utilising the modern technologies available, and aircraft continue to use flightpaths that are outdated. Those flightpaths often constrain aircraft climb performance such that more time is taken for them to reach their optimum cruising altitude. This creates inefficiencies and results in greater fuel burn and more emissions. Flightpaths may not presently be optimised to reduce noise impacts or designed to offer relief from noise. This inefficient use of airspace causes unnecessary delays for passengers and significant air traffic control workload to manage bad weather or other forms of disruption. It also has excessive impacts on the environment and those living near our airports. The outdated design is also, crucially, constraining the number of flights that the airspace can safely accommodate.
- 1.8 In addition, military airspace requirements are constantly changing as a result of technological developments and Government direction. Military aircraft, land and maritime systems use the full range of upper, lower and

⁹ Air traffic services in the eastern half of North Atlantic airspace are provided by NATS on behalf of the UK under its obligations to the International Civil Aviation Organisation (ICAO).

terminal airspace, including all classifications of airspace. The UK and its allies are bringing into service more technologically advanced and capable fast jets together with other platforms such as Remotely Piloted Aircraft Systems (drones)¹⁰ that have new airspace demands.

- 1.9 Drones can be remotely piloted or autonomous, and are used for civil or military aviation purposes. They may require changes to airspace structures and rules if they are to integrate seamlessly into UK airspace. They are an example of the different types of new technology airborne vehicles that the UK's skies are now hosting, in addition to accommodating increasing commercial flights, military activities and an active General Aviation sector. In the future, UK airspace will also need to accommodate commercial spaceflight, and other new technologies are constantly being developed. These technologies affect what flies, and also how vehicles are flown, meaning new concepts for operating aircraft are also emerging.
- 1.10 Such a high rate of change cannot be accommodated within the current airspace structure. Incorporating this ever more complex and growing mix of traffic requires advanced technological tools and air traffic solutions. For example, in 2019 the CAA will consult on proposals to mandate full electronic conspicuity – electronic or digital means for allowing airspace users to sense all others and be seen by all others – in order to unlock safety benefits, save lives and enable future airspace design to accommodate better sharing and access among different users of airspace, including commercial aviation, the military, General Aviation and drones. The economic and financial models that will be used to deliver the services required by new types of airspace users will also need to be developed.

¹⁰ Drones may be referred to by a variety of terms, including Unmanned Aerial Vehicles (UAV) and Remotely Piloted Aircraft Systems (RPAS). Further information is at www.caa.co.uk/Consumers/Unmanned-aircraft/Our-role/An-introduction-to-unmanned-aircraft-systems/.

- 1.11 It is therefore essential that the UK's airspace is modernised. Unlocking the benefits of modernisation, such as reduced stacking and allowing flights to climb and descend continuously, will make each journey faster and more environmentally friendly, benefiting consumers while maintaining already high safety standards. Modernisation of relevant airspace structures, systems and processes can also further improve the flexible use of airspace, whereby airspace is considered as a shared resource and is allocated for specific periods of time to particular users, such as the military.
- 1.12 As noted above, modernisation is needed to meet future military requirements: access to larger portions of segregated airspace, weapons ranges and to meet other training requirements such as electronic warfare. To allow military aircraft to operate across the differing classifications of airspace, there is a need to standardise and ensure interoperability of airborne and ground systems, such as electronic conspicuity. This will help enable more flexible designs of airspace, improve safety and encourage integration rather than segregation.
- 1.13 Implementing new airspace design will affect overflown communities in different ways, for example in terms of facilitating an increased number of flights at some airports or changing the flightpaths that are used. Reducing noise impacts could itself be a driver for a new design. Those who are affected by airspace change must therefore be involved in the decision-making process, and fully informed of the pros and cons of such a transformation.
- 1.14 If the structure of UK airspace is not modernised to incorporate new technology, the demand on the system, exacerbated by the current worldwide shortage of air traffic controllers, is expected to lead to a sharp increase in air traffic delays. Military capability will be degraded and sub-optimal airspace solutions will have an impact on other users.
- 1.15 In broad terms, UK airspace will require modernisation if we are to achieve the following aims:

