



Farnborough Airport

Airspace Consultation

Part A: Introduction and Overview



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1. General overview of airspace development

- 1.1. Air travel plays a crucial role in supporting economic growth and prosperity, particularly for an island nation like the UK. It is a part of modern life that we all take for granted; for business, international trade and leisure, flying is central to today's fast-moving lifestyle.
- 1.2. The expertly controlled passage of aircraft above us ensures our safety and keeps aircraft flowing efficiently. The more efficient the air traffic network can be made, the more we can potentially enhance safety and reduce the environmental impact.
- 1.3. This means that, from time to time the organisations responsible for managing the airspace will make proposals for changes to the airspace structures in order to enhance safety and improve efficiency. These proposals are always subject to consultation with relevant stakeholders. When changes are proposed which affect the flight paths of aircraft flying at low and intermediate altitudes¹, the stakeholders will include members of the public in the areas which may be affected. Hence this consultation invites members of the public to provide feedback.
- 1.4. Updating the airspace design gives us the opportunity to improve efficiency, and better match it to the improved performance capabilities of more modern aircraft. It also enables higher volumes of air traffic to be handled safely, and can reduce the environmental impact of air traffic, especially noise.
- 1.5. This proposal is being put forward by TAG Farnborough Airport as the changes are focussed mainly on the routes used by our inbound and outbound flights. We are also working closely with the organisations responsible for the surrounding neighbouring air routes; in particular Heathrow and Gatwick Airports and with the NATS London Airspace Management Programme (LAMP) infrastructure project².
- 1.6. The changes proposed here form a part of the first stage in a wider programme of changes proposed to deliver the UK's Future Airspace Strategy (FAS), developed by the Civil Aviation Authority (CAA) with the support of the aviation industry. This larger programme will deliver significant benefits, including fuel savings for aircraft operators which will also mean reduced CO₂ emissions, and less noise overall for people living below. See section 3 for more information on FAS.
- 1.7. The following points should be noted:
 - a. We are consulting on volumes of airspace and on flight-path routes. Final route positions will be determined after considering the consultation feedback.

¹ Altitude is measured in feet above mean sea level. 'Low' and 'Intermediate' altitudes are defined later in this document.

² NATS provides air traffic control for the UKs 'en-route' airspace which connects the airports with one another and with neighbouring states. LAMP is a wide-ranging airspace development project over the whole South East of England. For more information on LAMP search online for 'NATS London Airspace Management Programme' or 'London Airspace Consultation'.

- b. The net effect of these proposals would be to enhance the overall efficiency of airspace management for Farnborough, and to achieve connectivity to the wider air route network. The former should benefit as many users and residents as practicable; the latter would benefit the wider air route network by reducing delays and giving more predictability to the air network management system.
- c. The air route network is a complex 3D interweaving of flight-paths. A change in one place can ripple through to affect flight-paths some way away from the original change.

Consultation: Your role

- 1.8. If these changes might affect you, we would like your feedback. You can use our postcode search facility, which makes it easy to see which proposed changes have most relevance to your location.
- 1.9. This consultation launches 09:00 Monday 3rd February, and closes 23:00 Friday 2nd May 2014. This is just under thirteen weeks.
- 1.10. This consultation concerns:
 - a. Changes to aircraft departure routes from, and arrival routes to, Farnborough;
 - b. Changes to aircraft holding patterns for Farnborough. Unlike Heathrow and Gatwick, these holds are only used occasionally, for contingency reasons;
 - c. Associated volumes of 'controlled' airspace to enclose and protect these routes and holds;
 - d. Consequential route changes and airspace associated with new air traffic interactions in regions shared between Farnborough, Southampton and Bournemouth airports, and between Farnborough and RAF Odiham; and
 - e. Other airspace changes at a low altitude to provide additional options for General Aviation (GA)³ flights.
- 1.11. The geographical area covered by this consultation is shown in Figure A1 overleaf, and includes:
 - a. Hampshire and Surrey;
 - b. West Sussex, the Isle of Wight and part of eastern Dorset; and
 - c. A small part of southern Berkshire.

³ Typical GA flights are light aircraft and helicopters flown for leisure, basic pilot training, air taxi or similar light commercial or personal transport purposes, and also includes gliders, balloons, parachuting etc. They tend to navigate visually, weigh less, fly lower and slower than most aircraft that use, for example, Heathrow and Gatwick airports. Farnborough generally operates light to medium business jets for personal or corporate transport purposes, which technically is a type of GA. When we refer to GA in this consultation, we are not referring to our own operations – we are referring to these slower, lighter aircraft types.

