UK Civil Aviation Authority

Airspace Fundamentals and the Future of Flight

CAP 2530

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Civil Aviation Authority
Aviation House
Beehive Ring Road
Crawley
West Sussex
RH6 0YR

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Enquiries regarding the content of this publication should be addressed to: innovation@caa.co.uk

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Introduction

Innovation in aviation has been relentless in the last few years. The aviation sector is undergoing significant transformation. The integration of new types of aircraft, services, and technology into the UK airspace, requires the revision of the existing regulatory frameworks. As a consequence, parts of the regulatory framework might need updating, while others could remain largely unaffected. In any case, innovation presents a unique challenge, which could potentially bring about shifts in the aviation market's underlying models.

This document sets how the UK airspace works today; and what potential mechanisms might already exist to help us in considering new technologies. The paper does not propose any specific operational, technical or market solutions. The document's purpose is to educate innovators, in a context where many new entrants might not have enough background knowledge of aviation law and regulation.

The issues this paper deals with are complex. The CAA is unlikely to be able to find solutions to them without first engaging in several internal and external tasks. An early warm up on where we are today, and some of the issues being discussed regarding airspace design, operation, services, and charging will open up the debate more widely, rather than just trying to craft a single solution internally. Our stakeholders will have different views. We will need to engage openly with them during various stages of the development.

This work sits in the context of further activities carried out by the Department for Transport (DfT) and the CAA. Among those, the most relevant workstreams are the DfT's Future of Transport consultation;[1] the CAA's next NATS (En Route) plc (NERL) price control review (NR23);[2] and the CAA's refresh of the Airspace Modernisation Strategy (AMS).[3] While these three workstreams are currently in process, this paper aims to be aligned with them.

This paper is organised as follows: Chapter 1 briefly explains the fundamental concepts that apply to the UK, including classification, structures, management, and charges. A description of how the UK airspace is currently used, and how changes to its structure take place can be found in chapter 2. Later, the role and characteristics of air navigation service

1 In late 2021, the DfT held a consultation on the future of transport regulatory review: future of flight. The consultation dealt with novel aircraft, safety, security, UAS traffic management (UTM), airspace, noise, infrastructure, and future plans. Our response can be found in CAP 2296. It provides a good summary of some of the issues we see as relevant in the foreseeable future of aviation. Those answers inform this document.

2 See Economic regulation of NATS (En Route) plc: working paper on the reconciliation review for NR23, including the request for information (CAP2291).

3 See Airspace Modernisation Strategy 2023–2040 Part 1: Strategic objectives and enablers (CAP1711); and Airspace Modernisation Strategy 2023–2040 Part 2: Delivery elements (CAP1711a).

providers (ANSPs) and the en route service provider are covered in chapter 3. Chapter 4 sets out the future aircraft and use cases we expect in the UK.

Chapter 1

Airspace Fundamentals

1.1. *UK airspace* is the airspace above the territories of the UK including territorial waters. More specifically, UK airspace means airspace in managed areas, which comprise the UK, as well as any area which is outside the UK but in respect of which the UK has undertaken under international arrangements to carry out activities with regard to air navigation.[4] UK airspace is an essential, but largely invisible, part of our national transport infrastructure. It is a shared and (in certain regions) scarce resource. The Secretary of State (SoS) may give directions to the CAA imposing duties or conferring powers (or both) on it with regard to air navigation in a managed area.[5]

1.2. *Airspace structure* means "a specific volume of airspace designed to ensure the safe and optimal operation of aircraft."[6] The SoS must make regulations laying down detailed provisions concerning the rules and procedures for the design of airspace structures.[7] Those regulations must be made on the basis of the principles[8] and with a view to achieving the objectives[9] set out in UK Regulation (EU) 2018/1139 (the "Basic Regulation").[10] The principal objective of the Basic Regulation is to establish and maintain a high level of civil aviation safety in the UK.[11] The CAA has the obligation to ensure that airspace structures are properly designed, surveyed and validated before they can be deployed and used by aircraft, in accordance with the SoS's regulations.[12]

1.3. The UK airspace structure currently makes significant use of controlled airspace, primarily for safety reasons. The structure specifies the routes that aircraft fly and the procedures and systems used by air traffic controllers (ATCOs) to manage traffic flows.

1.4. The following paragraphs summarise fundamental concepts of airspace structure. Later, they explain what controlled and uncontrolled airspace exists in the UK. The

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4 TA00, Section 72(3) and the Civil Aviation Authority (Air Navigation) Directions 2017, as amended, direction 2.

5 TA00, Section 66(1).

6 The Civil Aviation Authority (Air Navigation) Directions 2017, as amended, direction 2.

7 UK Regulation (EU) 2018/1139, Article 44(1)(b), as amended by Aviation Safety (Amendment etc.) (EU Exit) Regulations 2019/645 Pt 3(5) reg.121.

8 UK Regulation (EU) 2018/1139, Article 4.

9 UK Regulation (EU) 2018/1139, Article 1.

10 UK Regulation (EU) 2018/1139, Article 44(1), as amended by Aviation Safety (Amendment etc.) (EU Exit) Regulations 2019/645 Pt 3(5) reg.121.

11 UK Regulation (EU) 2018/1139, Article 1, as amended by Aviation Safety (Amendment etc.) (EU Exit) Regulations 2019/645 Pt 3(5) reg.83(2).

12 UK Regulation (EU) 2018/1139, Article 46, as amended by Aviation Safety (Amendment etc.) (EU Exit) Regulations 2019/645 Pt 3(5) reg.123(a)&(b).

chapter then moves on to address the question of who manages UK airspace and who is the authority. Finally, this chapter deals with charges for airspace services.

The Fundamentals of Airspace

1.5. The airspace's structure is organised based on the concepts of International Civil Aviation Organisation (ICAO) regions, flight information regions, airspace sectors, airspace classification, and airspace types. The following paragraphs explain each of them.

1.6. *ICAO regions.* International airspace is divided into nine ICAO air navigation regions, sometimes referred to as Global Air Navigation Plan regions. The present regional structure comprises the following regions:[13] Africa-India Ocean (AFI) region; Asia (ASIA) region; Caribbean (CAR) region; European (EUR) region; Middle East (MID) region; North American (NAM) region; North Atlantic (NAT) region; Pacific (PAC) region; and South American (SAM) region. Airspace is further divided into flight information regions.

1.7. *Flight Information Regions (FIR)*. Once the ICAO regions are established, FIRs are set up. FIRs are airspace of defined dimensions (i.e., portions of the airspace) where it is determined that flight information service and alerting service will be provided.[14] Flight information regions must be delineated to cover the whole of the air route structure to be served by them.[15] All of the world's airspace is organised into FIRs, which vary in size and can cover neighbouring airspace over an ocean. FIRs are managed by the controlling authorities appointed in a particular region (typically, the controlling authority of an FIR is that state whose territory lies within the FIR). In the UK, the CAA is the designated controlling authority for two FIRs and shares responsibility over a third FIR.

1.8. The UK airspace is divided into two FIRs: (i) London, which covers most of England and Wales; and (ii) Scottish, which covers parts of Northern England, Scotland, and Northern Ireland. ICAO has also delegated the Shanwick Oceanic FIR to the UK and Ireland to service. The Shanwick Oceanic comprises a region of more than 1.8 million of Sq. Km (700,000 Sq. miles) over the North-East Atlantic Ocean. It is a shared responsibility between the UK and Ireland to provide ATS.

1.9. FIRs can also be split into upper (*en route*) and lower sections, and into different classifications (or classes of airspace), which have different rules of flying and air traffic services (ATS) within that airspace.

1.10. Once FIRs have been established and the controlling authorities designated, a state determines those portions of the airspace (and those aerodromes) where air traffic

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13 As defined in Appendix 1 to the Directives to Regional Air Navigation Meetings and Rules of Procedure for their Conduct (Doc 8144-AN/874).

14 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, s. 2.5.2.1 and UK Regulation(EU) No 923/2012, Article 2(76)).

15 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, s. 2.11.2.1.

services will be provided.[16] Where a State has determined the need for the provision of ATS, the state must then decide whether ATC service or flight information services (FIS) will be provided. In turn, this affects whether controlled airspace or uncontrolled airspace is required, which requires a further decision on the specific classification of controlled airspace that may be required.[17]

1.11. *Airspace sectors*. ANSPs break down FIRs into sectors to facilitate airspace management by ATCOs and Flight Information Services Officers (FISOs). However, it is important to note that within a FIR there will be uncontrolled airspace, in which pilots will not be required to receive ATS. Airspace sectors can be created and reduced to deal with demand.[18] Individual sectors are defined as a volume that can be combined with neighbouring volumes when demand is low and split again when demand is higher.

1.12. *Airspace classification.* Three-dimensional blocks of the airspace are assigned to a specific class for the purpose of ATS.[19] ICAO lists seven airspace classes (A to G). Each class is described by: (i) the type of flights that are permitted; (ii) separation among types of flights; (iii) services provided; (iv) speed limitation; (v) radio communication requirement; and (vi) whether flights are subject to ATC clearance.[20] Thus, for example, under ICAO, in Class A, "IFR [instrumental flight rules] flights only are permitted, all flights are provided with air traffic control service and are separated from each other."[21]

1.13. This means that airspace classes determine the applicable flight rules; how and where aircraft can fly; the equipment that must be carried; and procedures that must be followed. However, ICAO rules do not guarantee that full harmonisation exists internationally.

1.14. Each state is sovereign over the airspace above its territory. Hence, each state decides how it will apply the ICAO airspace classification system to its airspace.[22] In the European Union, EASA's Standardised European Rules of the Air (SERA) harmonised airspace classes in EU member states[23] (previously, there were over

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16 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, s. 2.1.1.

17 See also SARG's Policy for the Classification of UK Airspace, dated 11 August 2022.

18 Individual sectors are defined as a volume that can be combined with neighbouring volumes when demand is low and split again when demand is higher.

19 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, s. 2.6.

20 ICAO Annex 11: Air Traffic Services, 15th edition (2018), Appendix 4.

21 Ib.

22 For example, the FAA has the duty to designate classes of airspace in the United States. The FAA has authority designate airspace classes under 49 U.S.C. 106(f) & (g), 40103, 40113, 40120, and applicable executive orders. The FAA designates airspace classes in the Code of Federal Regulations, Title 14, Chapter I, subchapter E, parts 71 & 73. A listing of classes A, B, C, D, and E airspace areas; air traffic service routes; and reporting points can be found in FAA Order JO 7400.11F, Airspace Designations and Reporting Points, dated August 10, 2021 (incorporated by reference to part 71). As we will see below, there are differences in how the US and the UK classify airspace. See the Pilot's Handbook of Aeronautical Knowledge's chapter 15 (Airspace) illustrates the United States' airspace classes.

23 Commission Implementing Regulation (EU) No. 923/2012, as amended (EU SERA).

20 national differences).[24] SERA is an EU regulation, directly applicable to EU member states, who must designate airspace in accordance with the SERA airspace classification.[25]

1.15. The UK has retained SERA after 31 December 2020.[26] In this text, EU SERA refers to SERA as applicable to EU member states, while UK SERA means SERA as retained and amended by UK domestic law. In the UK, the CAA shall designate airspace in accordance with the following airspace classification and in accordance with UK SERA's Appendix IV.[27]

1.16. *Controlled and uncontrolled airspace*. Roughly speaking, aircraft in higher classifications of controlled airspace fly under the positive monitoring and direction of air traffic control to maintain safe distances between them. The exact type of separation and services provided depend on the airspace classification and the type of flight (whether it is IFR or visual flight rules (VFR)). Uncontrolled airspace often incorporates areas where aircraft are not identified and managed by air traffic control, although they may request a service that can provide information and advice to support a safe flight. The UK designation of airspace classes is explained further below. Before that, we will cover other airspace concepts.

1.17. *Airspace types.* Controlled airspace can also be catalogued by type. Airspace types coexist with airspace classes, and organise airspace based on function and location. Airspace types include (i) control areas and terminal control areas; (ii) control zones; (iii) restricted areas, prohibited areas, danger areas, and flight plan buffer zones; and (iv) airways. Airways have been largely replaced by control areas in the UK.

(i) *Control Areas*. Annex 11 to the Chicago Convention 1944, EU SERA and UK SERA define them as "a controlled airspace extending upwards from a specified limit above the earth."[28]

Control areas are portions of the airspace where ATC service will be provided to IFR flights.[29] When designated within a FIR, control areas form part of that FIR.[30] Control areas must be delineated to encompass sufficient airspace to contain the flight paths of those (full or portions of) IFR flights, to which it is desired to provide the relevant parts of the ATC service.

According to Annex 11, the lower limit of a control area must be established at a height above the ground or water of not less than 200 m (700 ft).[31]

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24 EASA's Flying in the EU

25 EU SERA 6001.

26 Please see UK Regulation (EU) No 923/2012, as amended.

27 UK Regulation (EU) 923/2012, SERA.6001 point (a) , as amended by the Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2019/459 Pt 3(16) reg.307(6)(a).

28 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 1, Commission Implementing Regulation (EU) No. 923/2012, Article 2(56), and UK Regulation (EU) No 923/2012, Article 2(56).

29 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, para. 2.5.2.2.1.

30 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, para. 2.5.2.2.2.

31 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, para. 2.11.3.2.

Similarly, according to Annex 11, an upper limit of a control area must be established when "either: a) ATC service will not be provided above such upper limit; or b) the control area is situated below an upper control area, in which case the upper limit must coincide with the lower limit of the upper control area."[32] When established, such upper limit must coincide with a VFR cruising level.[33]

Consistent with Air Navigation Directions 2023, the CAA's policy for establishing a volume of controlled airspace is that the CAA must seek to ensure that the amount of controlled airspace is the minimum required to maintain a high standard of air safety and, subject to overriding national security or defence requirements, that the needs of all airspace users are reflected on an equitable basis.[34]

Terminal control area. This is "[a] control area normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes"[35] or an "[a]rea of controlled airspace surrounding an airport."[36] An example is the London Terminal Control Area, which works with air traffic departing from, and arriving to Heathrow, Gatwick, Stansted, Luton, City, Southend, and other aerodromes and minor airfields.

(ii) *Control zones*. Annex 11, EU SERA, and UK SERA define them as "[a] controlled airspace extending upwards from the surface of the earth to a specified upper limit."[37] They are usually established around aerodromes.

Like control areas, control zones are also portions of the airspace where ATC service will be provided to instrumental flight rules (IFR) flights.[38]

Aerodrome traffic zone (ATZ). This is an airspace of defined dimensions established around an aerodrome for the protection of aerodrome traffic.[39] Aerodrome traffic is all traffic on the manoeuvring area of an aerodrome and all aircraft flying in the vicinity of an aerodrome.[40]

(iii) *Restricted areas*. Annex 11, EU SERA, and UK SERA define it as an "airspace of defined dimensions, above the land areas or territorial waters of

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32 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, para. 2.11.3.3.

33 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, para. 2.11.3.3.

34 CAA's SARG's Policy for the Design of Controlled Airspace Structures, issued on 11 August 2022, and Air Navigation Directions 2023, direction 3(c).

35 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 1. See also CAP1430.

36 CAP1616, Appendix J.

37 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 1, Commission Implementing Regulation (EU) No. 923/2012, Article 2(61), and UK Regulation(EU) No 923/2012, Article 2(61).

38 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, s. 2.5.2.2.1.

39 Commission Implementing Regulation (EU) No. 923/2012, Article 2(11), and UK Regulation (EU) 923/2012 (SERA), Article 2(11)1. See also ANO 2016, Article 5, which defines ATZ in more detail.

40 Commission Implementing Regulation (EU) No. 923/2012, Article 2(9), and UK Regulation (EU) 923/2012 (SERA), Article 2(9).

a State, within which the flight of aircraft is restricted in accordance with certain specified conditions."[41] CAP1616's description is similar[42].

Prohibited areas. Annex 11, EU SERA, and UK SERA defined a prohibited area as "[a]n airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited"[43] (except, in the case of UK SERA, by permission of the Secretary of State). CAP1616's description is similar.

Danger areas. Annex 11, EU SERA, and UK SERA defined a danger area as "an airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times."[44] CAP1616 replaces *specified* with *notified*.

Flight Plan Buffer Zone (FBZ). This is an airspace volume which may be established in association to a reserved or restricted area. The FBZ defines the lateral, vertical and time limits for the purpose of validating submitted IFR filed flight plans (FPL) when the associated area is activated or planned to be activated.[45] Neither EU SERA nor UK SERA defined FBZ.

(iv) *Airway*. This is a control area (in full or a portion) established in the form of a corridor.[46] Airways connect control areas and link up with airways in other states.

1.18. Given its importance, the following subchapters analyse what controlled and uncontrolled airspace exists in the UK.

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41 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 1, Commission Implementing Regulation (EU) No. 923/2012, Article 2(111), and UK Regulation (EU) No 923/2012 Article 2(111).

42 CAP1616 is the CAA's publication on Airspace Change: Guidance on the regulatory process for changing the notified airspace design and planned and permanent redistribution of air traffic, and on providing airspace information.

43 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 1, Commission Implementing Regulation (EU) No. 923/2012, Article 2(103), and UK Regulation (EU) No 923/2012 Article 2(103), UK SERA.3145.

44 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 1, Commission Implementing Regulation (EU) No. 923/2012, Article 2(65), and UK Regulation (EU) No 923/2012 Article 2(65).

45 Eurocontrol European Route Network Improvement Plan Part 1 (See CAP1430).

46 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 1.d See also Commission Implementing Regulation (EU) No. 923/2012, Article 2(36), and UK Regulation (EU) No 923/2012 Article 2(36). CAP1616 offers a more detailed description, adding that an airway has "a defined width with a defined lower base, extending to Flight Level 245 (a nominal altitude of 24,500 feet) unless otherwise denoted." (CAP1616, Appendix J.).

What Controlled Airspace Exists in the UK?

1.19. ICAO Annex 11[47] and UK SERA[48] classify airspace in classes A to G. Under Annex 11, states shall select only those airspace classes appropriate to their needs.[49] SERA's description of the classes expands on Annex 11's text, adding descriptions of mandatory and optional services in each class.

1.20. In the UK, SERA is retained EU regulation. When the UK exited the EU, SERA effectively bifurcated. There are now two SERAs: EU SERA and UK SERA (i.e., SERA as it was EU exit day, plus any changes introduced by UK domestic primary and secondary legislation). The UK has now the ability to amend UK SERA and to issue its own acceptable means of compliance and guidance material to UK SERA.

1.21. The DfT has directed the CAA to develop and publish a national policy for the classification of the UK airspace.[50] The CAA must therefore classify UK airspace in accordance with that policy[51] and publish that classification through the Aeronautical Information Publication for the UK (AIP).[52] Within the UK FIR and Upper Flight Information Region (UIR), airspace is classified as A, C, D, E, F and G in accordance with UK SERA, subject to the differences notified in the AIP.[53]

1.22. Controlled airspace (CAS) means an "airspace of defined dimensions within which air traffic control service is provided in accordance with the airspace classification."[54] The GM1 to UK SERA goes on to clarify that *controlled airspace* "is a generic term which covers ATS airspace Classes A, B, C, D and E."[55] The UK controlled airspace is currently comprised of classes A, C, D and E. [56] There are no Class B or class F (advisory airspace).[57]

1.23. Within one volume of notified controlled airspace there will be one *notified airspace controlling authority*. However, a few comments are in order here. Controlled airspace arrangements are complex. Controlled airspace may include things such as local flying areas. There can also be changes in controlling authority at different times of day. A volume of airspace can also revert to Class G at notified times.[58] The CAA acknowledges that ATS units (ATSUs), which are not notified as the

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47 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, para. 2.6.1.