- enable and facilitate continuous improvements in safety standards within the system through innovation
- accommodate growing demand from airspace users, including:
 - commercial airlines providing a key element of the UK's transport infrastructure supporting economic growth, and
 - ensuring defence requirements are facilitated through access to appropriate airspace
- maximise the utilisation of available runway capacity, including the government's policy for a new runway at Heathrow airport
- enable government policies in respect of the reduction and mitigation of noise and how it should be distributed to manage the impact of aviation growth on local communities
- deal with 'hotspots' of congestion within the current system
- improve resilience of the system to bad weather or other forms of disruption
- develop a genuinely sustainable framework to guide the aviation industry in its investment and technological development
- take advantage of those technological developments to improve safety and efficiency
- safely and efficiently accommodate new technologies that change the types of aerial craft and how they operate, for example drones and spacecraft
- implement internationally agreed requirements designed to increase the overall safety, capacity and efficiency of the global air traffic management system, while making commensurate environmental improvements, such as the Single European Sky
- further enable greater access to airspace for non-commercial users
- help the UK to mitigate the impact of disruptions in neighbouring European airspace
- provide flexibility within the system to enable continuing development and improvement.

- 1.16 Key to delivering airspace modernisation successfully is that each of the entities involved has the right role, powers and/or incentives, underpinned by appropriate governance and enforcement.

What has been achieved so far

The 2011 Future Airspace Strategy

- 1.17 In June 2011 the CAA published the UK's Future Airspace Strategy (FAS), which addressed the development of the UK's airspace system from 2011 to 2030. FAS was developed by the CAA, with contributions from the Department for Transport, Ministry of Defence and NATS. FAS had its genesis in the Department for Transport's *The Future of Air Transport White Paper* in 2003 and the subsequent *Future of Air Transport Progress Report* in 2006.
- 1.18 FAS set out how the planning, management and regulation of UK airspace should be developed to:
- maintain and improve the UK's high levels of safety
 - address the many different requirements on the airspace system
 - deliver balanced or 'optimal' outcomes, taking into account all those involved in, or affected by, the use of airspace.
- 1.19 FAS did not provide a detailed roadmap or plan for the implementation of changes to the UK's airspace system. Similarly, it did not provide a blueprint or future design for the UK's airspace structure, but it did set the direction for future detailed pieces of work.
- 1.20 FAS addressed UK implementation of the EU's air traffic management Master Plan and deployment of SESAR (Single European Sky Air Traffic

Management Research, the technological pillar of the EU Single European Sky initiative).¹¹

Developments in government policy

1.21 In 2015 the Department for Transport and CAA both commenced work on reviewing the policy and regulatory approaches to the design and use of airspace, tackling directly some of the most pertinent challenges to airspace modernisation.

1.22 The Department for Transport subsequently published new policies in October 2017, including new Air Navigation Guidance and new Air Navigation Directions to the CAA.¹² The changes to government policy and guidance on the CAA's decision-making role included:

- clarifying how the noise impacts of airspace change should be distributed and measured
- a greater emphasis on the aviation industry working with communities to manage noise impacts
- requiring the sponsor of a given airspace change to carry out and consult on an options analysis that allows the impacts of different airspace designs to be compared
- a new power for the Secretary of State to call-in an airspace change proposal of national strategic importance
- the establishment of the Independent Commission for Civil Aviation Noise, which will provide advice on the noise aspects of airspace changes

¹¹ The EU Single European Sky initiative was launched in 2004 with the aim of reforming air traffic management in Europe in order to accommodate sustained air traffic growth.

https://ec.europa.eu/transport/modes/air/single_european_sky_en

https://ec.europa.eu/transport/modes/air/sesar_en.

¹² Air Navigation Guidance 2017: Guidance to the CAA on its environmental objectives when carrying out its air navigation functions, and to the CAA and wider industry on airspace and noise management, Department for Transport, October 2017.

www.gov.uk/government/publications/uk-air-navigation-guidance-2017

The Civil Aviation Authority (Air Navigation) Directions 2017 form Annex D to the Air Navigation Guidance.