- 1.12. Parts B, C and D give further detail of the proposed changes in the areas shown in Figure A1, including comprehensive information on both the current and proposed flight-paths.
- 1.13. The information contained in this consultation is also provided on our website:

www.Consultation.TAGFarnboroughAirport.com

Density plots

- 1.14. In order to illustrate where aircraft currently fly, we have provided maps overlaid with aircraft flight-paths, known as 'density plots'. Density plots are produced using radar data, and show how many aircraft over-flew a particular place.
- 1.15. Density plots in this consultation show **all** commercial flights, to and from **all** airports (not just Farnborough), for one month in the region⁴. They give a good representation of where flights are most concentrated, and are **averaged** over the 30-day month.

A colour key explains the average number of flights per day over a particular place.

- 1.16. Figure A3 shows all flights from all airports up to 20,000ft, and Figure A4 shows the same with National Parks and Areas of Outstanding Natural Beauty (AONBs) highlighted.

National Parks, AONBs, and tranquillity

- 1.17. We have outlined these nationally designated places in Figures A2 and A4, and in Parts B, C and D. This will allow you to determine any change in impact over these designated areas, which may be valued by some for their tranquillity.

⁴ The month of September 2012 was chosen because it was a representative month for our air traffic, and was outside the London 2012 Olympics period. During the Olympics, special airspace was applied to the London region for parts of July and August, meaning that the (special) flight-path patterns were not representative of the flight-paths normally flown across the region.