48 UK Regulation (EU) No 923/2012, section 6 (SERA.6001) and Appendix 4.

49 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, para. 2.6.2.

50 The Civil Aviation Authority (Air Navigation) Directions 2017, as amended, direction 3(a).

51 At the time of writing, the current policy statement is the CAA's SARG's Policy for the Classification of UK Airspace, dated 11 August 2022.

52 The Civil Aviation Authority (Air Navigation) Directions 2017, as amended, direction 3(b).

53 UK AIP, part 2, ENR 1.4.1.1.

54 UK Regulation (EU) No 923/2012 Article 2(58).

55 UK Regulation (EU) No 923/2012, GM1 to Article 2(58); and ANO 2016, Schedule 1 para 1.

56 UK AIP, part 2, ENR 1.4.1.2.

57 UK AIP, part 2, ENR 1.4.2.2. and 1.4.2.6.

58 As with part of Southampton's CAS.

controlling authority for a given airspace, might nevertheless seek to provide ATS within controlled airspace, and has a policy for those scenarios.[59] This means that, for example, ANSPs not notified as a controlling authority may provide ATS within a Class E airspace structure in accordance with CAA's policy.[60]

1.24. Airspace classification within a FIR governs the applicable flight rules, as well as the baseline ATS that have to be made available. A detailed description of airspace classes can be found in the AIP.[61] For the purpose of this paper, UK SERA's description of each class existing in the UK is presented here.[62]

(i) *Class A*. IFR flights only are permitted. All flights are provided with air traffic control service and are separated from each other. Continuous air-ground voice communications are required for all flights. All flights shall be subject to ATC clearance.

(ii) *Class C*. IFR and VFR flights are permitted. All flights are provided with air traffic control service and IFR flights are separated from other IFR flights and from VFR flights. VFR flights are separated from IFR flights and receive traffic information in respect of other VFR flights and traffic avoidance advice on request. Continuous air-ground voice communications are required for all flights. For VFR flights a speed limitation of 250 kts indicated airspeed (IAS) applies below 3050 m (10000 ft) Above Mean Sea Level (AMSL), except where approved by the competent authority for aircraft types, which for technical or safety reasons, cannot maintain this speed. All flights shall be subject to ATC clearance.

Please note that, while the designation of the airspace classification must be appropriate to the needs of the UK, all airspace above flight level (FL) 195 must be classified as Class C.[63]

(iii) *Class D*. IFR and VFR flights are permitted, and all flights are provided with air traffic control service. IFR flights are separated from other IFR flights, receive traffic information in respect of VFR flights and traffic avoidance advice on request. VFR flights receive traffic information in respect of all other flights and traffic avoidance advice on request. Continuous air-ground voice communications are required for all flights and a speed limitation of 250 kts IAS applies to all flights below 3,050 m (10,000 ft) AMSL, except where approved by the competent authority for aircraft types, which for technical or

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59 SARG's Policy for ATS Provision Within Controlled Airspace by Units not Notified as the Controlling Authority, 19 June 2020.

60 Change Proposals for Class E Airspace ATS Procedures: Consultation Report (CAP1800), para. 2.4.1(b).

61 UK AIP, part 2, ENR 1.4.

62 UK Regulation (EU) No 923/2012, section 6 (SERA.6001(a)).

63 UK Regulation (EU) No 923/2012, section 6 (SERA.6001(b)).

safety reasons, cannot maintain this speed. All flights shall be subject to ATC clearance.

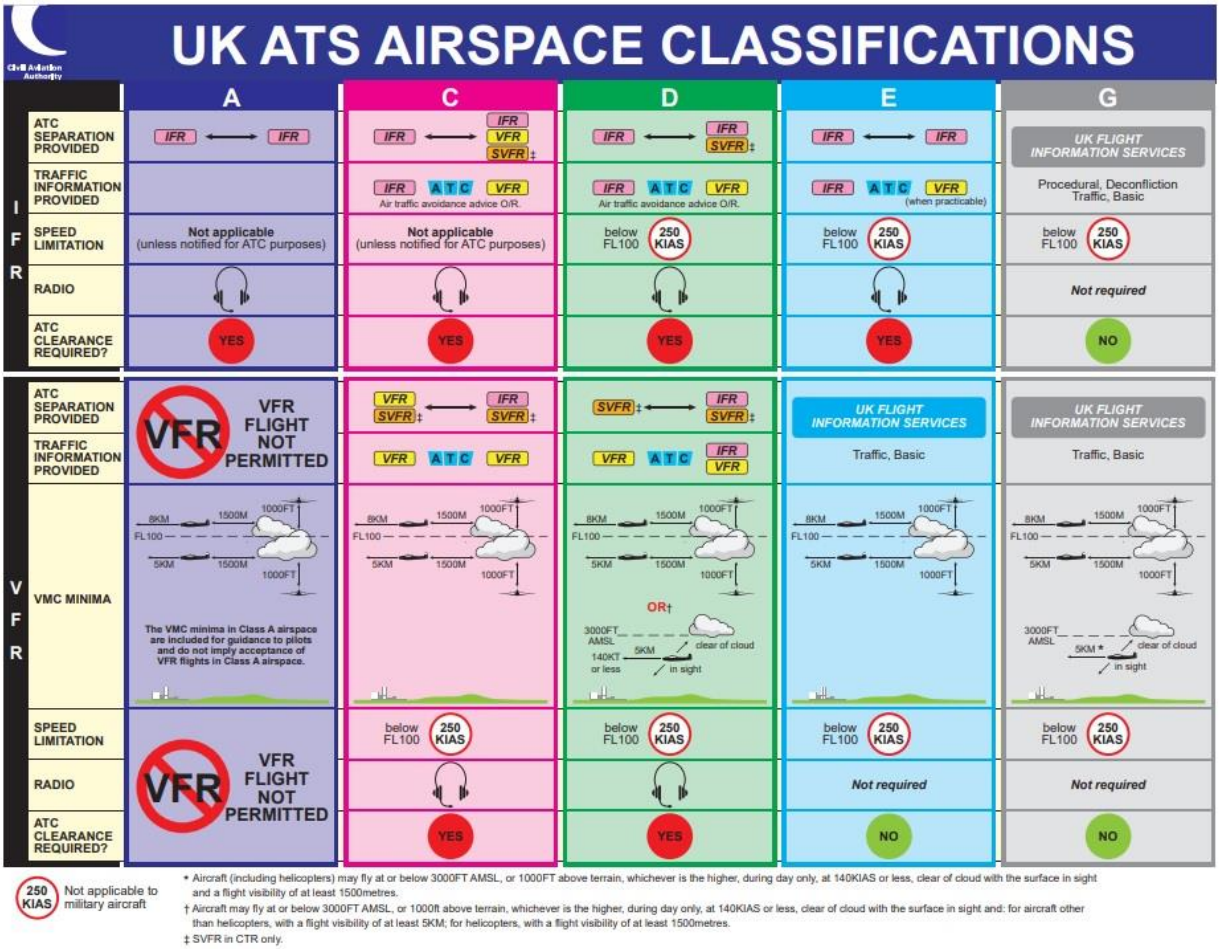
(iv) *Class E*. IFR and VFR flights are permitted. IFR flights are provided with air traffic control service and are separated from other IFR flights. All flights receive traffic information, as far as is practical. Continuous air-ground voice communications are required for IFR flights. A speed limitation of 250 kts IAS applies to all flights below 3050 m (10000 ft) AMSL, except where approved by the competent authority for aircraft types, which for technical or safety reasons cannot maintain this speed. All IFR flights shall be subject to ATC clearance. Class E shall not be used for control zones.

1.25. The preceding paragraphs described ICAO classes as applied in the UK by UK SERA. UK amendments to SERA.6001 were made on exit from the EU.[64] The CAA has also amended the AMC and GM to UK SERA.6001.[65] Differences between UK and ICAO rules are notified in AIP GEN 1.7 and change over time. The following graph shows the current UK ATS airspace classification:[66]

64 Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2019/459 Pt 3(16) reg.307(6).

65 CAA Decision to amend AMC and GM for UK Regulation (EU) No. 923/2012 pursuant to Article 76(3) of UK Regulation (EU) 2018/1139. Decision 9, dated 18 October 2021.

66 UK AIP, part 2, ENR 6-8 (effective 26 January 2022).



Uncontrolled Airspace

1.26. Class G airspace is uncontrolled. In accordance with ICAO, Class G is defined as a portion of airspace where "IFR and VFR flights are permitted and receive flight information service if requested."[67] UK SERA adds that "[a]ll IFR flights shall be capable of establishing air-ground voice communications. A speed limitation of 250 kts IAS applies to all flights below 3,050 m (10,000 ft) AMSL, except where approved by the competent authority for aircraft types, which for technical or safety reasons cannot maintain this speed. ATC clearance is not required."[68] UK SERA goes on to say that continuous two-way radiocommunications are not required in Class G.[69]

67 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, s. 2.6.

68 UK Regulation (EU) No 923/2012, section 6 (SERA.6001(a)).

69 UK Regulation (EU) No 923/2012, Appendix 4. The ICAO requirement for IFR flights in Class G is more

1.27. In the UK, uncontrolled airspace comprises all airspace that is not controlled airspace.[70] A detailed description of the UK's Class G airspace can be found in the AIP.[71] The differences notified in AIP GEN 1.7 are that: (i) subject to availability, all flights within Class G airspace may receive UK Flight Information Services;[72] and (ii) with regards to Class G, the UK does not require continuous two-way communications under IFR.[73]

1.28. There are no restrictions on which aircraft can enter uncontrolled airspace. Generally, there is no obligation to carry specific equipment in the aircraft[74] or to take a specific route flow from the nature of the Class G airspace . Those flying in uncontrolled airspace are not required to receive services or obtain ATC clearance[75] but may choose to obtain information and advice from ATS (where such services are available). However, there may be other legal requirements, depending on the circumstances (e.g., an overlay structure, such as a Transponder Mandatory Zone (TMZ)).

1.29. There is no notified controlling authority in Class G. Uncontrolled airspace has overlapping Lower Airspace Radar Services (LARS)[76] providers, as well as other non-LARS ANSPs providing ATS to Class G users.

Adjoining and Overlapping Classes

1.30. EU SERA and UK SERA do not have a rule dealing with overlapping airspace classes. However, the AMC and GM to UK SERA.6001 deal with adjoining airspaces , following Annex 11.[77] "Where ATS airspaces adjoin vertically, i.e., one above the other, flights at a common level should comply with the requirements of, and be given services applicable to, the less restrictive class of airspace."[78] Under the AMC to UK SERA.6001, Class B airspace is considered less restrictive than Class A airspace; Class C airspace less restrictive than Class B airspace, and so

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restrictive because it requires continuous two-way radiocommunications (see ICAO Annex 11: Air Traffic Services, 15th edition (2018), Appendix 4).

70 UK AIP, part 2, ENR 1.4 at 2.7.1.

71 UK AIP, part 2, ENR 1.4 at 2.7.

72 ICAO ref. C2, 2.6.1.

73 UK AIP, part 1, GEN 1.7, Annex 11 (effective on 26 January 2023).

74 However, there are some requirements for aircraft equipage depending on the aircraft type. E.g., aircraft with a maximum certified take-off mass exceeding 5,700 kg or authorised to carry more than 19 passengers are required to carry ACAS.

75 UK Regulation (EU) No 923/2012, Appendix 4.

76 UK CAA's Lower Airspace Radar Service

77 ICAO, Annex 11, note after 2.6.3.

78 AMC and GM for Standardised European Rules of the Air (SERA) as retained in (and amended by UK law), section 6, AMC1 SERA.6001.

on.[79]

Who Manages it? Who is the Authority?

1.31. ICAO Annex 11 provides that each contracting state must determine those portions of the airspace and those aerodromes within the state's jurisdiction where air traffic services will be provided. States must arrange for those services to be established and provided.[80] The authority responsible for establishing and providing the services may be a state or a suitable agency, at the choice of the state with jurisdiction in the relevant portions or airspace and aerodromes.[81]

1.32. Within the UK, there are several organisations which have roles and responsibilities regarding airspace legislation, regulation, control, operation of services and safety. These include: Parliament, Government, the CAA, the en route service provider, ATC organisations, and aerodromes.

1.33. *Parliament*. Parliament enacts laws that govern aviation in the UK and decides which government departments or agencies have powers and their extent. The Transport Act 2000 (TA00) sets out the SoS and the CAA's duties.

1.34. *His Majesty*, by Order in Council has the power to make provisions through air navigation orders to carry out the Chicago Convention 1944 and its annexes, and to regulate air navigation more generally.[82]

1.35. *The SoS*. The SoS main duty is to maintain a high standard of safety in the provision of air traffic services.[83] In exercising their ATS functions, the SoS must further the interests of certain stakeholders regarding range, availability, continuity, cost, and quality of air traffic services, while promoting competition in the provision of ATS; and promote efficiency and economy on part of licence holders, while securing that the financing of their activities is not unduly difficult.[84]

1.36. *The SoS* has the power to give directions to the CAA imposing duties or conferring powers (or both) on it with regard to air navigation in a managed area.[85] The SoS has done so though The Civil Aviation Authority (Air Navigation) Directions 2017, and amendments. The SoS also has the power to determine certain proposals for permanent changes to the UK airspace design, where the call-in criteria are met.[86]

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79 AMC and GM for Standardised European Rules of the Air (SERA) as retained in (and amended by UK law), section 6, GM1 SERA.6001.

80 ICAO, Annex 11, 2.1.1.

81 ICAO, Annex 11, 2.1.3, Note 1.

82 CA82, Section 60(1),(2),(3)(g) to (j).

83 TA00, Section 1.

84 TA00, Section 1(2), (3) & (4).

85 TA00, Section 66.

86 Air Navigation Directions 2023, direction 6.

1.37. *The CAA*. The CAA must also exercise its functions in the same manner as the SoS, while also taking account of any UK international obligations as notified by the SoS; as well as any SoS's guidance on environmental objectives.[87] The CAA must exercise its air navigation functions so as to maintain a high standard of safety in the provision of air traffic services.[88] The CAA must exercise its air navigation functions also in the manner it thinks best calculated to: secure the most efficient use of airspace consistent with the safe operation of aircraft and the expeditious flow of air traffic; satisfy the requirements of operators and owners of all classes of aircraft; and take account of the interests of any person (other than an operator or owner of an aircraft) in relation to the use of any particular airspace or the use of airspace generally.[89] The CAA must also consider several other factors, including, environmental objectives and national security, among others.[90]

1.38. In accordance with the Air Navigation Directions 2023, the CAA must (among other things):[91]

(i) develop and publish a national policy for the classification of UK airspace;

(ii) classify UK airspace in accordance with such national policy; publish that classification; regularly consider whether that classification should be reviewed; carry out a review;

(iii) develop and publish rules, guidelines, technical design criteria and common procedures for the use of UK airspace;

(iv) ensure that an Aeronautical Information Service is provided for UK airspace, including the CAA being responsible for the form and content of the UK AIP, in accordance with international obligations;[92] the CAA is also responsible for:[93] the form and content of the UK AIP;[94] ensuring that AIS is provided, in accordance with ICAO Standards and Recommended Practices, legislation requirements, as well as any additional requirements the UK CAA may determine; the regulatory approval of specified aeronautical information and data submitted to the AIS Provider; and the provision of data and information to AIS in accordance with the Formal Arrangement established between the CAA and UK AISP;

(v) maintain and keep under review a co-ordinated strategy and plan for the use of all UK airspace for air navigation up to 2040, including for the modernisation of the use of that airspace (the AMS);

87 TA00, Section 2(2).

88 TA00, Section 70(1).

89 TA00, Section 70(2)(a)-(c).

90 TA00, Section 70(2)(d) & (f).

91 Air Navigation Directions 2023, direction 3.

92 Including Annex 15 of the Chicago Convention,

93 UK AIP, part 1, GEN 1.

94 CAP 032.

(vi) consult the SoS in relation to the AMS, including any current or future implementation plans associated with it;

(vii) report to the SoS annually on the delivery of the AMS;

(viii) develop and publish procedures, and guidance on those procedures for changes to airspace;[95]

(ix) decide whether to approve a proposal for a permanent[96] or temporary[97] change to airspace design or trials;[98]

(x) determine the extent and coverage needed for a LARS for the UK airspace, procure, and administer that service;[99]

(xi) prepare and publish guidance on transparency and engagement for operational changes to airspace usage by aircraft which might affect the noise impact on other persons;[100] and

(xii) establish and maintain a process to receive, classify and respond to complaints received by it in relation to the environmental impact (including noise) of the use by civil aircraft (including general aviation and helicopters) of UK airspace.[101]

1.39. Each FIR is managed by a controlling authority that has responsibility for ensuring that air traffic services are provided to the aircraft flying within it. The CAA is the controlling authority for the UK.

1.40. *NERL*. The CAA has an obligation to ensure that Aeronautical Information Services (AIS) are provided for UK airspace.[102] AIS are provided on an exclusive basis by NATS (En Route) Plc (referred to as NERL), as a subcontractor of the CAA. NERL, under its licence, is responsible for the provision of AIS. AIS services must be provided as an independent function of all ANSPs.

1.41. NERL provides en route services in the airspace within the UK FIRs. NERL is also responsible for managing the westbound track system of the Shanwick Oceanic FIR.[103] En route services are further discussed in chapter 3.

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95 Air Navigation Directions 2023, direction 4.

96 Air Navigation Directions 2023, direction 5.

97 Air Navigation Directions 2023, direction 7.

98 Air Navigation Directions 2023, direction 8.

99 Air Navigation Directions 2023, direction 10.

100 Air Navigation Directions 2023, direction 17(1).

101 Air Navigation Directions 2023, direction 17(2).

102 Air Navigation Directions 2023, direction 3(e).

103 This covers the Atlantic's Eastern portion, (between latitudes 45 degrees North and 61 degrees North, and westward to longitude 30 degrees West.

1.42. *ANSPs and Air Traffic Management (ATM) providers.* ANSPs, ATM providers, and services are explained in chapter 3.

Charging for Airspace Use

International Law

1.43. *Chicago Convention*. Charges for airport use and air navigation services are regulated by the Chicago Convention 1944.[104] The main principles regarding charges are that:

(i) *Uniform conditions for airport use*. Every airport in a contracting state which is open to public use by its national aircraft must be open under uniform conditions to the aircraft of all the other contracting states.[105] However, states can designate the route to be followed within its territory by any international air service and the airports which any such service may use;[106]

(ii) *Uniform conditions for air traffic services*. The uniform conditions described above also apply to the use, by aircraft of every contracting state, of all air navigation facilities, including radio and meteorological services, which may be provided for public use for the safety and expedition of air navigation;[107]

(iii) *Maximum price*. Any charges for the use of such airports and air navigation facilities by the aircraft of any other contracting state shall not be higher, (a) as to aircraft not engaged in scheduled international air services, than those that would be paid by its national aircraft of the same class engaged in similar operations; and (b) as to aircraft engaged in scheduled international air services, than those that would be paid by its national aircraft engaged in similar international air services;[108]

(iv) *Publication*. all charges must be published and communicated to ICAO.[109] ICAO collects and publishes information on aeronautical charges worldwide in Tariffs for Airports and Air Navigation Services;[110]

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104 Chicago Convention 1944, Article 15.