- a commitment to give the CAA a new decision-making role over changes in air traffic control operational procedures that could result in a planned and permanent redistribution of air traffic, even though the airspace design itself is unchanged.
- 1.23 In December 2017 the CAA published a new process for its airspace change decision-making role and supporting guidance, based on these government policy changes and on the CAA's own review of the process.¹³ The new process came into effect in January 2018.
- 1.24 The Government has most recently set out its support and objectives for the modernisation of UK airspace in its Green Paper¹⁴ published in December 2018 in preparation for its forthcoming Aviation Strategy.

An updated airspace strategy to replace FAS

- 1.25 Since 2011, much progress has been made in delivering FAS, but the world within which it sits has also shifted. Recent and forthcoming government policy changes, coupled with technological developments, mean that while many sections of FAS remain relevant, they must be rearticulated within this new context, taking into account:
- a new runway at Heathrow: outlined in the Airports National Policy Statement designated in June 2018¹⁵, and any other runways used more intensively or due to be developed by 2040
 - the need to co-ordinate multiple inter-related airspace changes across different airports

¹³ Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements, CAP 1616 www.caa.co.uk/cap1616 with supporting documents CAP 1616a, CAP 1617, CAP 1618 and CAP 1619 www.caa.co.uk/cap1616a etc.

¹⁴ The Green Paper also consults on some specific new government policies to support modernisation.

¹⁵ Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England, Department for Transport, June 2018.
<https://www.gov.uk/government/speeches/airports-national-policy-statement>

- potential policy changes arising from government reviews, such as more explicit policy on how noise must be considered, and relevant international policy changes
- the airspace requirements of the most advanced, known as 'fifth generation', military aircraft and other new military systems
- drones
- commercial spaceflight.

- 1.26 The CAA has reviewed and rearticulated its strategy in light of these anticipated changes and in response to a government policy change that redefined our role when the Government's Air Navigation Directions were updated and republished in October 2017. The CAA is now directed to prepare and maintain a **co-ordinated strategy and plan for the use of UK airspace for air navigation up to 2040, including for the modernisation of the use of such airspace**. This is consistent with the CAA's role as specialist aviation regulator and its statutory responsibilities.
- 1.27 This **Airspace Modernisation Strategy** will address upper and lower airspace in the controlled and uncontrolled environments more comprehensively than FAS.
- 1.28 The CAA must consult the Secretary of State about the preparation and maintenance of this Airspace Modernisation Strategy and the detail to be included in the **delivery plan**, and must give a delivery report to the Secretary of State annually.
- 1.29 This Airspace Modernisation Strategy forms part of the Government's new arrangements to take forward the delivery of the airspace modernisation programme, which will be a cornerstone of its forthcoming Aviation Strategy. Airports will need to develop their own airspace modernisation proposals in conjunction with each other where there are interdependencies between their airspace designs. Changes may also be necessary to comply with UK and international policy and law (such as any further new National Policy Statements, ICAO Standards and Recommended Practices, or new EU implementing regulations) for which the UK must have a delivery plan.

A shared objective for modernising airspace

- 1.30 Working together, the Department for Transport and the CAA have developed a shared objective for modernising airspace.
- 1.31 The Department for Transport and the CAA cannot deliver this objective alone. Airspace modernisation will need to be delivered by a range of aviation organisations, and a wide range of stakeholders will need to be engaged throughout this delivery. The Department for Transport and the CAA are committed to working with relevant stakeholders and those tasked with delivery to ensure modernisation happens in a coherent and consistent way, delivering the benefits described above.

Department for Transport and CAA shared objective for modernising airspace

Objective

Deliver quicker, quieter and cleaner journeys and more capacity for the benefit of those who use and are affected by UK airspace.