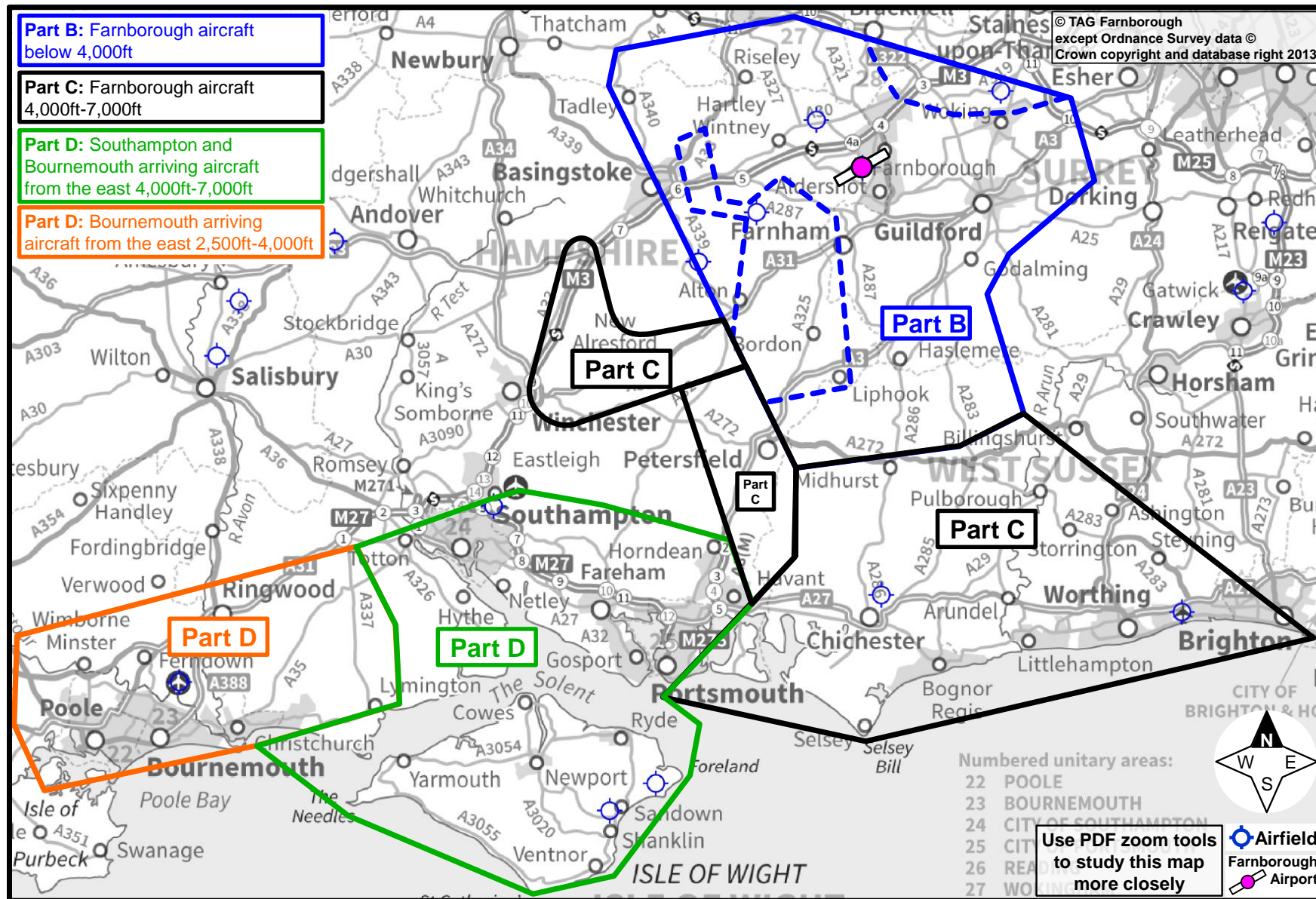


Figure A1: Consultation areas overview

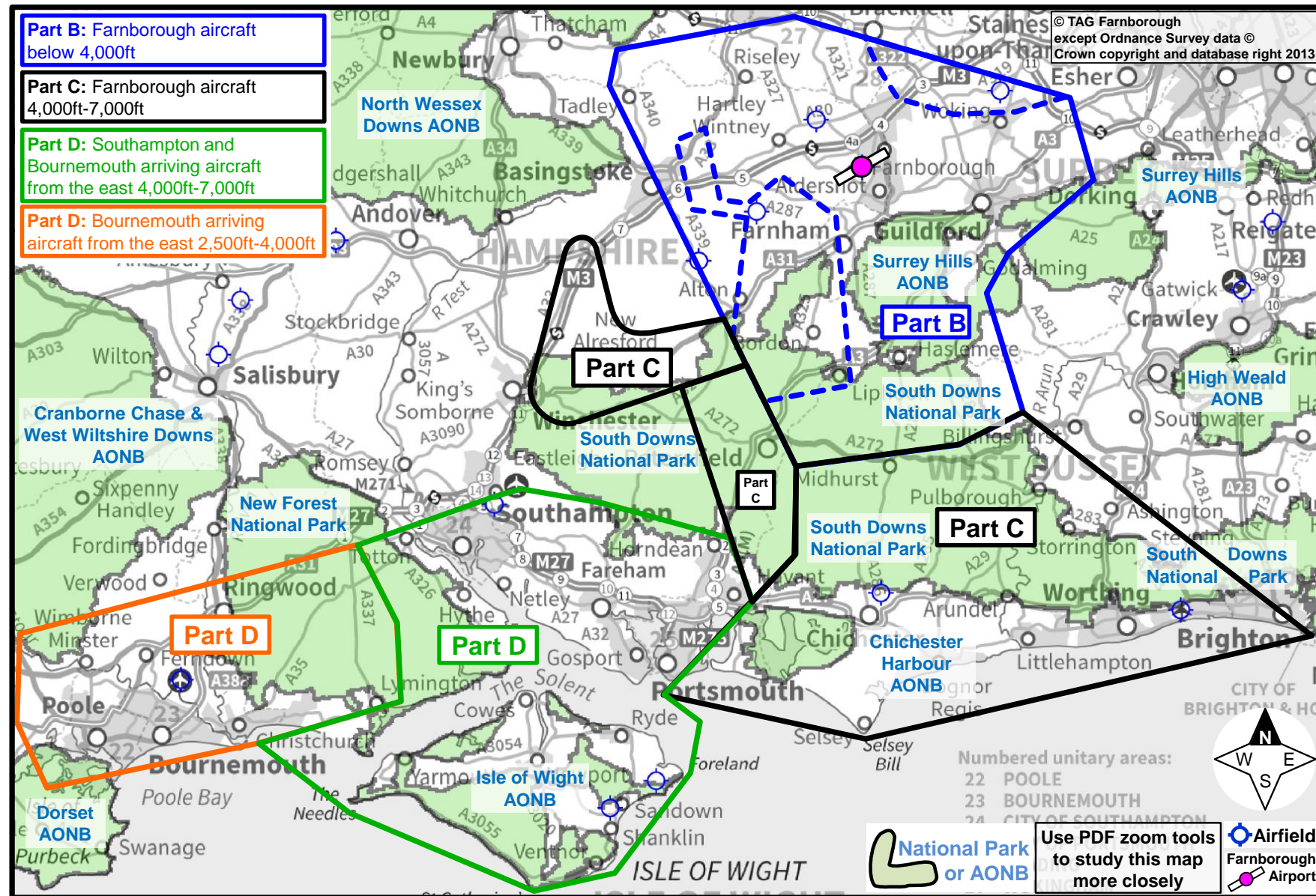


Figure A2: Consultation areas overview (National Parks and AONBs highlighted)