105 Ib.

106 Chicago Convention 1944, Article 68.

107 Chicago Convention 1944, Article 15.

108 Chicago Convention 1944, Article 15.

109 Chicago Convention 1944, Article 15.

110 Doc 7100.

(v) *Review*. If requested by an interested contracting state, the charges imposed for the use of airports and other facilities shall be subject to review by the ICAO Council, which shall report and make recommendations thereon for the consideration of the state or states concerned;[111] and

(vi) *Prohibition*. No fees, dues or other charges must be imposed by any contracting State in respect solely of the right of transit over or entry into or exit from its territory of any aircraft of a contracting state or persons or property.[112]

1.44. *The* Chicago Convention also has rules on custom duties on aircrafts flying on or across other states, fuels, lubricants, parts, and equipment.[113] Those rules and the related ICAO guidance[114] are not analysed here.

1.45. *ICAO statements, policy, and guidance*. The most relevant ICAO documents in this regard are two. First, ICAO Assembly updates a Consolidated Statement of Continuing ICAO Policies in the Air Transport Field at each regular session. Second, ICAO Council approved a Policies on Charges for Airports and Air Navigation Services.[115] The latter covers:[116] the cost basis for air navigation services charges; the allocation of costs of air navigation services among aeronautical users; air navigation services charging systems; approach and aerodrome control charges; route air navigation services charges ; and charges for air navigation services used by aircraft when not over the provider State.

1.46. Other guidance includes the Manual on Air Navigation Services Economics,[117] the Manual on Air Traffic Forecasting;[118] and the Database of the World's Air Services Agreements.[119]

EU Law

1.47. Charging is subject to a series of rules in the EU. The rules described in this section applied in the UK until 11.00 pm on 31 December 2021, and continue to apply in

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111 Chicago Convention 1944, Article 15.

112 Chicago Convention 1944, Article 15, *in fine*.

113 Chicago Convention 1944, Article 24.

114 ICAO's Policies on Taxation in the Field of International Air Transport (Doc 8632).

115 Doc 9082 - ICAO's Policies on Charges for Airports and Air Navigation Services, Ninth Edition (2012).

116 ICAO's Policies on Charges for Airports and Air Navigation Services, Ninth Edition (2012), Section III and Appendix 2.

117 Doc 9161.

118 Doc 8991-AT/722.

119 Formerly, Doc 9511. There are other ICAO documents that are of help regarding the economics of air transport: Policy and Guidance Material on the Economic Regulation of International Air Transport (Doc 9587), complemented by a Manual on the Regulation of International Air Transport (Doc 9626).

EU27. Some of these rules have also been retained by the UK. Retained EU regulations and other domestic UK law are explained in the next section.

1.48. *EU Airport Charges Directive*.[120] EU Directives give EU Member States instructions to implement new rules through their domestic legal system, e.g., Acts of Parliament or statutory instruments. When the UK was an EU member state, the UK implemented the EU Airport Charges Directive through the Airport Charges Regulations 2011 (ACR2011). The CAA also issued guidance.[121] Unlike EU regulations (which had direct effect), the EU directive did not need to be imported into UK domestic law,[122] because the implementing legislation[123] was already in place in the UK hierarchy. ACR2011 applies to charges for airport services to airlines, including en route and terminal air navigation services.[124]

1.49. *EU Single European Sky*. The Framework Regulation[125] establishes a harmonised regulatory framework for the creation of the Single European Sky (SES), in conjunction with a series of other regulations.[126] Among the latter, the Service Provision Regulation,[127] as amended,[128] sets forth a series of rules regarding charging schemes for air navigation services in the SES.

1.50. For EU Member States, the Services Provision Regulation requires that the charging scheme for air navigation services must:

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120 The EU Parliament and Council European Directive 2009/12/EC on airport charges.

121 See Guidance on the application of the CAA's powers under the Airports Charges Regulations 2011 (CAP1143); and CAA Scheme of Charges (Regulation of Airports) (ORS5 No. 385).

122 However, the existence of the Directive is not now irrelevant. The supremacy of EU law continues to apply to pre-Implementation Period Completion Day law (i.e., 31 December 2020 at 11.00 pm), plus any directly effective rights recognised by the Court of Justice of the EU as flowing from the Directive might be saved under Section 4 of the EU Withdrawal Act 2018.

123 Airport Charges Regulations 2011 and related guidance.

124 The Airport Charges Regulations 2011 (ARC 2011) defines "airport charges" in connection to an airport as "charges levied on operators of aircraft in connection with the landing, parking or taking off of aircraft at the airport (including charges that are to any extent determined by reference to the number of passengers on board the aircraft) but excluding excepted charges." (Reg3(1)). TANS used to be excluded from the definition (under Reg 3(2)(f)). However, The Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2019, S.I. 2019 No. 459, Regulation 391, has omitted Reg. 3(20(f) of the ACR 2011. Therefore, charges for en route and terminal air navigation services are no longer excluded from the ACR 2011.

125 EU Regulation (EC) No 549/2004.

126 Regulation (EC) No 550/2004 on the provision of air navigation services in the Single European Sky (the service provision Regulation); Regulation (EC) No 551/2004 on the organisation and use of the airspace in the Single European Sky (the Airspace Regulation); and Regulation (EC) No 552/2004 on the interoperability of the European Air Traffic Management network (the interoperability Regulation).

127 EU Regulation (EC) No. 550/2004.

128 By EU Regulation (EC) No 1070/2009.

(i) contribute to: (a) greater transparency in the determination, imposition, and enforcement of charges to airspace users; (b) the cost efficiency of providing air navigation services; and (c) efficiency of flights;[129]

(ii) be based on the account of costs for air navigation services incurred by service providers for the benefit of airspace users. The scheme shall allocate these costs among categories of users;[130]

(iii) apply a series of principles when establishing the cost-base for charges, including transparency and a prohibition against cross-subsidy among certain services;[131] and

(iv) comply with a series of principles when setting charges including: that charges must be set for the availability of air navigation services under non-discriminatory conditions; when imposing charges on different airspace users for the use of the same service, no distinction must be made in relation to the nationality or category of the user; and charges must reflect the cost of air navigation services and facilities made available to airspace users, taking into account the relative productive capacities of the different aircraft types concerned.[132]

1.51. When providing bundle services, ANSPs must identify and disclose the costs and income deriving from air navigation services, broken down in accordance with the charging scheme for air navigation services. Where appropriate, ANSPs must keep consolidated accounts for other, non-air-navigation services, as they would be required to do if the services in question were provided by separate undertakings.[133]

1.52. The EU Commission must provide for the ongoing review of compliance with the principles and rules regarding charging schemes, acting in cooperation with the EU Member States.[134] At the request of one or more Member States or on its own initiative, the EU Commission must carry out an investigation into any allegation of non-compliance or non-application of the principles or rules concerned and make a decision.[135]

1.53. The EU Commission has the obligation to adopt detailed implementing rules of the charging schemes principles set forth in EU Regulation (EC) No 550/2004.[136] The Commission Implementing Regulation (EU) 2019/317 lays down a performance and charging scheme for the SES.

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129 EU Regulation (EC) No. 550/2004, Article 14, substitute by Regulation (EC) No 1070/2009.

130 Regulation (EU) No 550/2004, Article 15(1), substitute by Regulation (EC) No 1070/2009.

131 Regulation (EU) No 550/2004, Article 15(2), substitute by Regulation (EC) No 1070/2009.

132 Regulation (EU) No 550/2004, Article 15(3), substitute by Regulation (EC) No 1070/2009.

133 Regulation (EU) No 550/2004, Article 12(3), substitute by Regulation (EC) No 1070/2009.

134 Regulation (EU) No 550/2004, Article 16(1), substitute by Regulation (EC) No 1070/2009.

135 Regulation (EU) No 550/2004, Article 16(2)&(3), substitute by Regulation (EC) No 1070/2009.

136 Regulation (EU) No 550/2004, Article 15(4), substitute by Regulation (EC) No 1070/2009.

1.54. *Eurocontrol.* Eurocontrol's Central Route Charges Office (CRCO) runs a system for the cost recovery of air traffic services made available to aircraft operators. On behalf of Eurocontrol's Member States, the CRCO bills and collects route charges that fund certain air navigation facilities and services and supports ATM developments.[137] The UK is a Eurocontrol member state, and participates in the Multilateral Route Charges System.[138]

Domestic Law

1.55. *The* Framework Regulation and the Service Provision Regulation explained above, are retained UK domestic law, subject to a series of amendments made by statutory instruments.[139]

1.56. The EU charging scheme principles and requirements listed under para. 1.50, points (i) to (iv), above, have been omitted in the UK via statutory instrument, and are no longer applicable.[140] The EU provision regarding bundle services still applies in the UK, subject to amendments. The difference is that, when providing bundle services in the UK, ANSPs must identify and disclose the costs and income deriving from air navigation services, but they do not need to break down the cost in accordance with the charging scheme for air navigation services.[141]

1.57. The Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2020 amended Implementing Regulations (EU) 2017/373 and 2019/123; and revoked the Commission Implementing Regulation (EU) 2019/317 and the Commission Implementing Decision (EU) 2019/903. UK Regulations (EU) 2017/373[142] and 2019/123, as amended, are further discussed in chapter 3.

1.58. The charging policy is driven by the Chicago Convention and ICAO's Charging Principles descried above; Eurocontrol's Charging Principles;[143] and CAA duties under the TA00.[144]

1.59. For the purpose of allowing the provision of ATS, the TA00 defines ATS as:[145]

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137 Eurocontrol, Central Route Charge Office Customer Guide to Charges, November 2021, at 3.

138 Eurocontrol, Central Route Charge Office Customer Guide to Charges, November 2021, at 5.

139 See Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2019 (S.I. 219/459); and Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2020 (S.I. 2020/694).

140 Air Traffic Management (Amendment etc) (EU Exit) Regulations 2019 (SI 2019/459) reg. 34.

141 Air Traffic Management (Amendment etc) (EU Exit) Regulations 2019 (SI 2019/459) reg. 32.

142 Also amended by The Aviation Safety (Amendment) (No. 3) Regulations 2021.

143 Principles for Establishing the Cost-Base for En-Route Charges and the Calculation of the Unit Rates, Doc. N° 20.60.02 (Text approved by the enlarged Commission on 28.11.2019 and entered into force on 1.1.2020). See also Eurocontrol's website at https://www.eurocontrol.int/crco

144 TA00, Section 2.

145 TA00, Section 98(1).

(i) providing instructions, information or advice with a view to preventing aircraft colliding with other aircraft or with other obstructions (whether in the air or on the ground);

(ii) providing instructions, information or advice with a view to securing safe and efficient flying;

(iii) managing the flow of air traffic with a view to ensuring the most efficient use of airspace;

(iv) providing facilities for communicating with aircraft and for the navigation and surveillance of aircraft; and

(v) notifying organisations of aircraft needing search and rescue facilities, and assisting organisations to provide such facilities.

1.60. The TA00 rules on charges apply to “chargeable air services”. These are:[146]

(i) ATS provided in respect of the UK;

(ii) ATS which the UK has undertaken under international arrangements to provide in respect of an area outside the UK;

(iii) ATS which are provided in respect of an area outside the UK and the charges for which the UK has undertaken to collect under international arrangements;

(iv) services which are provided by the CAA in performing its air navigation functions and for which Eurocontrol is to collect charges under the Eurocontrol agreement;

(v) ATS which do not fall within paragraph (iv) and for which Eurocontrol is to collect charges under the Eurocontrol agreement; and

(vi) ATS for which Eurocontrol is to collect charges under the Eurocontrol agreement, and are provided by the owner or manager of an aerodrome or by his employee under a contract or other arrangement made by the owner or manager with the CAA and the CAA in making that contract or other arrangement is acting in pursuance of its air navigation functions.[147]

1.61. Certain air traffic services provided by the owner or manager of an aerodrome (or on their behalf) or by his employee, unless included above, are excepted air services.[148]

1.62. The TA00 also provides for the CAA power to make a specification for ATS charges. The CAA might specify (i) the amounts of, or methods of calculating, the

[146] TA00, Section 77(2).

[147] TA00, Section 77(3A).

[148] TA00, Section 77(3).

charges which are to be paid in respect of chargeable air services; (ii) the operators and owners of aircraft who are to pay the charges; (iii) the persons to whom they are to be paid (e.g., Eurocontrol or foreign governments); and (iv) the currencies in which they are to be paid.[149] The TA00 contains provisions for administrating charges. After making specifications, the CAA may stipulate that: (i) charges are to be dispensed with in cases of specified descriptions; (ii) interest at a specified rate is to be paid; and (iii) that charges are payable elsewhere than in the UK.[150] This list is not comprehensive.[151]

1.63. Details of the charges for aerodromes, heliports and air navigation services can be found in AIP GEN 4.1. Details of the air navigations service charges, including aerodrome and en route service charges, can be found in AIP GEN 4.2.

[149] TA00, Section 73(1).

[150] TA00, Section 73(2).

[151] TA00, Sections 73-79.

Chapter 2

Airspace Use in the UK

How Airspace is Currently Structured and Used in the UK

2.1 *UK's Joint and Integrated Approach to airspace management*. The UK operates a joint, integrated, and collaborative approach between the CAA, the Ministry of Defence (MoD) and NERL with regards to airspace policy, planning and management, and the provision of ATS in UK airspace. The guiding principles are: airspace is a shared resource; expeditious access to all airspace should be available to all users, with the exception of airspace segregated for safety reasons; and ATS will be available upon request, from both MoD and NERL units, subject to operational prioritisation, and unless agreed otherwise.[152]

2.2. *Principle*. The Rules of the Air Regulations 2015 provide that all aircraft must be *flown in accordance with the requirements for flight in airspace that has been* notified in accordance with the airspace classifications and flight rules specified in SERA.6001 and in Appendix IV to UK SERA.[153] However, except in accordance with a permission issued by the CAA, an aircraft flying in visual meteorological conditions (i) in Class C airspace above flight level 195; or (ii) along a Class C ATS route at any level, must be flown in accordance with instrument flight rules.[154] The Rules of the Air Regulations 2015 do not apply to Uncrewed or Unmanned Aircraft Systems (UAS) or Remotely Piloted Aircraft Systems (RPAS) in the Open and Specific categories.[155]

2.3. *Structured routes*. Some aircraft flying in controlled airspace must follow structured routes and comply with ATC instructions. However, that is not always so. For example, aircraft flying VFR in Class E do not have to follow structured routes and do not have to be in contact with ATC. In Class D VFR traffic needs to be in contact, but again does not necessarily follow structured routes. The separation in different classes of airspace depends on the rules (IFR / VFR / Special VFR) within which the flight is operating.

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152 UK Airspace Management Policy (CAP 740), para. 3.4.

153 Rules of the Air Regulations 2015 (S.I. 2015/840), rule 22.

154 Rules of the Air Regulations 2015 (S.I. 2015/840), rule 23.

155 See para 1.1, Annex IX, Basic Regulation; Article 7(2) of UK Regulation (EU) 2019/947 and its AMC1; Articles 23 and 249 of ANO 2016.

2.4. *ATC Route Structure and Operational Techniques*. The ATC task is supported through a highly structured and systemised operation to manage air traffic to deliver the high levels of traffic throughput required whilst maintaining high levels of safety. Part of this system is a network of routes which aircraft fly. The majority of these routes are made up of standard instrument departures (SIDs); airways; standard arrival routes (STARs).[156] CAP 1379 explains these concepts, together with vectoring; final approach; runway and / or arrival demand and spacing.

2.5. *Airways*. The UK has been moving away from airways to designating CTAs with ATS Routes within them, largely below FL190/FL245; and Free Route Spreading in the Class C airspace above FL190 (the Divisional Flight Level – DFL).

2.6. *ATS Routes*. ATS route means a specified route designed for channelling the flow of traffic as necessary for the provision of air traffic services.[157] The establishment of a detailed ATS route network depends upon the composition of the air traffic it is intended to serve.[158] The majority of the ATS routes so established will be permanently available but there are exceptions. [159] When ATS routes are established, a protected airspace along each ATS route and a safe spacing between adjacent ATS routes must be provided.[160] In the UK this means that, where ATS routes are established and it has been determined that ATC service will be provided to IFR and/or VFR flights operating along those ATS routes, controlled airspace will be set up to afford the protection required and to contain those ATS routes.[161]

2.7. *Free Route Airspace (FRA).* FRA means a specific airspace within which airspace users can freely plan their routes between an entry point and an exit point without reference to the ATS route network.[162] Within this airspace, flights remain subject to ATC.[163]

2.8. The UK Pilot Common Project regulation identifies a first set of ATM functionalities to be deployed in timely, coordinated, and synchronised way so as to achieve the essential operational changes stemming from the European ATM Master Plan.[164]

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156 Description of Today's ATC Route Structure and Operational Techniques (CAP 1379), at 5.

157 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 1, and UK Regulation (EU) No 923/2012 Article 2(46).

158 SARG's Policy for the Design of Controlled Airspace Structures, dated 11 August 2022, para. A6.1.

159 SARG's Policy for the Design of Controlled Airspace Structures, dated 11 August 2022, para. A6.2.

160 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, 2.13.1.

161 SARG's Policy for the Design of Controlled Airspace Structures, dated 11 August 2022, para. A6.5.

162 UK Regulation (EU) 2019/123, Section 2(21). See also UK Regulation (EU) 2019/123, Annex I, part C point 1(f)&(g), as amended by S.I. 2020 No. 694, Regulation 47.

163 UK Regulation (EU) 716/2014, Annex, 3.1.1, as amended by S.I. 2019/459 reg. 341(7).

164 UK Regulation (EU) 716/2014, Section 1(1), as amended by S.I. 2019/459 reg. 333(2). See also UK Regulation (EU) 716/2014, Section 3(1)(c), as amended by S.I. 2019/459 reg. 335(2). See also UK

The design and implementation of FRA must take into account existing or proposed airspace structures designated for activities which require airspace reservation or restriction.

2.9. The CAA approved the introduction of FRA in the north of the UK above FL330 (Deployment 1), including the replacement of the Scottish Direct Route Airspace (DRA), which is a precursor to the FRA concept and where the majority of the ATS route structure has already been removed.[165] FRA Deployment 1 was implemented on 2 December 2021.[166] A proposal for FRA Deployment 2, which covers the Swanwick West Sector Group (i.e., most of Wales and Cornwall, and also Bristol), has been submitted to the CAA.[167]

2.10. *Commercial flights*. To assure the safety and efficiency of commercial air transport flights, it has been determined that they need to be in receipt of ATC service. Segregation is used in the form of controlled airspace to provide that service. The majority of commercial air transport flights operate in controlled airspace.

2.11. The different phases of a typical manned commercial flight can be divided into broad airspace categories: en route ; approach control, which is the terminal phase of the flight between en route and aerodrome control; and aerodrome control, the phase directly associated with take-offs and landings. ATC service is provided to all flights within airspace classes A to D and to those flights operating in accordance with IFR in Class E.[168]

2.12. *General aviation (GA)*. GA comprises all aircraft that are not operated by commercial aviation or by the military.[169] GA operations exclude commercial air transport or aerial work operations.[170] In other words, GA are all civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire. GA is a diverse sector and parts of it are changing rapidly. At one end of the spectrum are high-value, business aircraft; at the other end paragliders and hang-gliders. GA also serves many purposes,

Regulation (EU) 716/2014, Annex, 3.1.1, as amended by S.I. 2019/459 reg. 341(7). UK Regulation (EU) 716/2014 has also been amended by S.I. 2022/211.