Parameters

- create sufficient airspace capacity to deliver safe and efficient growth of commercial aviation
- progressively reduce the noise of individual flights, through quieter operating procedures and, in situations where planning decisions have enabled growth which may adversely affect noise, require that noise impacts are considered through the airspace design process and clearly communicated
- use the minimum volume of controlled airspace consistent with safe and efficient air traffic operations
- in aiming for a shared and integrated airspace, facilitate safe and ready access to airspace for all legitimate classes of airspace users, including commercial traffic, General Aviation and the military, and new entrants such as drones and spacecraft
- not conflict with national security requirements (temporary or permanent) specified by the Secretary of State for Defence.

The Department for Transport and CAA will undertake further work to consider whether and how the impact of the objective can be assessed.

Later in this introductory chapter we explain the roles of the various parties involved in airspace modernisation. As context for the shared objective, the boxes below explain how airspace modernisation relates to:

- the CAA's decision-making role on individual airspace change proposals
- government policy on managing aviation noise.

How does this objective relate to the CAA's individual airspace decisions?

- Both the CAA's strategy and its individual airspace change decisions are governed by the factors set out in section 70 of the Transport Act 2000, and relevant Government policy and guidance.
- The objective for modernisation is drawn from section 70, and will guide the work the CAA does on the UK's national strategy.
- Separately from the objective, the way in which section 70 guides airspace change decisions is set out in detail in the CAA's guidance on airspace design (CAP 1616).
- The CAA's decisions will also be informed by decisions of relevant planning authorities, guidance and directions given to it by the Secretary of State and other relevant government policy.
- The CAA's airspace design guidance requires that evidence be developed to cover every factor in section 70, and shared with the CAA (and published on the airspace change portal).
- All airspace change proposals will be required to undertake a formal cost benefit analysis conducted in accordance with the Government's WebTAG methodology. This will enable the different costs and benefits of changes to be compared on a common basis and will be used to inform CAA's decisions.
- For each proposal, WebTAG is used to measure and compare the adverse health impacts of aviation noise, to help the sponsor design – and the CAA consider – the option that creates the best possible noise outcome alongside all other factors in section 70.

How does this objective relate to government noise policy?

- The objectives of the Airspace Modernisation Strategy (AMS) interact with wider government policies on noise. This section provides context about this interaction.
- The AMS objective and parameters set out above provide a set of deliverables that the AMS is responsible for. They do not aim to encapsulate the entire government policy on aviation noise. Instead, the noise objective aims to identify where airspace has a specific role relating to noise. For example, while the Government continues to expect the ICAO Balanced Approach to be followed, the objective focuses on the measures within the Balanced Approach where airspace is most relevant. The AMS aims to progressively reduce the noise of

individual flights, through quieter operating procedures. In situations where planning decisions have enabled growth which may adversely affect noise, noise impacts are considered through the airspace design process and clearly communicated.¹⁶

- The AMS can only be responsible for delivering noise reduction where it has an element of control. Where a decision has been taken through the planning process to increase airport capacity, this is outside the responsibility of the AMS. The objective therefore does not focus on the overall level of noise as this is contingent on planning decisions.
- When an airport is changing airspace (for a planned increase in capacity or any other reason) it must develop its design proposal in accordance with policy and law. This means adhering to the CAA's airspace change process, through which WebTAG is used to measure and compare the adverse health impacts of aviation noise, to help the sponsor design – and the CAA consider – options that manage noise impacts using health assessments and consultation responses, and consider noise alongside all other factors in section 70.
- The Government will articulate its overarching objective on aviation noise through the Aviation Strategy.
- The Aviation Strategy will consider whether, where there is new airport growth which requires approval through the planning process, this should be accompanied by a noise cap which balances noise and growth and gives communities future certainty around noise.
- It is therefore important to note that at some airports, where a planning authority has placed a condition which limits the number of aircraft or passenger movements, and where an airport has reached that limit, additional airspace capacity created to deliver safe and efficient growth of commercial aviation can only be used if and when planning approval is given for airports to grow.
- Through the Aviation Strategy, the Government will also consider proposals for the creation of a new national performance indicator (KPI) which can be used to track the long-term performance of the UK aviation industry in reducing noise at a national level. We also want to ensure that there are suitable mechanisms in place to deliver noise reduction at airport level which are measurable and enforceable and thereby contribute to the national noise KPI.