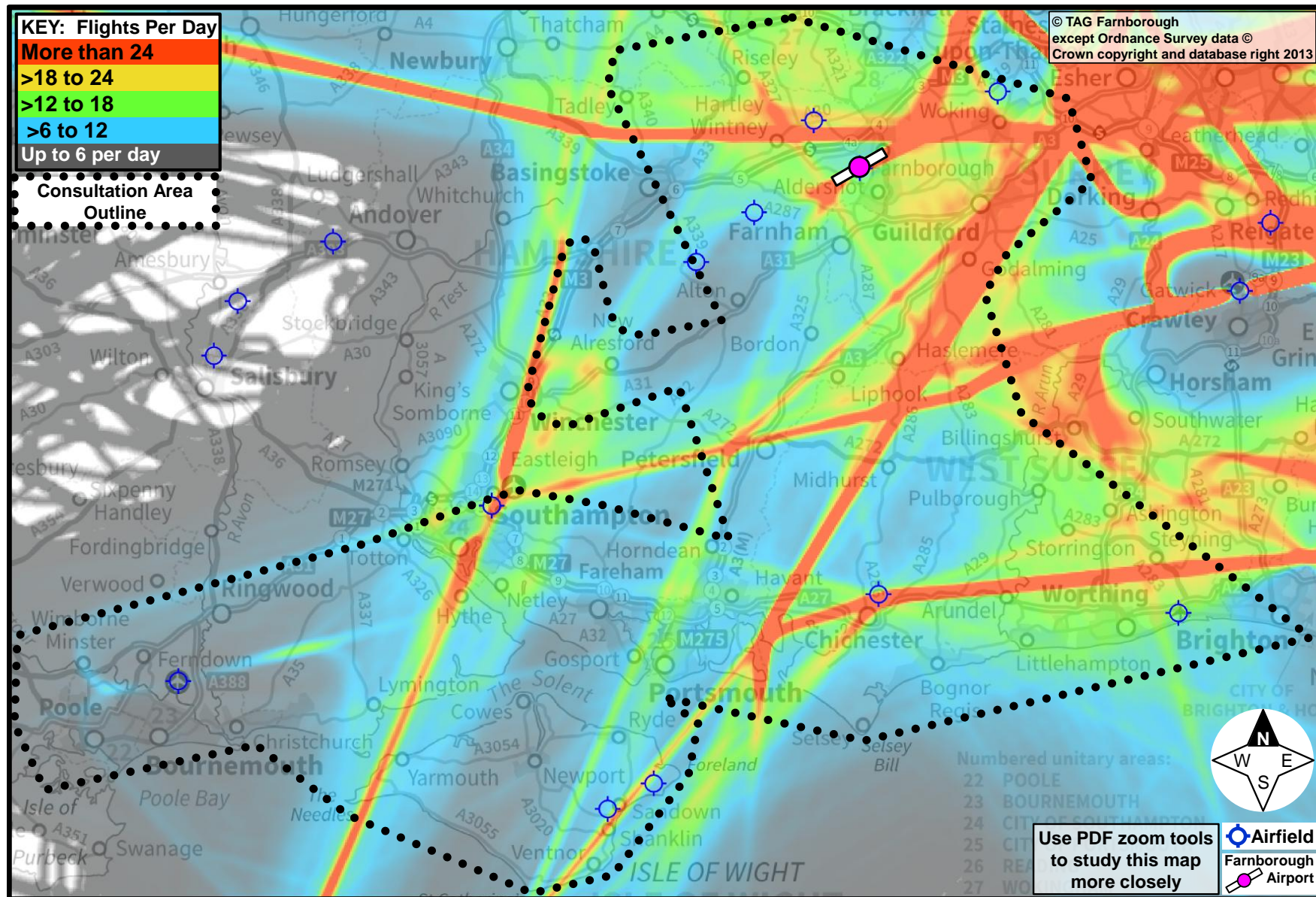


Figure A3: All commercial air traffic to/from all airports (up to 20,000ft)