165 Free Route Airspace Deployment 1, Airspace Change Decision (CAP 2187), paras. 1.1 and 1.4.

166 Free Route Airspace Deployment 1, Airspace Change Decision (CAP 2187), para. 1.6. See also NATS: Introducing Free Route Airspace into the UK Skies.

167 Free Route Airspace, Deployment 2, Airspace change ID: ACP-2019-12 at CAA Airspace Change.

168 CAP 1991, para. 13.

169 ICAO, Study on International and General Business Aviation Access to Airports, prepared by the Secretariat, August 2005, para. 2.1.1.

170 ICAO Annex 6 Part II – International General Aviation, 10th edition, July 2018, Chapter 1.1.

including business usage, sports, and recreational activities, and as a means of personal transport.[171]

2.13. General Aviation operates largely, but not exclusively, in uncontrolled airspace below 6,000 feet (that is, Class G, alongside a few commercial air transport flights). There, aircraft can fly when and where they like, subject to a set of rules. While they are not legally required to do so, pilots in Class G can notify ATS units of their presence and intentions, as well as request a flight information service. Pilots take full responsibility for their own safety. However, Class G airspace can also contain Danger Areas (DA), Temporary Danger Areas (TDA), restricted areas, prohibited areas, Aerodrome Traffic Zones (ATZ), Radio Mandatory Zones (RMZ) and Transponder Mandatory Zones (TMZ). The classification of all of those structures remains Class G but rules associated with them will apply, in addition to the rules for flight in Class G.

2.14. IFR and VFR flights are permitted in Class G.[172] In Class G, UK Flight Information Services are provided on request (Basic Service, Traffic Service, Deconfliction Service or Procedural Service).[173] ATC Separation is not provided. Deconfliction advice is provided against participating aircraft under a Procedural Service or against participating and non-participating traffic (unknown traffic) under a Deconfliction Service. Both the Procedural Service and Deconfliction Service aim to achieve planned deconfliction minima.[174] An Alerting Service is provided to notify appropriate organisations regarding aircraft in need of assistance (e.g., search and rescue).

2.15. *Risk of mid-air collision.* The risk of mid-air collision exists in all airspace. In Class G, the severity is low (by comparison to controlled airspace) but the likelihood is raised because military, general aviation and some commercial air transport aircraft operate in an environment where the overarching operating principle is ‘see and avoid,’ with at times limited supporting air traffic services and surveillance coverage available to users. Statistical evidence tells us this system is imperfect. Each participant retains responsibility for maintaining their own visibility and keeping a lookout for aircraft in order to avoid them, regardless of the availability of air traffic services support. This can be of particular concern around smaller aerodromes that have no surveillance capability themselves, and in areas with a high density of airspace users that may be harder to see with the naked eye, such as light aircraft, gliders, hang-gliders, and UAS/RPAS.[175]

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171 CAA’s Strategic Review of General Aviation, July 2006, para. 6.

172 UK Regulation (EU) No 923/2012, section 6 (SERA.6001).

173 UK AIP, part 2, ENR 1.4 at 2.7.

174 UK AIP, part 2, ENR 1.4 at 2.7.

175 Draft Airspace Modernisation Strategy 2022–2040 Part 1: Strategic objectives and enablers (CAP 2298a), para 2.16.

2.16. *Trial and test flights for innovation*. Many new aircraft (e.g., UAS or RPAS), new technologies for aircraft, and new use cases are trialled and tested. Innovators often use RMZ, TMZ, established DA, and TDA for that purpose. These structures can provide the degree of segregation from other airspace users required for the particular trial, test, or operation.

2.17. A RMZ is "an airspace of defined dimensions wherein the carriage and operation of radio equipment is mandatory."[176] VFR flights operating in parts of Classes E, F or G airspace, and IFR flights operating in parts of Classes F or G airspace designated as a RMZ must maintain continuous air-ground voice communication watch and establish two-way communication, as necessary,[177] on the appropriate communication channel, unless in compliance with alternative provisions prescribed for that particular airspace by the ANSP.[178]

2.18. A TMZ means "an airspace of defined dimensions wherein the carriage and operation of pressure-altitude reporting transponders is mandatory."[179] All flights operating in airspace designated by the competent authority as a TMZ must carry and operate SSR transponders capable of operating on Modes A and C or on Mode S, unless in compliance with alternative provisions prescribed for that particular airspace by the ANSP,[180] to facilitate the air-to-air passage of information, not necessarily air-to-ground.

2.19. The objective of a RMZ and a TMZ is to enhance the conspicuity of aircraft operating within, or in the vicinity of, complex, or otherwise busy airspace, when the establishment of a more restrictive classification of airspace is not warranted.[181] RMZ/TMZ are established in accordance with the requirements of the CAA's Airspace Change Process.[182] The policy enables ANSPs, in consultation with airspace users, to determine the most appropriate electronic conspicuity data to achieve their safety objectives.[183]

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176 UK SERA (UK Regulation (EU) 923/2012, as amended), Article 2(106).

177 Please note that flyers do not always have an obligation to call the controlling authority of every RMZ. There have been examples of RMZ where flyers just had to listen out within the defined area.

178 UK SERA, 6005.1.

179 UK Regulation (EU) 923/2012, as amended, Article 2(136).

180 UK Regulation (EU) 923/2012, as amended, Article 2(136) and UK SERA 6005.1.(b).

181 GM1 to UK SERA.6005. See also SARG's Policy for Radio Mandatory Zones and Transponder Mandatory Zones, 13 January 2022, para. 2.3.

182 SARG's Policy for Radio Mandatory Zones and Transponder Mandatory Zones, 13 January 2022, para. 4.1. See CAP 1616.

183 SARG's Policy for Radio Mandatory Zones and Transponder Mandatory Zones, 13 January 2022.

2.20. A DA means "an airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times."[184] A DA is permanent (although not always active), while a TDA is temporary.[185]

2.21. *RPAS*.[186] RPAS are divided into three categories:[187] Open, Specific and Certified. UK laws and regulations often exclude, except, or do not bring into their scope certain or all UAS or RPAS operations or systems. E.g.:

(i) UK SERA does not automatically apply to UAS or RPAS (the extend to which UK SERA applicable operational requirements apply per UAS/RPAS category, if at all, is further explained below);[188]

(ii) the Rules of the Air Regulations 2015 do not apply to UAS or RPAS in the Open and Specific categories;[189] and

(iii) the ANO 2016 excepts UAS/RPAS which are not subject to certification from much of its provisions[190] (i.e., most ANO 2016's articles do not apply to UAS/RPAS operations in the Open or the Specific category).

2.22. Crewed aircraft fly IFR or VFR. However, UAS or RPAS follow different rules. UAS or RPAS do not have a legal obligation to fly IFR or VFR. UAS or RPAS fly in accordance with applicable primary legislation,[191] the relevant AMC and GMs to the UAS Implementing Regulation, and the relevant operational authorization, when applicable.

2.23. UAS or RPAS in the Open Category are not subject to UK SERA. UAS or RPAS in the Open category shall comply with the operational limitations set out in Part A of the Annex to the UAS Implementing Regulation.[192] Among other things, this means that RPAS in the Open category are allowed to fly VLOS[193] up to 120 m (400 ft) above the surface.[194] In this category, UAS/RPAS cannot be flown within restricted airspace without relevant permission. UAS/RPAS in the subcategories A1 and A2

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184 UK Regulation (EU) 923/2012, as amended, Article 2(65).

185 SARG Policy, CAA Policy for the Establishment of Permanent and Temporary Danger Areas, 21 July 2020, para. 6.2.

186 UK Regulation (EU) 2019/947 lays down the provisions for the operation of RPAS.

187 UK Regulation (EU) 2019/947, Articles 4-6.

188 UK Regulation (EU) 2019/947, Article 7.

189 See para 1.1., Annex IX, Basic Regulation; Article 7(2) of UK Regulation (EU) 2019/947 and its AMC1; Articles 23 and 249, ANO 2016.

190 See ANO 2016, Article 23(1)(c).

191 UK Regulation (EU) 2019/947.

192 UK Regulation (EU) 2019/947, Article 7.1.

193 UK Regulation (EU) 2019/947, Article 4.1(d).

194 UK Regulation (EU) 2019/947, Article 4.1(e).

are allowed to fly within residential, commercial, industrial, and recreational areas, but subcategory A3 must not fly within 150 m horizontally of those areas.[195]

2.24. The UAS or RPAS Specific category covers operations that do not meet one of the requirements of the Open category.[196] That is, operations that present a greater risk than that of the Open category, or where one or more elements of the operation fall outside the boundaries of the open category. The UAS or RPAS operator must hold a CAA-issued operational authorisation.[197] The operational authorisation document sets out the privileges and limits of the operation. Each operational authorisation is specific to the named UAS/RPAS operator, and is dependent on the risk assessment and evidence supplied to the CAA by that operator. UAS or RPAS operations in the Specific category are subject to operational limitations of the relevant authorisation (unless the UAS or RPAS operator holds a light UAS operator certificate with appropriate privileges).[198]

2.25. UAS or RPAS in the Specific category are not subject to the totality of UK SERA. UAS or RPAS operations in the Specific category shall be subject to the applicable operational requirements laid down in UK SERA.[199] Those applicable operational requirements are set forth by the relevant AMC and GMs to the UAS Implementing Regulation.[200]

2.26. Therefore, UK SERA only applies to UAS or RPAS in the Specific category to the extent that the relevant AMC and GM to the UAS Implementing Regulation,[201] and the particular operational authorisation issued by the CAA say so.

2.27. The UAS or RPAS Certified category covers operations only where the following requirements are met: (i) the UAS or RPAS is certified;[202] (ii) and the operation is conducted in any of the following conditions: over assemblies of people, involves the transport of people; or involves the carriage of dangerous goods, that may result in high risk for third parties in case of accident.[203] Additionally, UAs or RPAS operations are classified as being in the certified category where the CAA, based on

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195 UK Regulation (EU) 2019/947, Annex, Part A, UAS.OPEN.040 UAS operations in subcategory A3, para (2).

196 UK Regulation (EU) 2019/947, Article 5.1.

197 UK Regulation (EU) 2019/947, Articles 5.1 and 12.

198 UK Regulation (EU) 2019/947, Article 7.2, which makes reference to the operational authorisation under Article 12 or the Authorisation under Article 16 of the same regulation.

199 UK Regulation (EU) 2019/947, Article 7.2.

200 AMC1 to Article 7(2) of the UK Regulation (EU) 2019/947.

201 UK Regulation (EU) 2019/947, Article 7.2.

202 Pursuant to points (a), (b) and (c) of paragraph 1 of Article 40 of Delegated Regulation (EU) 2019/945.

203 UK Regulation (EU) 2019/947, Article 6.1.

a risk assessment,[204] considers that the risk of the operation cannot be adequately mitigated without the certification of the UAS or RPAS, and of the UAS or RPAS operator, as well as, where applicable, without the licensing of the remote pilot.[205]

2.28. UAS or RPAS operations in the Certified category are subject to the applicable operational requirements laid down in UK SERA,[206] Regulation (EU) No 965/20123 and Regulation (EU) No. 1332/2011.[207]

2.29. *Use of Airspace by UAS or RPAS.* There are a few airspace requirements for UAs or RPAS, which depend on the relevant category,[208] the airspace classification and structures. There are specific operational provisions for the Open and Specific category in the Annex to the UAS Implementing Regulation.[209] UAS or RPAS in the Certified category are subject to the same requirements applicable to 'manned' aircraft.

2.30. Currently, the UK uses DA or TDA as the primary method of airspace segregation for UAS or RPAS operations. For flights within segregated airspace, whilst some restrictions may still apply, an UAS or RPAS will generally be given freedom of operation within the bounds of the allocated airspace, subject to their being able to comply with certain rules, agreed procedures, and safety requirements. The AMS has suggested the use of TMZ as one possible structure (and part of the potential solution) towards routine beyond visual line of sight (BVLOS) operations by UAS/RPAS.[210]

Reviewing and Changing Airspace

2.31. This section deals with two different main tasks regarding airspace design: first, airspace classification review; and second, airspace change process, including airspace trials and certain changes to air traffic. After that, this section briefly explains the AMS.

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204 UK Regulation (EU) 2019/947, Article 11.

205 UK Regulation (EU) 2019/947, Article 6.2.

206 UK Regulation (EU) No 923/2012.

207 UK Regulation (EU) 2019/947, Article 7.3.

208 UK Regulation (EU) 2019/947, Article 7.

209 UK Regulation (EU) 2019/947.

210 Airspace Modernisation Strategy 2023–2040 Part 1: Strategic objectives and enablers (CAP1711), use case 3 and figure 5.3.

Airspace Classification Review

2.32. *Airspace Classification*. The CAA has a series of obligations regarding airspace classification under the Air Navigation Directions 2023, described in chapter 1, above. The CAA must classify UK airspace in accordance with its national policy and ICAO Annex 11, as well as review and amend that classification.[211]

2.33. *Principle*. When developing policy, classifying airspace or amending a classification, the CAA must ensure that the amount of controlled airspace is the minimum required to maintain a high standard of air safety and, subject to overriding national security or defence requirements, that the needs of all airspace users are reflected on an equitable basis.[212] The CAA understands 'equitable' to mean that needs are fairly accounted for, not that each user has the same and equal amount of airspace. The needs of different types of airspace user could vary considerably.[213]

2.34. *Considerations for the classification review.* The CAA must consider a series of issues under the TA00, including of the interests of any person other than an airspace user (which would include those on the ground) and of any SoS guidance on environmental objectives.[214] In respect of airspace classification, the Air Navigation Guidance 2017 was amended by the SoS's letter of 30 October 2019 accompanying the (now revoked) Air Navigation Directions 2019.[215] Specifically, that letter sets forth that the environmental objectives set out in the Air Navigation Guidance 2014 and 2017, as well as the rest of that Guidance, do not apply to airspace reclassification decisions.[216] While exempted, the SoS expects "sponsors of exempted proposals, including the CAA, to consider the potential environmental consequences of the proposals, and to engage with relevant communities as the CAA considers appropriate."[217] However, this part of the letter does not amount to a Direction from the SoS within the statutory meaning of the term. Moreover, the Air Navigation Directions 2017, and its 2018 and 2019 amendments have been revoked.[218]

2.35. *Classification Review*. The CAA itself must regularly consider whether airspace classification should be reviewed. Where the CAA considers a change to classification might be made, the CAA must carry out a review. If the CAA considers

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211 Air Navigation Directions 2023, direction 3(b).

212 Air Navigation Directions 2023, direction 3(c).

213 CAP 1991, para. 25.

214 TA00, Section 70(1)(c) & (d).

215 Secretary of State's letter of 30 October 2019.

216 Secretary of State's letter of 30 October 2019.

217 Secretary of State's letter of 30 October 2019.

218 Air Navigation Directions 2023, direction 19.

appropriate, it can amend any classification in accordance with procedures developed and published by the CAA for that purpose.[219]

2.36. *Procedure to review airspace classification.* The CAA regulates the procedure for an airspace classification review in CAP 1991.[220] This is a three-stage procedure: (i) consider (i.e., every two years);[221] (ii) review; and (iii) amend.[222] As mandated by the Directions, the review stage of the procedure includes a consultation with airspace users,[223] and if need, the CAA engages with relevant airspace controlling authorities to help refine the requirements for the amend stage. In the amend stage, the CAA then develops and carries out a consultation and engagement strategy with the relevant stakeholders[224] about the proposal. The proposal is then first signed off by the CAA's Airspace Classification team and then passed to the CAA's Airspace Regulation team for submission to the decision-making process.[225] The latter will assess whether the proposal satisfy the TA00, Air Navigation Directions, and any other requirements.[226] The decision is made and published.[227] After one year, the CAA Airspace Classification team reviews the effectiveness of the amendment, collating input from the controlling authority, relevant stakeholders and CAA data. The CAA Airspace Regulation team reviews the report, and the CAA decides whether any further action is needed.[228]

2.37. *Classification Approval from the MoD.* There might be situations when the CAA understands that there is a need to increase the volume, or alter the classification, of UK airspace but where to do so might have an adverse effect on the ability of the armed forces of the Crown to maintain their operational capability, in the opinion of the CAA or the MoD.[229] In those cases, the CAA must seek the approval of the Secretary of State for Defence before proceeding.[230]

2.38. The Secretary of State for Defence can be either content or discontent with the proposed change. If the former, the CAA must ensure that consultation on the

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219 The Civil Aviation Authority (Air Navigation) Directions 2017, as amended, direction 3(b).

220 Procedure for the CAA to review the classification of airspace (CAP 1991).

221 CAP 1991, at 18.

222 CAP 1991, para. 47.

223 This does not always mean that a public consultation will take place. See CAP 1991, at 18.

224 SoS, designated airspace controlling authority of a volume of airspace, airspace users, communities, and users of air transport services. See CAP 1991, paras. 63-67.

225 CAP 1991, at 18.

226 CAP 1991, para. 194.

227 CAP 1991, para. 195.

228 CAP 1991, paras. 205-8.

229 Air Navigation Directions 2023, direction 14(5).

230 Air Navigation Directions 2023, direction 14(6).

proposal takes place.[231] If the latter, the CAA may only approve the proposed change in accordance with directions given by the SoS.[232]

Changing Airspace Design

2.39. *Airspace change.* The CAA has a series of obligations regarding airspace design under the Air Navigation Directions 2023, described in chapter 1, above. Airspace design means "the structures of UK airspace and flight procedures used within UK airspace."[233] The SoS has given the CAA the power and duty to decide whether to approve changes to the UK airspace design, or to changes to the procedures for using airspace.[234]

2.40. *Considerations for airspace design change.* Just like in the case of the classification review, the CAA must take account of different considerations when making airspace change decisions, including the CAA's own published strategy, procedures and policy on the design and classification of UK airspace,[235] and SoS guidance on environmental objectives.[236] The CAA is required to take account of the Air Navigation Guidance 2017, as amended[237]when considering whether to approve a proposal for a change to airspace. That document was amended by the SoS's letter of 30 October 2019 accompanying the (now revoked) Air Navigation Directions 2019.[238] Specifically, that letter sets for that the environmental objectives set out in the Air Navigation Guidance 2014 and 2017, as well as the rest of that Guidance, do not apply to: "decisions whether to approve proposals for permanent changes to airspace design which seek to implement GNSS approaches without approach control."[239] The SoS expects "sponsors of exempted proposals, including the CAA, to consider the potential environmental consequences of the proposals, and to engage with relevant communities as the CAA considers appropriate." [240] However, that expectation is not part of the Air Navigation Directions. Moreover, the Air

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231 Air Navigation Directions 2023, direction 14(7).

232 Air Navigation Directions 2023, direction 14(8). The SoS must give the CAA those directions in accordance with TA00, Section 68(3).