¹⁶ Aiming to reduce the noise of individual flights means aiming for an average reduction per flight. It does not mean that there will be a reduction in noise on every individual flight, or that there will necessarily be an overall reduction in noise, as this will be dependent on the overall number of flights.

Stakeholders affected

- 1.32 Airspace modernisation will affect a wide range of stakeholders, including passengers, airspace users, airports, air navigation service providers, companies that rely on air transport to conduct their business and communities that may be affected by aircraft noise.
- **For passengers**, the benefits of airspace modernisation are clear. Fewer flight delays and service disruptions at short notice will save time and improve the passenger experience. A more efficient airspace will increase capacity while continuing to improve current high safety standards, leading to better value, including consistent quality of service, and more choice.
 - **For aircraft operators**, the airspace structure is a key determinant of costs, punctuality and environmental performance. More direct and efficient flightpaths will mean lower costs for operators because they will save on fuel and be able to enhance the utilisation of their aircraft. Timely access to appropriate airspace is essential for the maintenance of military capability. Airspace modernisation must enable this while minimising impact on other users. Airspace modernisation is also expected to improve access to airspace for General Aviation, by enabling greater integration (rather than segregation) of different airspace user groups. The same is true for new airspace users such as drones and spacecraft.
 - **For airports**, the sharing of accurate flight information about traffic using our airspace is expected to improve runway throughput and resilience. Additional airspace capacity will provide airports with the scope to develop their operations in line with their business plans (subject to planning considerations). Enhanced technology combined with updated airspace design enables safe, expeditious and efficient management of increased traffic.
 - **For the UK economy**, efficiency and enhanced global connections and emerging aviation technologies can help drive growth.

- **For communities¹⁷**, airspace modernisation offers environmental improvements because aircraft can climb sooner, descend more quietly and navigate more accurately around populated centres. In some areas, the increase in traffic can lead to an increase in noise, or the concentration of traffic can concentrate noise over a smaller area, which can reduce the areas in which noise is heard and offer the opportunity for respite routes. This means that not every community will benefit, so it is important that noise is managed as well as possible, in adherence to government policy. Airports should also consider whether they can develop airspace change proposals to reduce noise, i.e. to reduce the total adverse health effects of noise. Where aircraft are able to follow more fuel-efficient routes, wider society will also benefit because fewer CO₂ emissions will reduce greenhouse-gas impacts.

Structure of this document – ends, ways and means for modernising airspace

- 1.33 This Airspace Modernisation Strategy sets out the **ends**, **ways** and **means** of modernising airspace. The **ends** are the policy objectives the UK must meet. This strategy notes those ends and describes the **ways** of achieving them, such as new airspace design, new operational concepts and new technologies, initially focusing on the period until the end of 2024.¹⁸ To establish the **means** of delivering modernised airspace, such as the resources needed, this strategy requires industry-led working groups to draw up delivery plans, with delivery overseen by the CAA. One

¹⁷ When referring to 'communities' this strategy document generally means those on the ground affected by aviation's environmental impacts in the vicinity of an airport, usually by noise but also sometimes local air quality (where there is an impact on the distribution or volume of emissions below 1000 feet). Communities may in turn be represented in different ways: by local authorities and elected representatives in national or local government; community leaders or representative groups/forums, airport consultative committees, and bodies with an interest in aviation's environmental impacts.

¹⁸ 2024 corresponds to the end of the next Single European Sky Performance Scheme reference period (RP3). https://ec.europa.eu/transport/modes/air/single-european-sky/ses-performance-and-charging/performance-and-charging-schemes_en

such plan will be a macro-level co-ordinated implementation plan (an airspace change masterplan) detailing which interdependent airspace changes are deemed necessary and when. This itself will require a timeline of airspace change proposals needed as part of a modernisation effort, and a critical path outlining the deadlines for individual airspace change proposals within it.