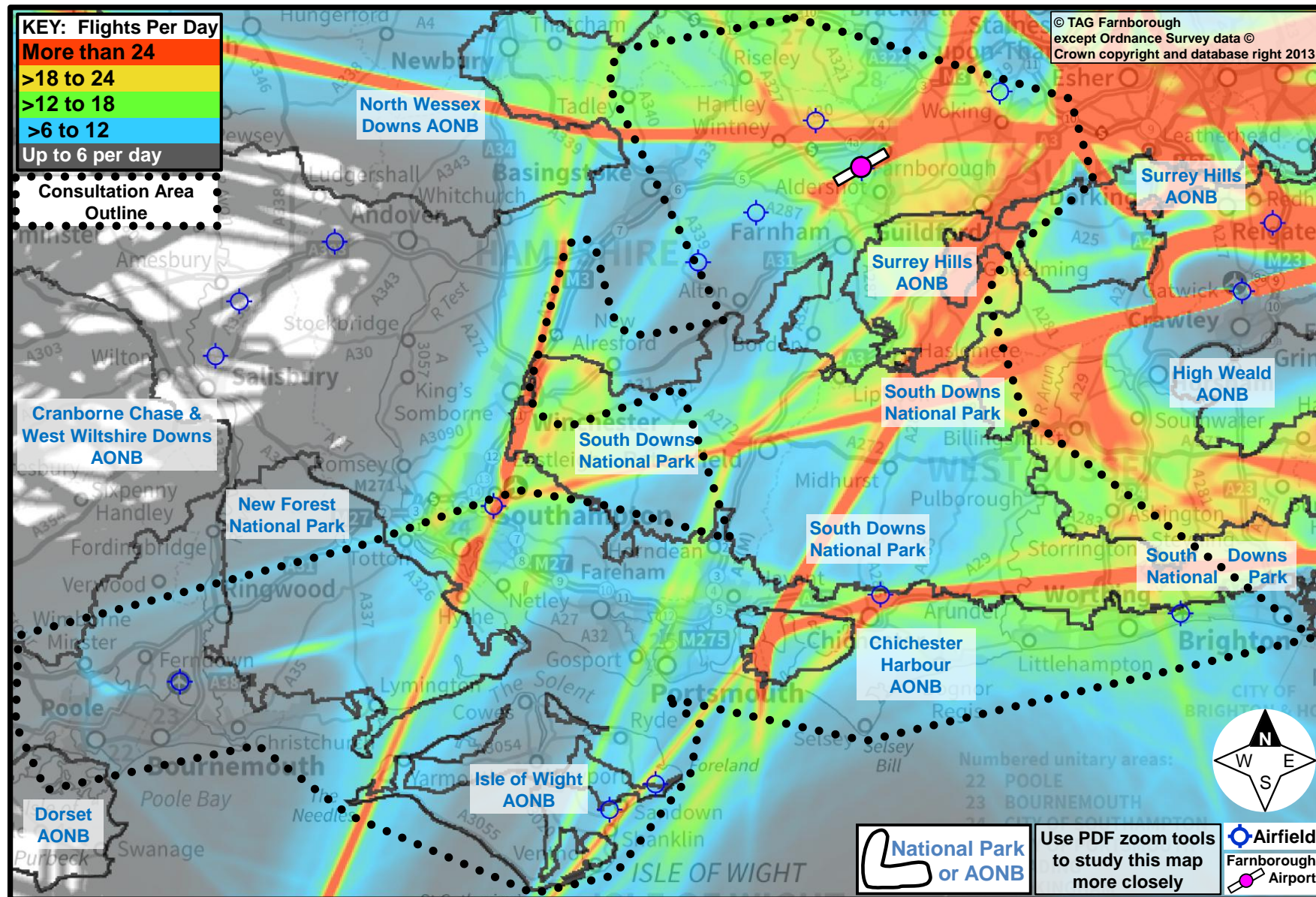


Figure A4: All commercial air traffic to/from all airports (up to 20,000ft), National Parks and AONBs highlighted

Other airspace consultations

- 1.18. NATS En-Route and London Gatwick Airport are jointly proposing route and airspace changes – their consultation ends before this one launches. Some of their consultation areas overlap with ours. We are working with NATS En-Route and Gatwick to ensure that our designs complement one another, but it should be noted that their proposals (and consultations) are independent from ours.
- 1.19. Likewise, Southampton Airport consulted on a minor change to their final approach path for some of their arrivals from the south – that consultation also ended before this one launches. There is no connection between Southampton’s final approach consultation and ours, they are entirely independent.
- 1.20. Search the internet for ‘London Airspace Consultation’ or ‘Southampton Airport Consultation’ for more information on these proposals.
- 1.21. Stakeholders may have already responded to these other consultations, and are also welcome to respond to ours.

2. Structure of the consultation documents

- 2.1. This consultation document is structured in five parts plus appendices as follows:
- Part A – Introduction and overview (this part)
 - Part B – Changes affecting air traffic below 4,000ft in the vicinity of Farnborough
 - Part C – Changes affecting air traffic between 4,000-7,000ft further away from Farnborough
 - Part D – Changes affecting arriving air traffic from the east, between 2,500-7,000ft, in the vicinity of Southampton and Bournemouth
 - Part E – Technical information for aviation stakeholders
 - Appendices A, B and C.
- 2.2. This is Part A. In this part, we provide:
- A general overview of airspace development
 - An overview of the consultation areas and the consultation document so that you can identify which parts may be of interest to you
 - Context for the consultation
 - How to respond to the consultation; and
 - What happens next.
- 2.3. After these sections, we have included more detailed background on the following:
- An overview of how Air Traffic Control (ATC) at Farnborough operates
 - An aviation-specialist introduction to the proposal
 - A description of the overall environmental effects the proposed changes might have; and
 - The airspace design options that were considered.