233 Air Navigation Directions 2023, direction 2.

234 Air Navigation Directions 2023, directions 4, 5(1)&(2), 7(1)&(2) and 8(1)&(2), as well as CAP 1616, para. 29.

235 Air Navigation Directions 2023, directions 5(1), 7(1) and 8(1).

236 TA00, Section 70(1)(c) & (d).

237 Air Navigation Guidance 2017.

238 Secretary of State's letter of 30 October 2019.

239 Secretary of State's letter of 30 October 2019.

240 Secretary of State's letter of 30 October 2019.

Navigation Directions 2017, and its 2018 and 2019 amendments have been revoked.[241]

2.41. *Categories of airspace change.* There are three categories of changes to the notified airspace design: (i) permanent changes; (ii) temporary changes (usually, less than 90 days); and (iii) airspace trials.[242]

2.42. *Procedures and guidance for airspace design change*. The CAA has an obligation develop and publish proportionate procedures (and guidance) for the development, making and consideration of proposals for a permanent or temporary change to airspace design or for airspace trial.[243] The procedures must follow government policy, and aim to expedite such proposals.[244] The CAA guidance can be found in CAP 1616.[245]

2.43. *Sponsorship of airspace change*. CAP 1616 requires that changes to the design of UK airspace are proposed by an airspace change sponsor.[246] The sponsor is usually an airport operator or an ANSP, separately or through a joint proposal. However, a proposal can be put forward by anyone, including: the MoD,[247] GA stakeholders, or members of a local community. A planned and permanent redistribution of air traffic (PPR) proposal can only be put forward by an ANSP.[248]

2.44. CAP 1616 describes the sponsor's obligations. Additionally, the directions mandate that the sponsor of a proposed permanent change must: assess whether the proposal "could both lead to a change in noise distribution resulting in a 10,000 net increase in the number of people subjected to a noise level of at least 54 dB LAeq

241 Air Navigation Directions 2023, direction 19.

242 Air Navigation Directions 2023, directions 4 to 9. Other procedures that affect airspace structures but do not involve any changes to the notified airspace design include: (i) planned and permanent redistribution of air traffic through changes in air traffic control operational procedure by an ANSP, without changing the notified airspace design (known as PPR); (ii) temporary PPR (usually, less than six months); and (iii) change by other reasons, e.g., a noticeable shift over a period of time in the distribution of flights or aircraft types being flown, caused not by a change to the design of airspace or the procedures for using it, but by a change in airline or airport operations as a result of weather, commercial decisions (such as routes flown or fleet deployment) or changing traffic volumes (A summary can be found in CAP1616, page 16, table 1).

243 Air Navigation Directions 2023, direction 4(1).

244 Air Navigation Directions 2023, direction 4(2).

245 Please note that the CAA is currently in process of reviewing CAP 1616. See CAP1616 Review: Consultation Guidance and Options Document (CAP2492).

246 CAP 1616, para. 4.

247 CAP 1616, para. 41.

248 CAP 1616, para. 19.

16hr and have an identified adverse impact on health and quality of life";[249] and provide that assessment to the CAA when making the proposal.[250]

2.45. *MoD's Proposal.* The MoD can also be a sponsor in its own right.[251] When considering and determining a proposal submitted by or on behalf of, the MoD, the CAA must not take into account any impacts on the environment resulting from the use of aircraft by or on behalf of the armed forces of the Crown.[252] A PPR proposed by or on behalf of the MoD is exempt from the procedures applicable to other PPR proposals.[253]

2.46. *Decision.* The CAA is the primary decision-maker of the airspace change process. The CAA must decide whether to approve proposals for permanent or temporary change to airspace design, as well as for airspace trial, subject to the modifications and conditions the CAA deems necessary.[254] The CAA is not responsible for developing airspace designs or instigating airspace changes, other than in exceptional circumstances, such as a change to meet international obligations where no individual change sponsor can be identified.[255]

2.47. *SoS's Call-in.* The CAA must notify the SoS if the CAA receives a request for a proposal to be referred to the SoS for determination on the ground that one or more of the call-in criteria has been met.[256] The CAA must later provide the SoS an assessment of whether the CAA considers the proposal meets one or more of the call-in criteria.[257] If, following a notification, SoS considers that one or more of the call-in criteria have been met, the SoS may require the CAA to refer the proposal for determination.[258] In the absence of any request from the SoS, the CAA must proceed to decide on the proposal.[259]

2.48. The "call-in criteria" are that the proposed change: (i) is of strategic national importance; or (ii) could have a significant impact (positive or negative) on the UK economic growth; or (iii) could both lead to a change in noise distribution resulting in

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249 Air Navigation Directions 2023, direction 6(7)(c).

250 Air Navigation Directions 2023, direction 4(3).

251 CAP 1616, para. 41.

252 Air Navigation Directions 2023, direction 4(5).

253 Air Navigation Directions 2023, direction 9(7).

254 Air Navigation Directions 2023, directions 5(1)&(2), 7(1) to (3) and 8(1) to (3).

255 CAP 1616, para. 59.

256 Air Navigation Directions 2023, directions 6(1). Please also see the Department for Transport's Guidance to the CAA on providing an assessment to the SoS as to whether a proposal for a permanent change to airspace design meets one or more of the call-in criteria (version 1.2, October 2019) at https://www.caa.co.uk/media/yxemgnsm/191031-guidance-to-the-civil-aviation-authority-on-call-in.pdf

257 Air Navigation Directions 2023, directions 6(2).

258 Air Navigation Directions 2023, directions 6(4).

259 Air Navigation Directions 2023, directions 6(6).

a 10,000 net increase in the number of people subjected to a noise level of at least 54 dB LAeq 16hr and have an identified adverse impact on health and quality of life.[260] Certain proposals, including one submitted by the MoD, are excluded from the SoS's call-in criteria.[261]

2.49. *Compelling airspace change*. The Air Traffic Management and Unmanned Aircraft Act 2021 (ATM&UA Act)[262] provides a definition of airspace change proposal[263] and it gives the SoS powers to compel airspace change proposals, following certain formalities.[264] Specifically, the SoS may give a direction to a person involved in airspace change requiring the person to: prepare, or take steps towards the preparation of; submit, take steps to obtain approval to (a submitted); or review the operation of (an approved), an airspace change proposal,[265] or to co-operate with another person involved in an airspace change proposal.[266] The SoS can give those directions to an ANSP, airport operator, or other person with functions relating to air navigation.[267] The SoS can delegate those powers to the CAA.[268] Such a delegation has not taken place at the time of writing. However, the CAA has a series of roles[269] in the SoS's directions, including providing advice and enforcement.[270]

2.50. *Change in classification.* Any change in airspace design that is proposed by a sponsor under the CAP 1616 process could include a change in airspace classification.

2.51. *Airspace Trial.* This refers to changes of a temporary nature to airspace design, or ATC operational procedures, for the purposes of: investigating the feasibility of, or validating proposals for, innovative airspace design, technology, or ATC operational

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260 Air Navigation Directions 2023, directions 6(7).

261 Air Navigation Directions 2023, directions 6(9).

262 The Air Traffic Management and Unmanned Aircraft Act 2021 (Commencement No. 2) Regulations 2022 brought sections 1 to 8 and Schedules 1 and 2 of the ATM&UA Act into force on 18th February 2022.

263 For the purpose of Part 1 of the ATM&UA Act, references to airspace change proposal "are to a proposal that— (a)relates to managed airspace or the flight procedures or air traffic control procedures used within it, and (b)is of a type that the CAA is required to develop procedures for dealing with by directions given (from time to time) under section 66 of the Transport Act 2000 (air navigation directions given by the Secretary of State to the CAA)." See ATM&UA Act, Section 1.

264 ATM&UA Act, Section 4.

265 ATM&UA Act, Section 2(1).

266 ATM&UA Act, Section 3(1).

267 ATM&UM Act, Section 2(2).

268 ATM&UM Act, Section 5.

269 Under Part 1 and Schedules 1 and 2 of the ATM&UA Act.

270 Please see the CAA's Enforcement Guidance and Statement of Policy on Penalties (CAP 2431) dated 19 April 2022.

procedures; or assessing its performance and effect; or supporting the development and integration of new airspace user groups into UK airspace.[271]

2.52. *PPR*. The CAA must develop and publish proportionate procedures, and guidance, for the development, consideration, and determination of proposals for relevant PPRs.[272] An ANSP must refer a proposal for a relevant PPR to the CAA for approval before the PPR is implemented.[273]

Airspace Modernisation Strategy

2.53. SoS has given the CAA a series of directions regarding the modernisation of the UK airspace. The CAA must: maintain and keep under review a co-ordinated strategy and plan for the use of all UK airspace for air navigation up to 2040, including for the modernisation of the use that airspace; consult the SoS in relation to that strategy, including any current or future implementation plans associated with it; and report to the SoS annually on the delivery of the strategy.[274]

2.54. The CAA published its AMS in 2018, which replaced the Future Airspace Strategy and focused on the period until the end of 2024. The CAA consulted on a (draft) refreshed AMS[275] in 2022.[276] The refreshed AMS, Parts 1 and 2, was published in January 2023.[277] Among other things, the AMS:

(i) extends the strategy's focus from 2024 out to 2040;

(ii) takes account of the latest developments in government policy, innovation, technology, placing integration of all airspace users (including new types of aircraft) at the core of the strategy;

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271 Air Navigation Directions 2023, direction 2.

272 Air Navigation Directions 2023, direction 9(1). A relevant PPR is a proposed PPR which both: (i) falls within one or more of Types 1, 2 or 3, as explained in schedule 1; and (ii) relates to an airport which has a Category C or D (or both) approach landing procedure, and/or established standard instrument departure (SID) routes published in the UK AIP (Air Navigation Directions 2023, Schedule 1 to direction 9, para. 1).

273 Air Navigation Directions 2023, direction 9(2)(b).

274 Air Navigation Directions 2023, direction 3(f) and (g).

275 CAP 2298a and CAP 2298b.

276 The consultation opened on 10 January 2022 and closed 4 April 2022.

277 See Airspace Modernisation Strategy 2023–2040 Part 1: Strategic objectives and enablers (CAP1711); and Airspace Modernisation Strategy 2023–2040 Part 2: Delivery elements (CAP1711a). Part 3 will be published later on.

(iii) aims for simpler airspace design and supporting regulations; treats environmental sustainability as an overarching principle;

(iv) aims to meet international considerations, in particular adherence to the ICAO Global Air Navigation Plan (GANP), and interoperability of the UK network with neighbouring air traffic management areas; and

(v) makes the AMS the single roadmap to guide the CAA's approach to its policy development on airspace modernisation.

Delivery of the AMS requires industry or other interested organisations to undertake supporting delivery, engagement and research work that benefits multiple stakeholders.

2.55. *The Airspace Change Organising Group* (ACOG). The DfT and CAA, as co-sponsors of airspace modernisation in the UK, commissioned NERL to create a single coordinated implementation plan for airspace changes in the UK to cover the period to 2040, known as the airspace change masterplan. The CAA and the DfT required NERL to set up an impartial body to coordinate among all sponsors the delivery of some elements of the UK's AMS. This body is known as the Airspace Change Organising Group (ACOG). NERL set up ACOG in 2019. Maintaining ACOG is a condition of NERL's licence.[278] ACOG operates as a separate and impartial unit within NERL, coordinating input from the airspace change proposal sponsors that make up the programme. ACOG is subject to oversight from a Steering Committee, which includes at least one representative from NERL, airlines, airports, the general aviation community, and independent members with appropriate experience, and is governed by a chair.[279] The scope of the original masterplan commission[280] has been extended to cover all of the UK.[281] NERL remains accountable for the outputs of ACOG.[282] As part of coordinating the airspace change programme and developing the masterplan, ACOG will be engaging a range of stakeholders throughout each iteration. More information on the regulatory process for accepting the masterplan can be found in the Airspace Modernisation Strategy 2023–2040 Part 1.[283]

278 Air Traffic Services Licence for NATS (En Route) PLC October 2021 (CAP 2111), Condition 10a.

279 CAP 2156a, para. 3.

280 Dated 2nd November 2018.

281 DfT and CAA letter to NERL, 12 May 2021 (reproduced in CAP 2156a, Annex A). See also the letters dated 2 November 2018 and 30 July 2019 (reproduced in CAP 2156a, Annex A).

282 Air Traffic Services Licence for NATS (En Route) PLC October 2021 (CAP 2111), Condition 10a.

283 CAP1711, appendix B.

Chapter 3

Air Navigation Service Providers

3.1. The following paragraphs first describe what air navigation services and air traffic management services are, to later deal with those who provide the services. Focus is briefly placed on providers' functions and economic regulation.

Air Navigation Services and Air Traffic Management

3.2. There is a significant body of legislation and regulation that ensures the provision of safe, operable, and functioning air traffic management and air navigation services in the UK. Much of this stems from international obligations. EU legislation, some of which has been retained in the UK following departure from the EU, builds on international law. For air navigation services and air traffic management, the Basic Regulation, the Framework Regulation, and the Service Provision Regulation, all retained in UK law, are the most relevant.

3.3. *ATM/ANS*. The Basic Regulation defines *ATM/ANS* as a collection of services by reference to other retained EU regulations. ATM/ANS covers: (i) the ATM functions and services as defined in the Framework Regulation; and (ii) ANS, also as defined in the Framework Regulation, including the network management functions and services referred to in Article 6 of the Airspace Regulation, "as well as services which augment signals emitted by satellites of core constellations of GNSS for the purpose of air navigation; flight procedures design; and services consisting in the origination and processing of data and the formatting and delivering of data to general air traffic for the purpose of air navigation."[284] The following paragraphs explain the definitions of ATM and ANS, which are distinct concepts, in accordance with the relevant retained EU regulations, as amended.

3.4. *ATM*. ATM means the aggregation of the airborne and ground-based functions (air traffic services, airspace management and air traffic flow management) required to ensure the safe and efficient movement of aircraft during all phases of operations.[285] Each of these components of air navigation services are explained below, based on the Framework Regulation.

(i) *ATS*. ATS is a component of both ATM and ANS. The definitions of ATS under the Framework Regulation and ICAO Annex 11 are explained further below.

(ii) *Airspace management* means a planning function with the primary objective of maximising the utilisation of available airspace by dynamic time-sharing

[284] UK Regulation (EU) No. 1139/2018, Article 3(5).

[285] UK Regulation (EU) No 549/2004 (the Framework Regulation), Article 2(10).

and, at times, the segregation of airspace among various categories of airspace users on the basis of short-term needs.[286]

(iii) *Air traffic flow management* means a function established with the objective of contributing to a safe, orderly, and expeditious flow of air traffic by ensuring that ATC capacity is utilised to the maximum extent possible, and that the traffic volume is compatible with the capacities declared by the appropriate air traffic service providers.[287]

3.5. *Air navigation services (ANS)*. ANS means air traffic services; communication, navigation, and surveillance services; meteorological services for air navigation; and aeronautical information services.[288] ANS does not include ATM. The following paragraphs briefly explain each of these components of ANS based on the Framework Regulation.

(i) *Communication services* are "aeronautical fixed and mobile services to enable ground-to-ground, air-to-ground and air-to-air communications for ATC purposes."[289]

(ii) *Navigation services* means "those facilities and services that provide aircraft with positioning and timing information."[290]

(iii) *Surveillance services* are "those facilities and services used to determine the respective positions of aircraft to allow safe separation."[291]

(iv) *Meteorological services* mean "those facilities and services that provide aircraft with meteorological forecasts, briefs and observations as well as any other meteorological information and data provided by States for aeronautical use."[292]

(v) *Aeronautical information service* refers to "a service established within the defined area of coverage responsible for the provision of aeronautical information and data necessary for the safety, regularity, and efficiency of air navigation."[293]

(vi) *Air traffic services* means "the various flight information services, alerting services, air traffic advisory services and ATC services (area, approach, and aerodrome control services)."[294]

3.6. Annex 11 to the Chicago Convention 1944 , is more detailed regarding the last definition. Under the Convention, *air traffic services* is "a generic term meaning

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286 UK Regulation (EU) No 549/2004 (the Framework Regulation), Article 2(7).

287 UK Regulation (EU) No 549/2004 (the Framework Regulation), Article 2(9).

288 UK Regulation (EU) No 549/2004 (the Framework Regulation), Article 2(4).

289 UK Regulation (EU) No 549/2004 (the Framework Regulation), Article 2(16).

290 UK Regulation (EU) No 549/2004 (the Framework Regulation), Article 2(30).

291 UK Regulation (EU) No 549/2004 (the Framework Regulation), Article 2(38).

292 UK Regulation (EU) No 549/2004 (the Framework Regulation), Article 2(29).

293 UK Regulation (EU) No 549/2004 (the Framework Regulation), Article 2(3).

294 UK Regulation (EU) No 549/2004 (the Framework Regulation), Article 2(11).

variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service)."[295] The objective of the air traffic services must be to: (i) prevent collisions between aircraft; (ii) prevent collisions between aircraft on the manoeuvring area and obstructions on that area; (iii) expedite and maintain an orderly flow of air traffic; (iv) provide advice and information useful for the safe and efficient conduct of flights; and (v) notify appropriate organisations regarding aircraft in need of search and rescue aid, and assist those organisations.[296] The TA00 also includes a definition of ATS for the purpose of economic regulation in the UK, which was explained in chapter 1, above.

3.7. The factors that must be considered to determine the need for the provision of air traffic services are: the types of air traffic involved; the density of air traffic; the meteorological conditions; and other factors as may be relevant.[297]

3.8. *ATC service* is divided in three parts. First, area control service, which provides air traffic control service for controlled flights, to accomplish the Annex 11 objectives listed above as (i) and (iii), but excluding other air traffic control services. Second, approach control service, which provides air traffic control service for those parts of controlled flights associated with arrival or departure, to accomplish objectives (i) and (iii), above, but excluding other air traffic control services. And third, aerodrome control service, which provides of air traffic control service for aerodrome traffic, except for those parts of flights described in the approach control service, to accomplish objectives (i), (ii) and (iii).[298] The remaining two objectives listed above are accomplished by the *flight information service*,[299] and the *alerting service*,[300] respectively.

3.9. *UK Flight Information Services* (UK FIS).[301] The ICAO requirements for a flight information and alerting service are met in the UK FIRs through a suite of services, collectively known as the UK FIS. The AMS has agreed to review the provision of the UK FIS to align with the ICAO FIS.[302] That review is yet to take place. In the meantime, the UK FIS includes the: Basic Service, Traffic Service, Deconfliction Service, and Procedural Service.[303] The UK FIS is supplied through the following provisions: [304]

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295 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 1.

296 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, para. 2.2.

297 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, para. 2.4.1.

298 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, para. 2.3.1.

299 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, para. 2.3.2.

300 ICAO Annex 11: Air Traffic Services, 15th edition (2018), chapter 2, para. 2.3.3.

301 Please note the difference between ICAO Flight Information Service (ICAO FIS) and UK Flight Information Services (UK FIS).

302 Airspace Modernisation Strategy (CAP 1711), paras. 4.33, 4.38.

303 See UK Flight Information Services (CAP 774) and UK Flight Information Services (CAP 1434).

304 See UK Flight Information Service (CAP 744 and CAP 1434). See also UK AIP, part 2, ENR 1.1, at 2.1.1.

(i) To participating flights arriving at, departing from, and overflying aerodromes located within Class G Airspace, as listed at GEN 3.3;

(ii) To participating VFR flights operating within Class E Airspace, as listed at ENR 3.1;

(iii) To aircraft within Advisory Radio Areas, as listed at ENR 1.1, paragraphs 5.2.5/6 and ENR 5.2;

(iv) LARS and Radar Service, FL 100 and above (outside CAS), as listed at ENR 1.6; and

(v) Area Control Centre (ACC) services, including the provision of service by ACC FISOs, as detailed at GEN 3.3.