- 1.34 It is important to recognise that, for example, a change to the airspace at a particular airport may be completely dependent on linked changes to the lower airspace in the immediate vicinity, and cannot be implemented without it. An airspace change masterplan will therefore be a crucial element in airspace modernisation. This is discussed in Chapter 6 in the context of the coordination role that NERL will carry out.
- 1.35 In the following chapters we explain the CAA's airspace responsibilities; the roles played by others; our strategic airspace role; and how and why we are changing our published strategy for airspace, including the case for modernisation.
- 1.36 The main **ways** in which these **ends** should be delivered, namely by updating airspace designs, operational procedures and enabling technologies through 15 initiatives, are described in Chapter 4.
- 1.37 This strategy does not pre-empt specific solutions and allows space for innovation. There are other ends which airspace modernisation may need to deliver that are still being developed in detail – for example, the approach to integrating drones with aircraft that have a pilot on board. The initiatives set out in Chapter 4 also act as enablers for further work on accommodating drones and other new airspace users, and as we develop the strategy in the future, we will add more detail on how to integrate these new users. Current gaps such as these are considered in Chapter 5.

Reviewing the strategy

- 1.38 The CAA will review the Airspace Modernisation Strategy regularly in order to report to the Secretary of State annually on its delivery and to measure progress against the delivery plans. The CAA will also use those opportunities to continue to update the strategy, bearing in mind the 2040 timescale specified by the Government, in order to accommodate new technologies or other developments. This will include the need to consider developments in neighbouring air traffic management areas, especially our European neighbours, given the need to manage traffic effectively end to end. Where appropriate, the CAA may seek comments on these updates before implementing them, but will not necessarily do so in every case.

Chapter 2

Roles, responsibilities and definitions

Chapter summary

This chapter explains:

- the accountabilities of the different entities involved in airspace modernisation
- the relevant legal framework, including what powers or levers are available to enable delivery, and where there are gaps
- a new governance structure required for airspace modernisation
- any tensions between roles in airspace modernisation, and how risks will be mitigated.

Accountabilities of the entities involved

Government

- 2.1 The Department for Transport develops national policy and law, and also ensures the UK contributes to and meets its obligations under relevant international policy and law. As part of this policy responsibility the Government will also play a role in making the strategic case for airspace modernisation. The Government is considering whether to develop new policies to support airspace modernisation through the Aviation Strategy. The Government is in the process of setting up an Independent Commission on Civil Aviation Noise (ICCAN) which may also have a role in the future.
- 2.2 For certain types of airspace change, the Secretary of State may also decide to call-in a particular airspace change proposal in order to make a decision instead of the CAA.

- 2.3 The Ministry of Defence must have access to airspace in order to train and maintain competency for the UK's defence needs. It acts as an airspace change sponsor where requesting dedicated airspace that is reserved for activities which may be hazardous to other airspace users, such as high-energy manoeuvring and testing munitions.

CAA

- 2.4 The CAA is the airspace regulator and primary decision-maker. Parliament and the Government are responsible for setting the CAA's objectives, outlining the CAA's functions and responsibilities and providing guidance to the CAA. More specifically, the Air Navigation Directions¹⁹ (given by the Secretary of State under sections 66(1) and 68 of the Transport Act 2000) set out several airspace responsibilities for the CAA. In all its responsibilities, the CAA is obliged to consider certain factors set out in section 70 of the Transport Act 2000²⁰ which include safety, security, operational impacts and environmental guidance from the Government (covering impacts such as aircraft noise and emissions), and the needs of all users of airspace.
- 2.5 The Air Navigation Directions set a strategic role for the CAA (Direction 3). The CAA is tasked with developing a strategy to modernise UK airspace and a plan setting out the best approach to new design, operational concepts and technology. The Directions and supporting government policy provide the framework for the strategy and for the roles and accountabilities of the CAA and other bodies in delivering that strategy. While the CAA must own the strategy and plan, delivery (including the design of any airspace changes) is undertaken by other entities, such as airports, air navigation service providers or airspace users.