3. Context for the consultation

- 3.1. This consultation will detail the proposal to establish airspace structures to protect formal departure and arrival routes by using 'RNAV' navigation standards. RNAV is the most common high-accuracy navigation standard for which there is procedure design guidance.
- 3.2. This section describes the strategy and legislation driving the proposed changes, the legal framework that determines how changes should be made, and how these relate to potential benefits and effects.

Modernising UK Airspace

- 3.3. Achieving efficiency means, among other things, taking advantage of the latest technology. To ensure that aviation across the UK does this, the CAA has been working with the aviation industry to develop the Future Airspace Strategy (FAS⁵), a blueprint for modernising the UK's airspace.
- 3.4. The UK's airspace infrastructure is currently predicated on 'conventional' navigation, using radio beacons sited at various locations around the UK, broadcasting radio waves that aircraft systems interpret and navigate via. This system has been in place for many decades and does not exploit the modern navigational capabilities with which most commercial aircraft are already equipped (e.g. satellite technology). It is less precise, and therefore relatively inefficient, both operationally and environmentally.
- 3.5. Modernisation of the airspace system is essential for the UK and continental Europe to remain competitive in the global market. Processes are underway at a European level to make modernisation a legal requirement for the UK and other European states by 2020. Ignoring modernisation is therefore not an option.
- 3.6. Modernisation will also enable UK aviation to reap the benefits of the latest technologies such as Performance Based Navigation (PBN)⁶. A route system using PBN standards allows more flexible positioning of routes and enables aircraft to fly them more accurately. This helps improve operational performance in terms of safety and capacity, and also offers environmental benefits.
- 3.7. Environmental benefits from PBN come from increased flexibility of route design; noise can be better managed by positioning some routes away from population centres or other sensitive areas, whilst also enabling us to seek an optimal design in terms of route efficiency to minimise fuel used and CO₂ emissions. Modernising the system can also help improve resilience by minimising the impact of unpredictable events such as bad weather.
- 3.8. FAS, and the upcoming European legislation, means that change to a PBN airspace environment is inevitable and outside the scope of this consultation. Our focus is on how best to apply this upcoming change, given that we have been granted planning permission for more aircraft movements.

⁵ The CAA explains the background to FAS here: www.caa.co.uk/default.aspx?catid=2408

⁶ PBN is a generic term for modern air navigation standards. See Part E for technical information.

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- 3.9. The recommendations made by the Airports Commission (chaired by Sir Howard Davies) are likely to eventually require more changes to the airspace system. The breadth of the required airspace changes will be entirely dependent on whatever option is ultimately chosen by the Government. Any such changes would be the subject of their own (separate) process and consultation at a later date.
 - 3.10. In the longer term, we may consider minor technical refinements to the departure and arrival routes, using a navigation standard called RNP1, that could improve flight management efficiency even more than this proposal. Guidance for the design of RNP1-standard procedures is not yet fully developed within the UK, but it has potential to be even more accurate than RNAV, and would almost certainly narrow the track keeping accuracy of RNAV routes even further.
 - 3.11. This could mean small changes to the tracks flown (compared to the ones proposed here and ultimately implemented, if approved). If these future RNP1 refinements do require significant changes to the proposed RNAV tracks, we would hold an additional consultation with those potentially affected.
 - 3.12. The CAA will provide guidance to us on what a 'significant change' would be, if we decide to proceed with RNP1 or any other system in the future.
 - 3.13. We undertake to maintain our engagement with both our local Farnborough Airport Consultative Committee (FACC) and other relevant National Air Traffic Management Advisory Committee (NATMAC) members regarding this.

Legal framework

- 3.14. The CAA regulates all airspace in the UK. Airspace change proposals must be submitted by the change sponsor to the CAA for approval. The CAA is required to consider a framework of legislation, standards and Government guidance. These set out the CAA's obligations, and the factors that it must take into account in assessing the merits of an airspace change proposal.
- 3.15. The CAA's primary obligation is to ensure that air navigation service providers (TAG Farnborough in this case) exercise their air navigation functions so as to maintain a high standard of safety in the provision of air traffic services. This duty, which is imposed on the CAA by the Transport Act 2000, takes priority over all of the CAA's other duties.
- 3.16. The Transport Act also directs the CAA to exercise its air navigation functions to:
 - a. secure the most efficient use of airspace consistent with the safe operation of aircraft and the expeditious flow of air traffic
 - b. satisfy the requirements of all airspace users; and
 - c. take account of Government guidance on environmental objectives⁷.