3.10. *Basic Service*. Within the UK, the scope of FIS, as defined in Annex 11, is met through the provision of a Basic Service.[305] The Basic Service provides advice and information useful for the safe and efficient conduct of flights. This may include weather information, changes of serviceability of facilities, conditions at aerodromes, general airspace activity information, and any other information likely to affect safety.[306] The avoidance of other traffic is solely the pilot's responsibility. The Basic Service is available under IFR outside controlled airspace in any meteorological conditions, or under VFR.[307] The Basic Service is available at all levels and the pilot remains responsible for terrain clearance at all times.[308]

3.11. *Traffic Service*. Traffic Service is a surveillance based ATS, where in addition to the provisions of a Basic Service, the controller provides specific surveillance derived traffic information to assist the pilot in avoiding other traffic. The avoidance of other traffic is solely the pilot's responsibility.[309] The Traffic Service is available under IFR outside controlled airspace in any meteorological conditions, or under VFR. If a controller issues a heading and/or level that would require flight in instrument meteorological conditions (IMC), a pilot who is not suitably qualified to fly in IMC shall inform the controller and request alternative instructions. [310] Subject to ATS surveillance system coverage, Traffic Service may be provided at any level and the pilot remains responsible for terrain clearance at all times.[311]

3.12. *Deconfliction Service*. A Deconfliction Service is a surveillance based ATS where, in addition to the provisions of a Basic Service, the controller provides specific surveillance derived traffic information and deconfliction advice.[312] A Deconfliction Service shall only be provided to flights under IFR in Class G Airspace, irrespective

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305 UK AIP, part 2, ENR 1.1, at 2.1.2.

306 UK AIP, part 2, ENR 1.1, at 2.3.1.

307 UK AIP, part 2, ENR 1.1, at 2.3.2.

308 UK AIP, part 2, ENR 1.1, at 2.3.4.

309 UK AIP, part 2, ENR 1.1, at 2.4.1.

310 UK AIP, part 2, ENR 1.1, at 2.4.2.

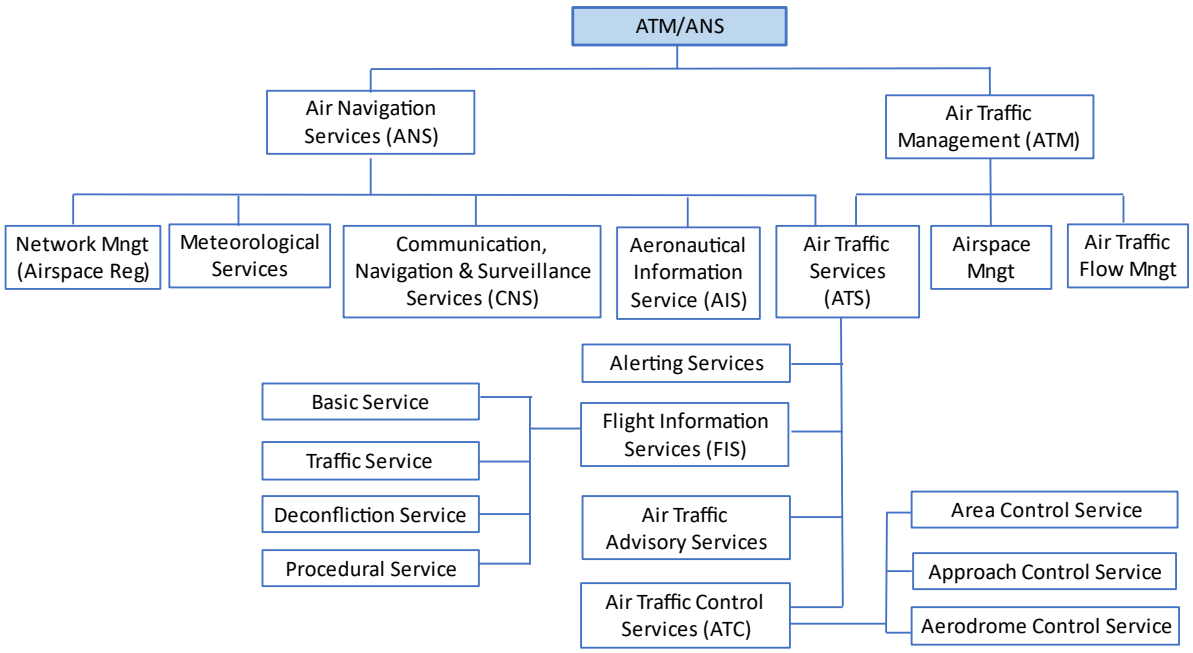
311 UK AIP, part 2, ENR 1.1, at 2.4.4.

312 UK AIP, part 2, ENR 1.1, at 2.5.1.

of meteorological conditions. The controller will expect the pilot to accept headings and/or levels that may require flight in IMC. A pilot who is not suitably qualified to fly in IMC shall not request a Deconfliction Service unless compliance permits the flight to be continued in visual meteorological conditions (VMC).[313] A Deconfliction Service will only be provided to aircraft operating at or above a terrain safe level, unless on departure from an aerodrome when climbing to a terrain safe level, or when following notified instrument approach procedures.[314]

3.13. *Procedural Service*. A Procedural Service is a non-surveillance ATS where, in addition to the provisions of a Basic Service, the controller provides instructions, which if complied with, must achieve deconfliction minima against other aircraft participating in the Procedural Service. Neither traffic information nor deconfliction advice can be passed with respect to unknown traffic.[315] A Procedural Service must only be provided to flights under IFR, irrespective of meteorological conditions. The controller will expect the pilot to accept levels, radials, tracks, routes, and time allocations that may require flight in IMC. A pilot who is not suitably qualified to fly in IMC must not request a Procedural Service unless compliance permits the flight to be continued in VMC.[316] A Procedural Service is available at all levels and the pilot remains wholly responsible for terrain clearance at all times. [317]

ATM/ANS Summary Chart



313 UK AIP, part 2, ENR 1.1, at 2.5.2.

314 UK AIP, part 2, ENR 1.1, at 2.5.5.

315 UK AIP, part 2, ENR 1.1, at 2.6.1.

316 UK AIP, part 2, ENR 1.1, at 2.6.2.

317 UK AIP, part 2, ENR 1.1, at 2.6.3.

ANSPs and ATM Providers

3.14. The term ANSP describes any public or private entity providing ANS for general air traffic.[318] Please note that, colloquially, the acronym ANSP sometimes is used as including ATM. ANS does not include ATM and therefore, technically, not all ATM providers are included as ANSPs. However, both ANS and ATM include ATS, and therefore ATS providers are ANSPs. Separately, the Basic Regulation refers to, and regulates, ATM/ANS providers,[319] but a definition is lacking.

3.15. ANSPs and ATM providers can provide services both in controlled and uncontrolled airspace. The availability and extend of the services would be subject to rules applicable to the relevant class of airspace, the applicable ICAO annexes, and documents, as well as to the actual existence of service providers in the relevant part of the UK.

3.16. The Service Provision Regulation mandates that there must exist a series of common requirements for the provision of ANS, including safety, security, and economic regulation concerns, that must be met by ANSPs.[320]

3.17. *National Supervisory Authority (NSA)*. States who are part of the SES regulations must either nominate or establish an NSA to assume the tasks under the Framework Regulation.[321] The NSA must be independent of ANSPs. This independence must be achieved through adequate separation, at the functional level at least, between the national supervisory authority and those providers.[322] The NSA may decide to delegate in full or in part the inspections and surveys of ANSPs to qualified entities.[323] The CAA is the NSA for the UK.[324]

3.18. *Certification*. Any organisation that wishes to provide an air navigational service must have a certificate issued by the NSA, which will check that the provider meets the common requirements.[325] Certificates may be issued individually for each type of air navigation service, or for a bundle of those services.[326]

3.19. *Certificate conditions*. Certificates must specify the rights and obligations of ANSPs, including non-discriminatory access to services for airspace users. Certification may

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318 UK Regulation (EU) No 549/2004 (the Framework Regulation), Article 2(5).

319 UK Regulation (EU) No 1139/2018, Articles 41-43.

320 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 6.

321 Regulation (EC) No 549/2004, Article 4(1).

322 UK Regulation (EU) No 549/2004 (the Framework Regulation), Article 4(2).

323 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 3 and Annex I.

324 The Single European Sky (National Supervisory Authority) Regulations 2013, Reg. 3(1), and Schedule 1.

325 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 7(3).

326 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 7(3).

be subject only to the limited list of conditions.[327] Those conditions must be objectively justified, non-discriminatory, proportionate, and transparent. [328]

3.20. *Exemptions*. The NSA may allow the provision of ANS in all or part of the airspace under their responsibility without certification in cases where the provider of such services offers them primarily to aircraft movements other than general air traffic.[329]

3.21. *Common requirements for ATM/ANS providers*. In order to be certified as ATM/ANS in the UK, a service provider must meet a series of requirements. UK Regulation (EU) 2017/373 sets forth common requirements for providers of ATM/ANS and other air traffic management network functions and their oversight. In the context of this regulation, *service provider* means "any legal or natural person providing functions or services of ATM/ANS or other ATM network functions, either individually or bundled for general air traffic".[330] ATM/ANS, in turn, means ATM and ANS and covers all of the following: "the air traffic management functions and services as defined in point (10) of Article 2 of Regulation (EC) No 549/2004; the air navigation services as defined in point (4) of Article 2 of that Regulation, including the network management functions and services referred to in Article 6 of Regulation (EC) No 551/2004, as well as services which augment signals emitted by satellites of core constellations of GNSS for the purpose of air navigation; flight procedures design; and services consisting in the origination and processing of data and the formatting and delivering of data to general air traffic for the purpose of air navigation".[331] The scope of the regulation is fairly broad. It includes organisation and technical requirements.

3.22. The CAA is the authority with competence to issue of certificates to service providers, acknowledge receipts of declarations made by FIS providers, as well as oversee and enforce the common requirements regulation.[332] The CAA will grant certificates to those service providers that comply with a list of requirements common to all AMT/ANS, laid down in Annex III (Part-ATM/ANS.OR), Subparts A and B, and in Annex XIII (Part-PERS),[333] in addition to those requirements specific to the relevant type of ANSP.

3.23. *Forthcoming changes to the common requirements*. The European Commission amended Regulation (EU) 2017/373 via Regulation (EU) 2020/469. This amendment by the EU did not apply to the UK because it was brought into force after 23:00 on 31 December 2020. The CAA will initiate a rulemaking task to consider the adoption of Regulation (EU) 2020/469 into UK law.

3.24. *Essential requirements for ATM/ANS providers and related organisations*. The Basic Regulation applies to the provision of ATM/ANS in the UK, and the design, production, maintenance and operation of systems and constituents used in the

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327 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 7(4) and Annex II.

328 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 7(4).

329 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 7(5).

330 UK Regulation (EU) 2017/373, Article 2(2), as substituted by S.I. 2021/1203 reg. 23.

331 UK Regulation (EU) 2018/1139, Article 3(5).

332 UK Regulation (EU) 2017/373, Article 4(1), as substituted by Regulations 2020/694 Pt 2(1) reg.6(2).

333 UK Regulation (EU) 2017/373, Article 6(a).

provision of those ATM/ANS.[334] The Basic Regulation also requires that Providers of ATM/ANS must hold a certificate. The CAA will issue that certificate when the applicant has demonstrated that it complies with the regulations adopted to ensure compliance with the essential requirements.[335] The Basic Regulation lays out a list of essential requirements for ATM/ANS service providers in Annex VIII and, if applicable, Annex VII.[336] The CAA may grant exemptions to ATM/ANS providers from the requirement to hold a certificate, when a series of conditions are met.[337]

3.25. In addition to ATM/ANS providers, the organisations involved in the design, production, or maintenance of ATM/ANS systems and ATM/ANS constituents, may be required to: declare their capability, and the availability to them of the means, to discharge the responsibilities associated with the activities performed in compliance with the regulations under Article 43 of the Basic Regulation; or hold a certificate.[338]

3.26. *SoS regulation of ATM/ANS*. The SoS must make regulations laying down detailed provisions concerning the operating rules related to the use of airspace, aircraft equipment and ATM/ANS systems and ATM/ANS constituents required for the use of airspace.[339] Those regulations must be made on the basis of the principles set out in Article 4 of the Basic Regulation and with a view to achieving the objectives set out in Article 1 of the Basic Regulation.[340] The principal objective is to establish and maintain a high level of civil aviation safety in the UK.[341]

3.27. The SoS may also make regulations for the ATM/ANS systems and ATM/ANS constituents, laying down detailed rules with regard to:[342]

(i) the conditions for establishing and notifying to an applicant the detailed specifications applicable to ATM/ANS systems and ATM/ANS constituents for the purposes of certification;

(ii) the conditions for issuing, maintaining, amending, limiting, suspending or revoking the certificates;

(iii) the privileges and responsibilities of the holders of certificates;

(iv) the privileges and responsibilities of the organisations issuing declarations;

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334 UK Regulation (EU) 2018/1139, Article 2(1)(g), words substituted by S.I. 2019/645 reg. 84(2)(e).

335 UK Regulation (EU) 2018/1139, Article 41(2).

336 UK Regulation (EU) 2018/1139, Article 40(1).

337 UK Regulation (EU) 2018/1139, Article 41(6).

338 UK Regulation (EU) 2018/1139, Article 42(1).

339 UK Regulation (EU) 2018/1139, Article 44(1)(a), as amended by Aviation Safety (Amendment etc.) (EU Exit) Regulations 2019/645 Pt 3(5) reg.121.

340 UK Regulation (EU) 2018/1139, Article 44(1), as amended by Aviation Safety (Amendment etc.) (EU Exit) Regulations 2019/645 Pt 3(5) reg.121.

341 UK Regulation (EU) 2018/1139, Article 1, as amended by Aviation Safety (Amendment etc.) (EU Exit) Regulations 2019/645 Pt 3(5) reg.83(2).

342 UK Regulation (EU) 2018/1139, Article 47(1), substituted by Aviation Safety (Amendment etc.) (EU Exit) Regulations 2019/645 Pt 3(5) reg.124.

(v) the conditions and procedures for the declaration by ATM/ANS providers; and

(vi) the conditions for establishing the detailed specifications applicable to ATM/ANS systems and ATM/ANS constituents which are subject to a declaration.

3.28. The SoS also has the power to amend Annex VIII and, if applicable, Annex VII, where necessary for reasons of technical, operational or scientific developments or safety evidence related to the ATM/ANS, in order and to the extent required to achieve the objectives set out in Article 1 of the Basis Regulation.[343]

3.29. *ANSPs relations between each other*. ANSPs can avail themselves of the services of other certified ANSPs.[344] Those relationships must be formalised through written agreements or legal arrangements, which must be notified to the NSA.[345] The NSA must approve those agreements involving the provision of ATS or of meteorological services, if an exclusive meteorological service provider has been designated.[346]

3.30. The preceding paragraphs apply to all ANSPs. In addition, there are specific safety, economic, security and data regulations applicable to some ANSPs subsets such as ATS, ATC, meteorological service providers, and ATM service providers, among others. The next three subsections focus on safety, financial fitness, and economic regulation, particularly looking at ATS.

Safety

3.31. The following paragraphs describe the safety regulatory framework of some types of ANSPs. The provision of some of these services is linked to one or more airspace blocks. *Airspace block* means an airspace of defined dimensions, in space and time, within which air navigation services are provided.[347]

3.32. *General rules*. ANSPs must comply with a set of general rules described in the previous section in order to be granted and continue to be certified. Certain natural persons involved in ATS and ANS have an obligation to report[348] occurrences which endanger or which, if not corrected or addressed, would endanger an aircraft, its

343 UK Regulation (EU) 2018/1139, Article 47(2), substituted by Aviation Safety (Amendment etc.) (EU Exit) Regulations 2019/645 Pt 3(5) reg.124.

344 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 10(1).

345 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 10(2).

346 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 10(3).

347 UK Regulation (EU) No 549/2004 (the Framework Regulation), Article 2(6).

348 UK Regulation (EU) 376/2014, Article 4.6(d) & (f).

occupants, any other person, equipment or installation affecting aircraft operations; and the reporting of other relevant safety-related information in that context.[349]

3.33. The general rules described above (including those above certification), require that all service providers must comply with the requirements laid down in Annex III (Part-ATM/ANS.OR), Subparts A and B, and in Annex XIII (Part-PERS) of UK regulation (EU) 2017/373.

3.34. In addition, there are a series of requirements that exclusively apply to some services, described as follows.

3.35. *Communication*, *navigation,* and *surveillance services*. Providers of these three groups of services must fulfil the requirements laid down in Annex III (Part-ATM/ANS.OR), Subparts C and D, and Annex VIII (Part-CNS) of UK Regulation (EU) 2017/373.[350] Those providers which operate certain systems will also be subject to the regulation laying down requirements for the performance and the interoperability of surveillance.[351]

3.36. *Aeronautical information service*. Providers of aeronautical information services must fulfil the requirements laid down in Annex III (Part-ATM/ANS.OR), Subparts C and D, and Annex VI (Part-AIS) of UK Regulation (EU) 2017/373.[352]

3.37. *Meteorological Services*. Providers of meteorological services must also fulfil the requirements laid down in Annex III (Part-ATM/ANS.OR), Subparts C and D, and Annex V (Part-MET) of UK Regulation (EU) 2017/373.[353] The NSA may designate a provider of meteorological services to supply all or part of meteorological data on an exclusive basis in all or part of the airspace under their responsibility, taking into account safety considerations.[354]

3.38. *ATS*. ATS providers have to comply with Annex III (Part-ATM/ANS.OR), Subpart D and Annex IV (Part-ATS).[355]

3.39. *ATS providers exclusivity*. ATS providers are required to be designated to provide their services on an exclusive basis within a specific airspace block, at a specific location.[356] The NSA has discretionary powers in choosing an ATS provider, on condition that the provider fulfils the common requirements and conditions, and is certified.[357]

3.40. *ATS Manual*. The Manual of ATS (MATS) contains procedures, instructions and information intended to form the basis of ATS within the UK. It is published for the

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349 UK Regulation (EU) 376/2014, Article 3.1(a).

350 UK Regulation (EU) 2017/373, Article 6(h).

351 UK regulation (EU) 1207/2011, Article 2(3).

352 UK Regulation (EU) 2017/373, Article 6(f).

353 UK Regulation (EU) 2017/373, Article 6(e).

354 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 9(1).

355 UK Regulation (EU) 2017/373, Article 6(d).

356 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 8(1).

357 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 8(4).

guidance of civil ATCOs and may also be of general interest to others associated with civil aviation.[358] MATS Part 1 published by the CAA and is based upon national legislation and non-legislative regulatory material, such as ICAO Standards and Recommended Practices (SARPs) and Procedures for Air Navigation Services (PANS). The MATS Part 2 produced by the each ATS unit.

3.41. *Additional rules applicable to some ATS providers.* As explained above, ATS cover flight information, alerting, air traffic advisory and ATC services (area, approach, and aerodrome control services). The provisions applicable to some of these services varies.

(i) *ATC*. ATCOs must hold an air traffic controller licence and an air traffic controller medical certificate appropriate for the service to be provided.[359] A person who is not required to be certified under the Service Provision Regulation to be in charge of the provision of ATC will need to be granted an approval by the CAA.[360] ATC providers which supply services based on surveillance data will also be subject to the regulation laying down requirements for the performance and the interoperability of surveillance.[361]

(ii) ATCO training organisations and aero-medical centres must receive approval.[362] Persons responsible for providing practical training, for assessing the practical skills of ATCOs, as well as aero-medical examiners, must hold a certificate.[363] Additionally, the persons and organisations involved in the licensing, training, testing, checking and medical examination and assessment of ATC applicants must be qualified and certified; and the ATC student, the ATC and the persons involved in the licensing, training, testing, checking and medical examination and assessment of ATC applicants must be qualified and licensed.[364]

(iii) *Air traffic flow management*. These providers also have to comply with Annex III (Part-ATM/ANS.OR), Subparts C and D and Annex IX (Part-ATFM).[365]

(iv) *Airspace management providers*. These providers also have to comply with Annex III (Part-ATM/ANS.OR), Subpart C and Annex X (Part-ASM). [366]

3.42. *ATM/ANS not listed in the Framework Regulation but included in the Basic Regulation*. In addition to the air navigation services explicitly mentioned in the Framework Regulation explained above, UK Regulation (EU) 2017/373 also lists

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358 CAP493 Manual of Air Traffic Services (Part 1).