¹⁹ The Civil Aviation Authority (Air Navigation) Directions 2017 as amended by The Civil Aviation Authority (Air Navigation) (Amendment) Directions 2018.
https://www.caa.co.uk/uploadedFiles/CAA/Content/Standard_Content/Commercial_industry/Airspace/Airspace_change/2017%20Directions%20as%20amended%20by%202018%20Directions.pdf

²⁰ These factors are explained in more detail later in this chapter.

- 2.6 The Directions give the CAA responsibility for deciding whether to approve a proposal for a change to the published design of airspace, administering the airspace change process and providing guidance on the process to stakeholders (Direction 4).²¹ Airspace design includes the airspace structure and the instrument flight procedures for the use of that airspace (i.e. procedures which enable aircraft to fly in a more technologically automated manner). The airspace designs approved by the CAA are published in the UK Aeronautical Information Publication (AIP).²² The Directions were amended to give the CAA a new decision-making role over changes in air traffic control operational procedures that could result in a planned and permanent redistribution of air traffic.
- 2.7 Changes may be proposed, for example, to enable UK airspace to maintain or further improve safety, to accommodate more flights, to incorporate new technology, to mitigate or reduce the effects of aircraft noise, to allow aircraft to fly more direct routes, to keep aircraft away from particular areas, or to integrate new technologies such as drones.
- 2.8 The Directions and legal framework are discussed more fully below. The approach the CAA adopts when undertaking its regulatory assessment of airspace change proposals, and how it takes the factors in section 70 into account, is set out in CAP 1616 and on our website.²³
- 2.9 As noted in Chapter 1, in October 2017 the CAA reformed the airspace change process to ensure that it meets modern standards for regulatory decision-making, and is transparent, consistent and proportionate. The process must be impartial and evidence-based, and must take account of the needs and interests of all affected stakeholders. To ensure that the needs of all stakeholders are met, the process emphasises the importance of engagement, i.e. developing relationships with

²¹ The CAA's process and guidance is set out in CAP 1616 and associated documents, as referenced in Chapter 1. www.caa.co.uk/cap1616

²² <http://www.nats-uk.ead-it.com/public/index.php.html>.

²³ www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Legislative-framework-to-airspace-change/

stakeholders. While some changes to the UK's airspace design can be contentious with aviation stakeholders and local communities, it is a key requirement that the methods used to reach those decisions are well understood and respected.

- 2.10 The CAA runs an online airspace portal where airspace changes are submitted and monitored, stakeholder comments can be made and viewed, and relevant documentation can be viewed.²⁴
- 2.11 The CAA is not responsible for developing airspace designs or instigating airspace changes, other than in exceptional circumstances.
- 2.12 The CAA also has additional duties in respect of the regulation of the provision of air traffic services under section 2 of the Transport Act 2000. In carrying out these duties, the CAA is responsible for the economic regulation of NATS' monopoly service provision activities under a licence.

Airspace change sponsor

- 2.13 The change sponsor owns the airspace change proposal and is responsible for developing it, including taking into account feedback from relevant stakeholders, in accordance with the CAA's airspace change process and the guidance provided by the CAA and by the Department for Transport. Anyone can sponsor an airspace change proposal – although it is usually an airport or an air navigation service provider. An airport will typically sponsor a change to the airspace design in its immediate vicinity (known as terminal air navigation services), while NERL (the air navigation service provider for en-route airspace, as discussed below) will typically sponsor changes to upper airspace, where traffic is in the cruise phase of the flight away from the airport environment.

Airports

- 2.14 The airport operator is responsible for the arrival and departure routes serving its runways. It will therefore typically sponsor a change to the

²⁴ <https://airspacechange.caa.co.uk>

airspace design and associated routes in its immediate vicinity, and is required to consult and collaborate closely with those affected by the change. The airport will work closely with the air navigation service provider that manages the approach and en-route airspace to ensure seamless and safe connectivity.

2.15 There are two elements to these terminal air navigation services:

- the 'radar approach and departure' (approach control) service, and
- the aerodrome control service.

2.16 These two elements of terminal air navigation services are provided by the airport (acting as an air navigation service provider) itself, or by a third-party air navigation services provider (for example, NATS (Services) Ltd, see below). Thus an airspace change that affects a number of airports may involve or affect multiple air navigation services providers.