⁷ See Appendix A for references

- 3.17. In addition to the duties imposed by the Transport Act, the CAA is obliged to take into account the need to reduce, control and mitigate as far as possible the environmental effects of civil aircraft operations, and the need for environmental effects to be considered at the earliest possible stages of planning, designing, and revising airspace procedures and arrangements.
- 3.18. We have sought to reflect these duties and objectives, and the framework as a whole, in our development of this proposal and this consultation. We also take into account Government guidance on environmental objectives. This sets out a number of environmental objectives, in relation to:
- Greenhouse gas emissions and ozone depleting substances
 - Local air pollution
 - Noise (particularly in relation to aircraft below 7,000ft); and
 - Tranquillity.
- 3.19. In our judgement, the way in which these objectives are best balanced is as follows:
- In low altitude airspace (below 4,000ft, discussed in Parts B and D), the environmental priority should be to minimise aviation noise impact, and the number of people on the ground significantly affected by it, whilst imposing the fewest possible restrictions to GA
 - In intermediate airspace (from 4,000ft to 7,000ft, discussed in Parts C and D), the focus should continue to be minimising the impact of aviation noise on densely populated areas, but this should be balanced with the need for a predictable, efficient flow of air traffic that minimises CO2 emissions as far as practicable
 - Where practicable, and without a significant detrimental effect on efficient aircraft operations or noise impact on populated areas, flight-paths below 7,000ft should, where possible, be avoided over Areas of Outstanding Natural Beauty (AONBs) and National Parks; and
 - Where route options are similar below 4,000ft in terms of their effect on densely populated areas, the value of maintaining legacy arrangements should be taken into consideration.
- 3.20. Airspace change sponsors must also take into account the guidance published by the CAA entitled 'CAP725 CAA Guidance on the Application of the Airspace Change Process'⁸. This guidance states that the environmental impact of an airspace change must be considered from the outset, which we have done and continue to do.
- 3.21. In considering the design of airspace we take account of the environmental effects in the current system, and the effects that we would expect to occur after implementation, should this proposal be approved and implemented.

⁸ See Appendix A for references

- 3.22. These are represented in the consultation material respectively by:
- Density plots, showing the location of current air traffic; and
 - Diagrams and maps showing where routes are planned to be positioned.
- 3.23. We have considered these effects for populated areas and AONBs/National Parks and will consider areas that are highlighted to us through the consultation process. We seek to mitigate the local environmental impact on these areas as best we can within the local airspace and operational constraints, referring to the legal framework set out above.

4. Consultation overview

- 4.1. The objective of this consultation is to enable us to collect as much information as possible about what all the stakeholders want from the airspace.
- 4.2. To that end this consultation document explains how aircraft currently use the airspace, and what effects the proposed changes are likely to have. We also explain the constraints within which we must work.
- 4.3. The views we seek include those from:
 - Farnborough airport users that fly through the airspace
 - Southampton and Bournemouth airport users that fly through the airspace
 - Representatives of people living under all these flight-paths, for example where the new flight-paths might reduce over-flight, and where they might increase over-flight
 - Environmental or special interest groups; and
 - GA and recreational flyers such as private pilots, gliders and balloonists.
- 4.4. This consultation is, however, open to all and we would welcome views from anyone who has an interest, whether an individual or representing a group or organisation.

Consultation on local impacts

- 4.5. Understanding stakeholder requirements is key to striking a balance of benefits and impacts; locally relevant information is therefore the main focus of this consultation.
- 4.6. In Parts B, C and D of this consultation document we provide maps of the areas and corridors within which the routes are planned to be positioned, and explain the reasons why they are there, including any unavoidable constraints.
- 4.7. We provide information on the scale of potential impacts, particularly noise, if a route was positioned overhead.
- 4.8. This will describe:
 - The potential number (and the likeliest types) of aircraft that would use the proposed route
 - The lowest altitude they would most likely be
 - A measurement of how loud aircraft types at that altitude typically sound, which is known as 'Lmax'.
- 4.9. We also include information about everyday sounds that are broadly equivalent in perceived volume, so you can understand the potential impact.

- 4.10. This information will allow you to identify the differences between what happens today and what is likely to result from this proposal, and whether you consider the change in impact to be significant to you.
- 4.11. In Parts B, C and D of this consultation document we ask you questions about how you think the proposed changes might affect your interests - these may be positive, negative, or not make much difference to you. We would like to hear about all of them, even if you think it will not affect you.