359 UK Regulation 2018/1139, Article 49(1).

360 ANO 2016, Article 180.

361 UK regulation (EU) 1207/2011, Article 2(3).

362 UK Regulation 2018/1139, Article 51(1).

363 UK Regulation 2018/1139, Article 52.

364 UK Regulation (EU) 2015/340, Article 2(1) and (2).

365 UK Regulation (EU) 2017/373, Article 6(i).

366 UK Regulation (EU) 2017/373, Article 6(j).

other ATM/ANS that must be certified. These include data services providers,[367] and procedure design providers.[368]

3.43. *FIS*. UK SERA sets forth the scope of the FIS.[369] A FIS provider declaring its activities must comply with a series of requirements,[370] and FISOs must have a licence.[371]

3.44. *Mandated Services*. The CAA has the power to mandate the provision of services in certain situations. In the interests of safety, the CAA can mandate the provision of an ATC service, a FIS or a means of two-way radio communication, as the CAA considers appropriate, from: (i) the person in charge of a (non-government) aerodrome, for that aerodrome;[372] or (ii) the holder of a licence to provide ATS granted under the TA00's Part I, for a UK airspace, other than am aerodrome.[373]

3.45. After consulting the SoS, the CAA may direct any person in charge of the provision of ATS to provide ATS for UK airspace.[374] The CAA can make that direction: in the interests of ensuring the efficient use of airspace; or to require that ATS are provided to a standard considered appropriate by the CAA for the airspace classification.[375]

Financial Structure and Fitness

3.46. *Common requirements*. The common requirements for the certification of ANSPs must include a series of provisions that can generally be described as financial structure and fitness. These are: financial strength; liability and insurance cover; as well as ownership and organisational structure, including the prevention of conflicts of interest.[376] ATS, meteorological service, AIS, CNS, and air traffic flow management providers (that is, most ANSPs) must comply with the requirements

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367 In addition to the general requirements applicable to all service providers, they must also fulfil the requirements laid down in Annex III (Part-ATM/ANS.OR), Subpart C, and Annex VII (Part-DAT) of UK Regulation (EU) 2017/373. See UK Regulation (EU) 2017/373, Article 6(g).

368 In addition to the general requirements applicable to all service providers, they must also fulfil the requirements laid down in Annex III (Part-ATM/ANS.OR), Subpart C, and Annex XI (Part-ASD) of UK Regulation (EU) 2017/373. See UK Regulation (EU) 2017/373, Article 6(k).

369 UK Regulation (EU) 923/2012, UK SERA.9005. See also UK Flight Information Service (CAP 744 and CAP 1434).

370 Annex III (Part-ATM/ANS.OR), Subpart A, ATM/ANS.OR.A.015 (d) of UK Regulation (EU) 2017/373. See also ATM/ANS.OR.A.030.

371 UK Regulation (EU) 2015/340.

372 ANO 2016, Article 184(1).

373 ANO 2016, Article 184(2).

374 ANO 2016, Article 185(1).

375 ANO 2016, Article 185(2).

376 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 6.

laid down in Annex III (Part-ATM/ANS.OR), Subpart D of UK Regulation (EU) 2017/373.[377]

3.47. *Transparency of accounts, audit, and annual report*. All ANSP must draw up, submit to audit, and publish their financial accounts. The accounts must comply with the international accounting standards.[378] If full compliance with the international accounting standards is not possible due to the legal status of the ANSP, the ANPS must achieve compliance to the maximum possible extent. ANSPs must publish an annual report,[379] and regularly undergo an independent audit.[380] ANSPs which provide a bundle of services must identify and disclose the costs and income deriving from ANS and, where appropriate, must keep consolidated accounts for other, non-ANS, as they would be required to do if the services in question were provided by separate undertakings.[381]

3.48. *Financial strength*. ANSPs must be able to meet their financial obligations, such as fixed and variable costs of operation or capital investment costs. ANSPs must use an appropriate cost-accounting system. ANSPs must demonstrate their ability through the annual plan, as well as through balance sheets and accounts, as applicable under their legal statute, and regularly undergo an independent financial audit.[382]

3.49. *Business plan*. ANSPs must produce a business plan covering a minimum period of five years. The business plan must: (i) set out the ANSPs' overall aims and goals; as well as a strategy towards achieving them in consistency with any overall longer-term plan of that ANSP and with the relevant requirements of law for the development of infrastructure or other technology; (ii) contain performance targets in terms of safety, capacity, environment, and cost-efficiency, as may be applicable pursuant to TA00's Chapter IV of Part 1.[383]

3.50. *Annual plan*. ANSPs must produce an annual plan covering the forthcoming year. The annual plan must further specify the features of the business plan and describe any changes to it as compared to the previous plan. The annual plan must cover: (i) information on the implementation of new infrastructure or other developments, and a statement on how they will contribute to improving the performance of the ANSP;

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377 UK Regulation (EU) 2017/373, Article 6(c), as amended by Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2020/694 Pt 2(1) reg.7(2).

378 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 12(1).

379 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 12(2) and UK Regulation (EU) 2017/373, Annex III, Subpart D, ATM/ANS.OR.D.025 Reporting requirements, as amended by Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2020/694 Pt 2(1) reg.13(8).

380 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 12(2).

381 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 12(3).

382 UK Regulation (EU) 2017/373, Annex III, Subpart D, ATM/ANS.OR.D.015 Financial strength - economic and financial capacity, as amended by Words repealed by Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2020/694 Pt 2(1) reg.13(6).

383 UK Regulation (EU) 2017/373, Annex III, ATM/ANS.OR.D.005 Business, annual, and performance plan, as amended by Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2020/694 Pt 2(1) reg.13(4).

(ii) performance indicators, as may be applicable, consistent with TA00's Chapter IV of Part I; (iii) information on the measures foreseen to mitigate the safety risks identified by the ANSP, including safety indicators to monitor safety risk and, where appropriate, the estimated cost of mitigation measures; (iv) the ANSPs' expected short-term financial position as well as any changes to or impacts on the business plan.[384]

3.51. *Liability and insurance cover*. ANSPs must have in place arrangements to cover liabilities related to the execution of their tasks. The method employed to provide the cover must be appropriate to the potential loss and damage in question, taking into account the legal status of the providers concerned and the level of commercial insurance cover available. ANSPs which avail themselves of services of another service provider must ensure that the agreements that they conclude to that effect specify the allocation of liability between them.[385]

3.52. *Additional regulation for ATS*. The requirements describe above apply to all ANSPs. Some types of ANSP are subject to additional regulations. The most relevant aspects of ATS economic regulation are explained, as follows.

3.53. *ATS*. The financial strength and economic regulatory regime for ATS is set out in Annex IV of UK Regulation (EU) 2017/373[386] and the TA00.

3.54. *ATS provider ownership.* An ATS provider must notify the competent authority of: (i) its legal status, its ownership structure and any arrangements having a significant impact on control over its assets; (ii) any links with organisations not involved in the provision of air navigation services, including commercial activities in which they are engaged either directly or through related undertakings, which account for more than 1% of their expected revenue; and (iii) any change of any single shareholding which represents 10% or more of their total shareholding.[387]

3.55. An ATS provider must take all necessary measures to prevent any situation of conflict of interests that could compromise the impartial and objective provision of their services.[388]

3.56. *Open and transparent provision of service by ATS providers*. A ATS provider must not engage in conduct that: would have as its object or effect the prevention,

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384 UK Regulation (EU) 2017/373, Annex III, Subpart D, ATM/ANS.OR.D.005 Business, annual, and performance plan, as amended by Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2020/694 Pt 2(1) reg.13(4).

385 UK Regulation (EU) 2017/373, Annex III, Subpart D, ATM/ANS.OR.D.020 Liability and insurance cover, as amended by Words repealed by Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2020/694 Pt 2(1) reg.13(7).

386 UK Regulation (EU) 2017/373, Article 6(d).

387 UK Regulation (EU) 2017/373, Annex IV, ATS.OR.100 Open and transparent provision of service, as amended by Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2020/694 Pt 2(1) reg.14(2).

388 UK Regulation (EU) 2017/373, Annex IV, ATS.OR.100 Open and transparent provision of service, as amended by Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2020/694 Pt 2(1) reg.14(2).

restriction or distortion of competition; or amounts to an abuse of a dominant position.[389]

Economic Regulation

3.57. *ATS under TA00*. The following paragraphs describe ATS regulation under the TA00.

3.58. *ATS definition*. The TA00's definition of ATS has been reproduced in chapter 1, above.[390] The SoS may by order amend the definition of ATS for the purposes of Part I of the TA00.[391]

3.59. *ATS licencing*. It is an offence for a person to provide ATS unless it is authorised to do so by an exemption or by a licence granted by the SoS or the CAA.[392] An ATS licence may be granted to a company authorising it to provide ATS in respect of a managed area.[393] An ATS licence may be granted in respect of: (i) ATS of one or more specified descriptions; and (ii) one or more specified areas (any of which may consist of all or part of a managed area).[394] An ATS licence may include such provisions (i.e., conditions) as the licence authority thinks are necessary or expedient; and a provision need not relate to services authorised by the licence.[395]

3.60. In relation to ATS other than en route, various orders since 2001[396] have provided a general exemption authorising the provision of ATS, except for area control services provided from an area control centre. The effect of these statutory instruments has been to remove the need for the CAA to issue licences for ATS provided from aerodromes (terminal air traffic services). This is, with the exception of certain services in the London TMA which are included within the terms of NERL's licence.[397]

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389 UK Regulation (EU) 2017/373, Annex IV, ATS.OR.105 Ownership, as amended by Air Traffic Management (Amendment etc.) (EU Exit) Regulations 2020/694 Pt 2(1) reg.14(3).

390 TA00, Section 98(1).

391 TA00, Section 98(2).

392 TA00, Section 3.

393 TA00, Section 5(1).

394 TA00, Section 5(2).

395 TA00, Section 7(1).

396 The Air Traffic Services (Exemption) Order 2001, the Air Traffic Services (Exemption) Order 2011 and the current SI, the Air Traffic Services (Exemption) Order 2019, which is in force until 31 December 2029.

397 The Air Traffic Services (Exemption) Order 2019 (S.I. 2019 No. 1130) authorises the provision of ATS in respect of a managed area until 31 December 2029. However, the exemption does not authorise the provision of an area control service from an area control centre or the provision of ATS by the holder of a licence granted under TA00, Section 5. NERL's licence was granted under the TA00, Section 6. NERL Licence's Core Service includes the London approach Service (Condition 1) and sets forth the Control of London Approach Charges (Condition 21a).

3.61. Although the approach to regulation for en route and terminal air traffic services differs, they both share a common principle that there can only be a single designated controlling authority for a given volume of airspace to ensure safety in controlled airspace. Yet, there can be changes in controlling authority at different times of day. However, the same conclusion regarding the existing of only one controlling authority does not apply to uncontrolled airspace, since in Class G there are overlapping LARS providers.

3.62. *Protection of ATS licence companies*. A series of restrictions apply to licenced companies. They cannot be: wound up voluntarily; subject to a court application for an administration order; subject to any steps towards the enforcement of any security over a licence company's office unless the person has given to the SoS and the CAA at least 14 days' notice of his intention to take the step; or subject to an application for the winding up of a licence company other than the SoS unless the applicant has given to the SoS and the CAA at least 14 days' notice of his intention to make the application.[398]

3.63. *Charging for ATS*. The rules for charging and the TA00's provisions regarding the specification and administration of charges have been briefly explained under chapter 1, above.

3.64. *ATS and competition law.* The TA00 gives the CAA concurrent competition functions with the Competition and Markets Authority (CMA) in relation to ATS. This means that both the CAA and the CMA can enforce the UK competition law prohibitions on anti-competitive agreements and abuses of dominant market positions in this sector. The CAA can also undertake market studies under Part 4 (market investigations) of the Enterprise Act 2002 (EA02); make market investigation references under Part 4 of EA02; and undertake investigations into super-complaints under Part 1 of EA02.[399]

3.65. *Terminal air navigation services (TANS)*. TANS are currently exempt from the requirements to be licensed, with the exception of the London TMA, as they are contracted by airport operators and there is scope for these activities to be tendered to a variety of ANSPs. This approach is consistent with the duties on the SoS and the CAA to further the interests of users by promoting competition in the provision of ATS, and with DfT's decision in 2019 to extend the TANS exemption from licensing for a further 10 years. The CAA has, in the past, reviewed whether market conditions were present in the TANS sector in the UK. Those studies are available online.[400]

398 TA00, Section 26.

399 TA00, Sections 85-89. Please also see the Guidance on the Application of the CAA's Competition Powers (CAP1235).

400 Available at Air Navigation Service Provision: The Contestability Assessment.

Characteristics of ANSPs in the UK

3.66. The CAA is a regulator that strives to promote competition and considers that healthy competition plays a crucial role in driving innovation and choice for consumers. Economic regulation is appropriate only where there is a market failure and a clear net economic benefit to consumers and society arising from such regulation. That may be, for example, when there is an operator in a key part of the sector that has significant market power.

3.67. The market for provision of air traffic service provision in the UK is liberalised, with nearly 60 ANSPs. Many of them are provided by aerodrome operators. [401]

3.68. Moreover, in the UK, an additional radar-based surveillance service known as LARS facilitates the provision of services in lower and uncontrolled airspace by utilising irreducible spare capacity from 26 air traffic units (14 military and 12 civilian units). These 'units' are not under common ownership, and some are privately owned facilities that are not connected to NERL. In general terms, these air traffic service units provide FIS to aircraft that are flying outside controlled airspace up to and including flight level FL100 (or 10,000 ft).

3.69. The provision of en route services is a monopoly. Separately, as a condition of its licence, NERL is responsible for meeting the UK obligation to ICAO to provide Aeronautical Information Services on an exclusive basis. Similarly, meteorological forecasting and climatological services for civil aviation are provided on an exclusive basis by the UK Met Office. The UK Met Office's aviation activities funded through the UK unit rate.

3.70. This is different from a few other states, where the provision of ANS is centralised by a state-owned or state-controlled provider. For example, the United States' Federal Aviation Administration's Air Traffic Organization is responsible for providing safe and efficient air navigation services to 29.4 million square miles of airspace.[402] ATO is in charge of Airport Traffic Control Towers, Terminal Radar Approach Control facilities, Air Route Traffic Control Centres, and Combined Control Facilities.[403]

En route Services

3.71. In simple terms, en route refers to aircraft movements through UK airspace and between airports. For safety and operational efficiency, it is desirable for a single organisation to provide a en route air traffic control service across UK airspace.

401 See UK ANSPs currently certified or designated.

402 See FAA ATO.

403 See FAA ATS.

3.72. In general terms, the rationale for the economic regulation of ANSPs stems from the fact that they are either deemed to be a natural monopoly provider or because in some states they are designated as a statutory monopoly. Such economic regulation typically involves up-front (*ex ante*) control of the prices that can be charged for providing ATS to airlines, as well as quality requirements and other performance standards.

3.73. *En route* services are part of ATS. ATS providers must be designated to provide services on an exclusive basis within a specific airspace block.[404] NERL is the franchise monopoly service provider of *en route* air traffic services to aircraft flying in UK airspace, and shares responsibility with Ireland over the north-east quadrant of the North Atlantic. In effect, this means that airlines which utilise the *en route* airspace do not have a choice of which ATS provider provides them with services, (i.e., they are captive), and are subject to the prices and services they offer.[405]

3.74. Given that ATS providers will have by default market power, they, including the en route provider, are regulated to ensure they do not abuse their position. NERL is subject to licence-based economic regulation under the TA00 and through the application of its licence conditions.[406] As explained above in chapter 1, the CAA has a series of duties that it must follow when exercising its functions under the ATS chapter of the TA00. The CAA must first exercise its functions so as to maintain a high standard of safety in the provision of ATS.[407] The CAA must also exercise its ATS functions in the manner it thinks best calculated to, among other things, further the interests of operators and owners of aircraft, owners and managers of aerodromes, persons travelling in aircraft and persons with rights in property carried in them; promote efficiency and economy on the part of licence holders; and secure that licence holders will not find it unduly difficult to finance activities authorised by their licences.[408]

3.75. Notwithstanding that *en route* air navigation services are considered to be a monopoly activity in almost all parts of the world, some entities, including the EU Commission, have supported the unbundling of certain services in the past to introduce some forms of competition. For *en route* services competition might involve the appointment of a franchise operator for a specific period of time, or in a specific sector of a state.

3.76. It is worth pointing out that, while *en route* air navigation services in the UK are provided by a private entity subject to economic regulation (i.e., NERL), in many

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404 UK Regulation (EU) No 550/2004 (the Service Provision Regulation), Article 8(1), as amended by amended by S.I. 2019/459 reg. 26(2).

405 In some regions, airlines may choose to by-pass a specific national *en route* airspace to avoid the charges being levied by the ANSP in that country. However, this can involve additional costs in terms of time, fuel etc.

406 CAP2111 is NERLs licence under TA00, Part 1. NATS also holds a certificate under UK Retained (EU) Regulation 550/2004 (as will all ANSPs)

407 TA00, Section 2(1).

408 TA00, Section 2(2)(a) to (c).

other jurisdictions, such as Australia, Italy, France, Germany, and the United States, air navigation services are provided by state-owned entities.

What are NERL's responsibilities under its Licence?

3.77. The SoS granted NERL a licence[409] authorising NERL to provide (i) air traffic services in and in respect of the En route UK Area;[410] (ii) the En route (Oceanic) Area;[411] (iii) the advisory control service; and (iv) the London Approach Service. These four services are described as the Core Services.[412] The authorisation to provide the Core Services is exclusive to NERL for a period of ten years from the date of its licence came into effect.[413]

3.78. *UK En route ATC service*. This means an ATC Service in respect of the En route (UK) Area, other than any Airfield Service or the London Approach Service. ATC service, in turn, means the giving of instructions or advice to aircraft, in flight for the purpose of: preventing, or assisting in the prevention of, collisions between aircraft; and managing the flow of air traffic for the purpose of expediting and maintaining an orderly flow of air traffic where appropriate in consultation with the CAA or any other provider of air traffic services or any international body responsible for coordinating air traffic services to which instructions the recipient aircraft are required to submit, save to avoid immediate danger.[414]

3.79. *Oceanic En route ATC Service*. This means the provision of an ATC service other than an Airfield Service in respect of the En route (Oceanic) Area.[415]

3.80. The UK shares responsibility with other states in the management part of the North Atlantic's oceanic airspace, a gateway between Europe and North America. This airspace is the world's busiest oceanic, intercontinental air corridor, and its efficient operation is crucial for international air traffic management. ATC services in the eastern half of North Atlantic airspace are provided by NERL, under its licence, on behalf of the UK under its obligations to ICAO.