NATS

2.17 NATS Holdings Ltd, the biggest air navigation services provider in the UK, provides air traffic control services through two principal subsidiaries: NATS (En Route) plc (called NERL) and NATS (Services) Ltd (called NSL), which provides air traffic services on a commercial basis. This strategy document concerns NERL only, and not the commercial work of NSL. NERL is the sole provider of air traffic control services for aircraft flying 'en route' in UK airspace²⁵ and provides some air traffic control services in the eastern part of the North Atlantic, as well as providing a combined approach function (London Approach) for five London airports. It is regulated by the CAA within the framework of:

- the EU Single European Sky, which sets out measures to improve the efficiency of air navigation services, through setting targets to drive performance in four key performance areas (safety, environment, capacity, and cost-efficiency)

²⁵ 'En route' means that part of the flight from the end of the take-off and initial climb phase to the commencement of the approach and landing phase.

- the Transport Act 2000, which sets the need for NERL to operate under a licence from the Secretary of State. NERL has duties under the Transport Act to provide, develop and maintain a safe system for the provision of air traffic services that is efficient and co-ordinated and meets the demand for air traffic services. NERL is also tasked through its licence and directions from the Government with a role in maintaining the effectiveness of the UK's air traffic management network.
- a performance plan proposed by the CAA, including targets and incentives, that covers NERL's monopoly en-route and London Approach air navigation service activities, for adoption by the Government. The performance plan has to be approved by the European Commission. NERL is required to report on its performance and delivery against targets.²⁶

Airspace users

2.18 Airspace users include airlines and other commercial operators, General Aviation, the Ministry of Defence, and new entrants such as drones and spacecraft. The definition of General Aviation can vary, but essentially it means all civil flying other than commercial airline operations. It therefore encompasses a wide range of aviation activity from powered parachutes, gliding and ballooning to corporate business jets, and includes all sport and recreational flying. Airspace users are required to have the necessary aircraft equipment to use the modernised airspace design, and to ensure that the associated operational procedures are introduced and that pilots are appropriately trained.

Stakeholders impacted by airspace change

2.19 There are stakeholders who may be impacted by individual airspace changes, and who may also be interested in the national policy and

²⁶ [Commission Implementing Regulation \(EU\) No 390/2013 of 3 May 2013 laying down a performance scheme for air navigation services and network functions](#) and [Commission Implementing Regulation \(EU\) No 391/2013 of 3 May 2013 laying down a common charging scheme for air navigation services](#). Both regulations are under review.

strategy that those changes are nested within. Stakeholders who may be impacted by individual airspace changes will normally have the opportunity to discuss with change sponsors the principles underlying the airspace change and the development of options for the change. These stakeholders may include: airspace users, such as airlines, General Aviation or the military; airports within the area of interest; affected air navigation service providers; local communities; local government and elected representatives; and non-governmental organisations.

Shared role

- 2.20 Some of the organisations listed above have a strategic role, meaning they have a responsibility for the management, organisation or use of airspace as a piece of national infrastructure. We will return to the strategic modernisation of airspace later in this chapter.

Law and policy governing the CAA's role

- 2.21 The CAA's statutory duties and functions regarding airspace are contained in The Civil Aviation Authority (Air Navigation) Directions 2017, section 70 of the Transport Act 2000 and the Air Navigation Guidance 2017.

The Civil Aviation Authority (Air Navigation) Directions 2017

- 2.22 All the CAA's responsibilities in the Air Navigation Directions must be carried out having regard to section 70 of the Transport Act 2000. Section 70 (see below) gives the CAA a duty to take a number of factors into account when exercising its air navigation functions. This includes our consideration of an airspace change proposal and the Directions on our strategic role.

Direction 3 on airspace design

- 2.23 In October 2017 the Direction to “prepare and maintain a co-ordinated strategy and plan for the use of UK airspace for air navigation” was replaced with the following three points (Direction 3, paragraphs e to g):