3.81. *Advisory control service*. This service refers to the giving of instructions or advice to aircraft flying on the advisory routes and areas described in the AIP to the extent undertaken by the NERL licence: (i) for the purpose of preventing, or assisting in the prevention of collisions between aircraft; and (ii) with a view to facilitating the flow of air traffic for the purpose of expediting and maintaining an orderly flow of air traffic where appropriate in consultation with the CAA or any other provider of air

409 In exercise of the powers conferred by TA00, Section 6.

410 See CAP2111, Schedule 1.

411 See CAP2111, Schedule 2.

412 CAP2111, Part II, condition 1, para. 3.

413 CAP2111, Part I, para. 3.

414 CAP2111, Part II, condition 1, para. 3.

415 CAP2111, Part II, condition 1, para. 3.

traffic services or any international body responsible for coordinating air traffic services but excluding any airfield service.[416]

3.82. *London Approach Service*. In respect of Heathrow, Gatwick, London City, Luton and Stansted airports, the licence requires NERL to provide ATC service to any aircraft: in the process of arriving at or departing from the aerodrome in respect of which the service is being provided; or in the vicinity of the aerodrome in respect of which the service is being provided, other than such element of service as is provided to an aircraft on its final approach path or initial departure path.[417]

3.83. *Specified Services*. In addition to the Core Services, NERL has an obligation to make available a list of other services described in schedule 4 of the NERL licence.[418]

[416] CAP2111, Part II, condition 1, para. 3.

[417] CAP2111, Part II, condition 1, para. 3.

[418] CAP2111, Part II, condition 2, para. 1.

Chapter 4

Future of Flight

4.1. This chapter deals with innovation in aviation, and covers new aircraft, new uses cases and use of airspace. The following paragraphs build on the CAA's public response to the DfT's consultation on the future of flight.[419]

4.2. Many of the changes brought by innovation in aviation are not based upon the linear progression of existing aviation technologies. Hence, they present a unique challenge and potentially represent a fundamental shift in the underlying operational and economic models of the aviation market.

4.3. The pace of innovation in aviation has significantly advanced. Capital investments in research and development of new aviation technologies from public and private sources increase the numbers of potential new aircraft and new aircraft designs. In addition, new entrants are joining the aviation and aerospace sectors, some of whom do not have previous operating experience in the field. There is a need to incorporate these new aircraft and new entrants in the existing airspace and in its regulatory framework. This has to be achieved without detrimentally affecting the safety and operational efficiency of the existing aviation environment.

4.4. First, through the various Future Flight Challenge (FFC) projects and sandboxes, the Innovation Team broadly knows the Advanced Air Mobility (AAM) and flying BVLOS in non-segregated airspace's use cases in the foreseeable future.

4.5. Second, together with the Office for the General Counsel, we have produced a memorandum identifying regulatory gaps and challenges towards the goal of achieving net zero aviation by 2050. We have begun researching the regulatory limits to the development and implementation of alternative propulsion systems and fuels, and will continue to do so with the aim of achieving safe net zero aviation.

4.6. Third, within the Future Air Mobility Sandbox, with our CAA SMEs, we have been able to work towards understanding some of the regulatory issues surrounding the integration of urban AAM operations into the airspace. Fuller appreciation of these challenge areas will play a significant role for the integration into UK airspace of AAM in urban environments.

4.7. Fourth, we have been asking relevant questions regarding the development of new forms of traffic management, for novel and new aircraft, as well as for traditional aircraft. This task builds on the learnings from FFC, and will be enriched by input from our stakeholders to be gained in informal consultations (call for insights). This

[419] CAA Response to 2021 Government Consultation on the Future of Transport Regulatory Review: Future of Flight (CAP2296).

work together with the review of safety cases proposed by industry, we will understand what regulatory changes or new regulations might be needed.

4.8. Fifth, regarding industry's plans to apply for certification of new hybrid vehicles in the next two to five years, we have worked with other regulators. Our finding is that there are gaps, as well as room for improvement, if the goal is to prevent industry from selecting a regulator of their choosing or avoiding regulation altogether.

New Users of Airspace

4.9. New aircraft and other machines have already or will become users of airspace. New aircraft designs which do not follow existing classifications include UAS or RPAS; aircraft used for AAM in urban and rural environments, such as electric vertical take-off and landing (eVTOL); personal flight aircraft, such as jet packs; High-Altitude Aeronautical Platforms (HAAPS) or High-Altitude Pseudo-Satellites (HAPS), and space launch vehicles. As examples of new aircraft and other machines in the process of being developed, we can mention hybrid air vehicles (HAV) that can be driven or sailed, as well as flown, and some craft that travel within the ground effect for part or all of the journey, in land, on water or both.

4.10. Many of these technologies are at a very early stage in both their development and their implementation within commercial scaled operations. We must recognise the imperfect state of our knowledge and the unpredictable transformative potential of these technologies. It must therefore be assumed that any regulatory approach must be cautiously iterative, will develop unevenly and will necessarily trail technological development.

4.11. Regarding the different types of wing-in-ground effect craft (WIG), it is worth mentioning that definition of aircraft excludes machines that derive support from reactions of the air against the earth's surface. The purpose of the exclusion is to remove ground-effect vehicles (also known as wing-in-ground-effect, ground-effect crafts, wingships, flarecraft or ekranoplans) from the scope of aircraft-specific regulation. However, while WIGs are currently being dealt with under maritime regulation, some WIG in the process of being developed by industry, as well as some proposed operations, might stray significantly into aviation. Any future discussions on WIG and similar craft by the DfT with international or domestic agencies or in other context should bear in mind that the International Maritime Organisation (IMO)'s guidance might not suit new craft and new use cases.

New Use Cases

4.12. Notwithstanding these innovative designs, operators and developers have a target purpose or use case. The CAA has had the opportunity to deal with several different types of use cases for RPAS which want to fly BVLOS, and for AAM. Those cases are sometimes analysed by our regulatory team (SARG) in the context of an application for authorisations or permits. Frequently, it is the CAA's Innovation Hub who reviews innovators' proposals before they are submitted to SARG (although they might not need to), to help innovators achieve regulatory readiness.

4.13. *UAS or RPAS flying BVLOS*. As regards UAS/RPAS flying BLVOS, the CAA has had opportunity to consider these use cases: response survey in case of oil spill offshore; inspection of assets offshore; delivery of mail and parcels to small islands; small UAS/RPAS to help in mountain rescue; powerline inspection in urban and rural areas; police surveillance and law enforcement; aerial mapping of rural and urban areas; and HAPS or HAAPS; among others.

4.14. Currently, two paths would lead to the authorisation of UAS/RPAS flights BVLOS: to fly it in segregated airspace (e.g., a DA or TDA); or to develop appropriate detect and avoid (DAA) systems. Regarding the BVLOS use cases identified above, there are some minimum, at this point, theoretical requirements to enable BVLOS without a segregated airspace structure. An effective DAA system which can handle uncooperative aircraft (i.e., with no transponder or EC), other aircraft and objects (e.g., birds) would in principle allow BVLOS to be approved, under existing regulation. At the moment, there is not a proven system in place. We do not know whether such a system will effectively be in place in five years.

4.15. Enabling BVLOS might require a combination of EC-based, cooperative DAA, uncooperative DAA systems, and deconfliction services. To allow BVLOS in unsegregated, Class G airspace, the minimum enabler would be an effective uncooperative DAA system. In certain circumstances, a low risk of airspace argument could hypothetically and potentially be used to allow certain BVLOS operations. This refers to areas where an air encounter would only occur if other airspace users were breaching the rules of the air.

4.16. *eVTOL for AAM*. Some of the AAM use cases that the CAA has seen so far include: air taxi operations over London; regional transport of passengers within cities in large eVTOLs; remotely piloted eVTOL aircraft to transport cargo; pop-up airports for eVTOL; and zero-emission regional airline operations; among others. Most projects are aimed at both cargo and passenger transport, while a few focus exclusively on passenger services.

4.17. The CAA does not expect a wholesale distributed, on-demand model of AAM to be operating at a large scale within five years. More limited scheduled and fixed route commercial services are though highly probably within that timeframe. These have

the potential to still add significant numbers of additional movements to the UK's aviation system.

4.18. However, to enable the initiation of operations within the next five years, certain developments may need to be in place. Ongoing research into the technologies and operational concepts under this topic will confirm specific milestones. Similarly, HMG decision-making on the role of AAM within the UK transport and aviation network will help shape the UK's objectives in this area. The CAA, in turn, will help HMG and DfT to understand the implications of the new entrant's use cases and determine what is safely viable in terms of its integration into the UK airspace system.

4.19. From collaborative discussions, possible key milestones may include, among others: advancements regarding vertiports and ground infrastructure, including safety case approval for eVTOL operations within new and existing operating environments; review of the current airspace change process to ensure it is capable of supporting new AAM airspace users and full consideration of airspace integration, including traffic management services; and consideration of social license issues (planning and operational stages).

4.20. This summary of potential milestones assumes that AAM operations will initially be low density. In that context, improvements in traffic management are a slightly lower priority for the first wave of AAM operations. Growth may depend on a range of economic, social, and political factors. This can be seen, for example, under the CAA Sandbox project which has seen Eve Air Mobility develop a concept of operations against a specific AAM case study.

4.21. *HAAPS or HAPS*. HAPS can be classified as fixed-wing aircraft, airships or balloons that fly or float at altitudes of about 20km. These systems are unmanned, and some can remain on-station at a specific location. They can also take off and land, making it possible to conduct periodic maintenance, observation, and payload changes. Among other applications, HAAPS or HAPS could: complement terrestrial network operations by covering more surface area making them less prone to interference, and providing 5G and 6G communications to the most remote parts of the world, temporary coverage for events, and private networks; the Internet of things; connectivity for urban air mobility and UAS/RPAS; disaster management, including monitoring the spread of wildfires or oil spills; greenfield coverage; white spot reduction; border protection; and surveillance.[420]

4.22. *WIGs*. New designs of craft that might be classified as WIG (but might also have the ability to fly outside the ground effect) might transport between 20 and 150

[420] GSMA, High Altitude Platform Systems Towers in the Skies, June 2021, at GSMA-HAPS-Towers-in-the-skies-Whitepaper-2021-1.pdf; GSMA, High Altitude Platform Systems Towers in the Skies, June 2021, at GSMA-HAPS-Towers-in-the-skies-Whitepaper-2021-1.pdf

passengers. These crafts would use existing dock infrastructure, then take off and fly at low altitude on a cushion of high-pressure air, to a second port.

4.23. *Net zero aircraft*. We have also seen strong use cases developing for novel aircraft designed towards zero emissions, e.g., using electric or hydrogen propulsion. These novel, zero or low emission aircraft will replace existing regional routes or establish a new direct transport link where there lacks one. The solutions to achieve low or zero emission range from replacing existing propulsion systems within certified airframes to newly designed VTOL.

4.24. In the next five years, it is expected that the aircraft used to develop regional transport of passengers on novel, low or zero emission aircraft will be relatively small. However, industry has signalled a desire to develop this over the longer period to include larger aircraft (i.e., more than 100 passengers).

Use of Airspace below 500 ft, Atypical Air Environment[421] and High Altitude

4.25. Several of the new use cases by new aircraft, or new use cases by existing aircraft operating in innovative manners, will take place in volumes of airspace not normally flown today. Portions of airspace of interest to innovators include: airspace below 500 ft, atypical air environment, and high-altitude.

4.26. *Airspace below 500 ft*. Use cases that rely on UAS or RPAS currently focus on airspace below 500 ft. UAS or RPAS in the Open category fly within 120 m (400 ft) from the closest point of the surface of the earth, except when overflying an obstacle.[422] The Specific category does not set forth an upper limit to RPAS operations. However, many of the use cases seen so far focus on airspace below 500 ft.

4.27. Pre-defined risk assessment operations (UKPDRA01 and – UKPDRA02) are subject to a maximum height not exceeding 120 m (400 ft) above the surface, and must be within 150 m (500 ft) of any residential, commercial, industrial, or recreational areas.[423]

4.28. UK SERA sets forth that, except when necessary for take-off or landing, a (crewed) VFR flight must not be flown over the congested areas or over an open-air assembly of persons at a height less than 300 m (1,000 ft) above the highest obstacle within a radius of 600 m (2,000 ft) from the aircraft; and elsewhere at a

[421] Atypical air environment is not a formally defined term in UK legislation o regulation but is sometimes used in policy.

[422] UK Regulation (EU) 2019/947, Article 4(1)(e).

[423] Unmanned Aircraft System Operations in UK Airspace – Guidance (CAP 722),

height less than 150 m (500 ft) above the ground or water, or 150 m (500 ft) above the highest obstacle within a radius of 150 m (500 ft) from the aircraft.[424] However, the CAA permits day VFR flights at a height of less than 500 ft above the ground or water; or less than 500 ft above the highest obstacle within a radius of 150 m from the aircraft.[425] This means that UAS / RPAS flying below 500 ft might encounter crewed aircraft flying VFR during daytime, in certain volumes of airspace.

4.29. *Atypical air environment*. This term is not currently formalised in the UK.[426] While not part of UK law, only for reference, it is worth pointing out that JARUS SORA defines *atypical airspace* as: (i) Restricted Airspace or DAs; (ii) airspace where normal manned aircraft cannot go (e.g., airspace within 100 ft. of buildings or structures); (iii) airspace characterization where the encounter rate of manned aircraft (encounter is defined as proximity of 3000 ft. horizontally and ± 350 ft. vertically) can be shown to be less than $1x10^{-6}$ per flight hour during the operation); and (iv) airspace not covered in Airspace Encounter Categories (AEC) 1 through 12.[427]

4.30. Some UAS or RPAS operations will likely take place in atypical air environments. That is particularly the case for line inspection, emergency and other use cases that require flying in very close proximity to infrastructure in land (e.g., powerlines), and offshore. Some UAS or RPAS's use cases might require making continued use of atypical airspace in urban environment.

4.31. *High altitude*. The CAA, through its horizon scanning, has also been working to capture a myriad of use cases that look to exploit the upper most levels (and above) FL660[428] in the coming years. There might be a gap regarding what rules and procedures apply above the existing limits of regulated airspace. Some HAAPS or HAPS can operate in the stratosphere at 65,000 feet conducted. It is worth noting that HAAPS or HAPS will have limited manoeuvrability and might fly or orbit in unusual patterns.

4.32. The European Concept for Higher Airspace Operation (ECHO) project, a two-year SESAR project, aims to deliver a comprehensive demand analysis and a concept of operation for higher airspace traffic management. The CAA is collaborating with ECHO.

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424 UK SERA 5005.(f)(1)&(2).

425 ORS4 1496, para. 5,dated 28 June 2021, issued under UK SERA.5005(f)(2).

426 The concept of *atypical airspace* based on JARUS SORA was part of the AMC & GM to the Implemented Regulation 2019/947 before EU-exit and continues to be so for EU27 but not for the UK.

427 JARUS SORA, Annex I (Glossary of Terms).

428 UK SERA does not currently include an upper limit to Class C. UK SERA.6001 provides that "the designation of the airspace classification shall be appropriate to the needs of the [United Kingdom], except that all airspace above FL 195 shall be classified as Class C airspace." However, MATS 1 (CAP 493) para. 9.1 provides for that "[t]he airspace classification between FL195 and FL660 within the UK FIRs / UIRs is Class C. However, the FIR / UIR boundary is FL245."

Description of the Future Market

4.33. PwC estimates that there will be more than 76,000 RPAS o UAS flying over the UK, split across several different industries by 2030. That overall figure includes: public and defence, health, education, and other services (27,521); agriculture, mining, gas, and electricity (25,732); transport and logistics (11,008); construction and manufacturing (4,816); technology, media and telecommunications (4,541); and financial, insurance, professional and administrative services (2,514).[429]

4.34. Regarding AAM, Roland Berger (management consultants) believe that 321 eVTOLs will be in operations in the UK by 2030, operating 1.1 million flights per year. [430] They also forecast that, by 2050, 6,500 eVTOLs could be in service in the UK, across the largest 18 cities, operating 58.8 million flights per year.[431] Vertical Aerospace estimates the UK AAM market could be worth over £30 billion in annual revenue by 2050. Market growth will be driven by the displacement of road journeys and trips across highly convoluted public transport routes.[432]

4.35. For HAPS, globally, NSR estimates that 30 platforms are in development or production, and that this number will grow to around double by 2023.[433] A separate study predicted 137 operations platforms by 2025.[434] Post 2025 an annual build rate of 16 is assumed.[435] The UK is home to many innovative terminal manufacturers and satellite service providers that could be well placed to address this market.[436]

4.36. Beside UAS/RPAS, eVTOLs and HAPS, other new aircraft, existing or to be created in the future, might reach critical numbers. This would create a similar challenge for airspace integration.

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429 PwC, Skies without Limits, 2018. See https://www.pwc.co.uk//intelligent-digital/drones/Drones-impact-on-the-UK-economy-FINAL.pdf

430 Vertical Aerospace, The Future of Advanced Aerial Mobility (whitepaper), October 2021 at 16, see The-Future-of-Advanced-Aerial-Mobility.pdf (vertical-aerospace.com)

431 Ib.

432 Ib.

433 Catapult, Routes to Market Report, Satellite Technologies for High Altitude Pseudo Satellite Communications, 2018, at 4, see https://sa.catapult.org.uk/wp-content/uploads/2018/12/16-High-Altitude-Platform-Communications.pdf

434 Ib.

435 Catapult, Routes to Market Report, Satellite Technologies for High Altitude Pseudo Satellite Communications at 6.

436 Ib.

APPENDIX A

Abbreviations

Abbreviations	
AAM	Advanced Air Mobility
ACOG	Airspace Change Organising Group
ACP	Airspace Change Process
ADS-B	Automatic Dependent Surveillance-Broadcast
ADS-C	Automatic Dependent Surveillance-Contract
AIP	Aeronautical Information Publication
AIC	Aeronautical Information Service
AMS	Airspace Modernisation Strategy
AMSL	Above Mean Sea Level
ANO	Air Navigation Order
ANS	Air Navigation Services
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATM	Air Traffic Management
ATM/ANS	Air Traffic Management / Air Navigation Services
ATM&UA Act	Air Traffic Management and Unmanned Aircraft Act 2021
ATZ	Aerodrome Traffic Zone
BVLOS	Beyond Visual Line of Sight
CAA	UK Civil Aviation Authority
CAP	Civil Aviation Publication
CAS	Controlled Airspace
CAT	Commercial Air Transport
CTA	Control Area
CTR	Control Zone
DA	Danger Area
DAA	Detect and Avoid
DfT	Department of Transport
EASA	European Union Aviation Safety Agency
EC	Electronic Conspicuity

Abbreviations	
EU	European Union
eVTOL	Electric Vertical Take-Off and Landing vehicle
FAS	Future Airspace Strategy
FIR	Flight Information Region
FIS	Flight Information Service(s)
FISO	Flight Information Service Officer
FL	Flight Level
FRA	Free Route Airspace
FPL	Filed Flight Plan
GA	General Aviation
GNSS	Global Navigation Satellite System
IAIP	Integrated Aeronautical Information Publication
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
LARS	Lower Airspace Radar Service
MAA	Military Aviation Authority
MATS	Manual of Air Traffic Services
MoD	Ministry of Defence
NERL	NATS En-Route PLC
NOTAM	Notice to Aviation
NSA	National Supervisory Authority
PIC	Pilot-in-command
RMZ	Radio Mandatory Zone
RPAS	Remotely Piloted Aircraft Systems
SERA	Standardised European Rules of the Air
SoS	Secretary of State for Transport
TANS	Terminal Air Navigation Services
TA00	Transport Act 2000
TMA	Terminal Control Area
TMZ	Transponder Mandatory Zone
UAS	Uncrewed Aircraft System
UAS / RPAS	Uncrewed Aircraft System / Remotely Piloted Aircraft Systems
UIR	Upper Flight Information Region

Abbreviations	
VLOS	Visual Line of Sight
VFR	Visual Flight Rules