Consultation on impacts to the aviation community

- 4.12. Details of the potential benefits and impacts on different aviation user groups are presented in Part E, including explanations of the constraints and balances we have to make between conflicting priorities and requirements. The aviation users range from airlines through to private light aircraft pilots, glider pilots, parachutists, paragliders, balloonists and anyone flying in the vicinity of Farnborough, Southampton and Bournemouth airports.
- 4.13. We ask questions about the potential benefits and impacts on the aviation community. This will allow us to gain an understanding of their requirements.
- 4.14. As described later (paragraph 10.22), Farnborough is sacrificing fuel efficiency for some of its flights in order to accommodate GA as far as is practicable, given the constraints within which we must operate. We ask your opinion on this.

Airspace design technicalities

- 4.15. It is not necessary to understand the technicalities of airspace design in order to respond to this consultation. Parts B, C and D have been designed to provide non-technical (as far as possible) information to describe the effect our proposal would have on flight-paths, and what that might mean for where you live or work, or how you fly your aircraft. However, for those interested in the technical details behind this proposal we provide additional detail in Sections 8 to 10 of this introduction and in Part E.

Consultation questions

- 4.16. The questions we ask in this consultation fall into four general categories:
- **Justification:** In each part of the consultation document, we describe the routes we are seeking to implement and the likely benefits and impacts. We ask you to consider our objectives and respond accordingly, given the system-wide impacts and benefits we expect them to generate if implemented.
 - **Balance:** The detailed design process involves balancing benefits and impacts against one another. In many cases, the optimal solution for one benefit/impact means a suboptimal solution for another type (an example is discussed later, where we consider the increased fuel consumption and CO2

impact of longer routes that avoid populated areas and dense GA areas). We ask you to consider our objectives and respond accordingly, having regard for the principles for balancing benefits and impacts.

- **Identifying specific local requirements:** Your local knowledge is valuable and we ask you to feed back details of any location that requires special consideration in the ongoing design process, and the reasons why we should consider it special.
- **Aviation technical:** Changes to airspace inevitably change the way pilots fly their aircraft. We ask the aviation industry in general, and those with an interest in the technical aspects of airspace design, to consider the proposal in relation to their requirements and answer the questions in Part E.

4.17. Questions are highlighted in a box like this, throughout the consultation material, and are also provided in the website response form.

Example Question A1 (this is what the questions look like in these documents)

We recap part of the text, and ask you to consider what you have just read.

We ask you a question that lets us understand your point of view on the subject.

Most questions involve us making a statement, and asking you to declare how strongly you agree/support or disagree/oppose it.

When we ask about specific places affected, and we ask you to tell us about it in a particular way so we can understand where it is, what type of place it is, and what the change in impact to that place would be if the proposal was implemented.

In all cases, you are welcome to add a supporting statement if you wish.

Part A contains no questions.

What are we *not* consulting on?

- 4.18. The scope of this consultation is limited to acquiring feedback about the possible impact on stakeholders due to the proposed introduction of routes and associated CAS for TAG Farnborough Airport.
- 4.19. This includes the consequential effects on some Southampton and Bournemouth arrivals using a route from the east.
- 4.20. We are *not* seeking feedback on:
- The planning decision to allow up to 50,000 movements at Farnborough;
 - Government and/or CAA policy, and their guidance on aviation matters including FAS and PBN - we must follow their policy and guidance;
 - The Airports Commission (chaired by Sir Howard Davies); or
 - Other subjects that fall outside the scope described above.
- 4.21. There are, therefore, no questions on issues that are outside the scope of this particular consultation. The receipt of all responses will be logged, but

those responses concerning issues outside the scope of this consultation will not be acted upon.

Who are we consulting?

- 4.22. This consultation is open to any group, organisation or individual that considers themselves to be a stakeholder, including the general public.
- 4.23. Appendix C lists the groups and organisations that have already been notified of this consultation. These groups have been directed to the consultation website for further information and the opportunity to respond. This list is not exhaustive - we know there will be many other interested organisations or individuals that wish to respond.
- 4.24. If you think you or your organisation may be affected by this proposal, we will be pleased to receive your responses to the questions we ask. We have publicised the availability of the consultation document via our website:
- www.Consultation.TAGFarnboroughAirport.com**
- and via other media.
- 4.25. Representative groups are invited to publicise this web link on their own websites.

5. Responding to the consultation

- 5.1. We regret we cannot enter into correspondence with individual respondents on issues relating to this consultation. We have taken great care to provide all the information we believe is required to help you answer the questions presented in this consultation material. Where we consider that additional information may be useful, whether it is raised in a response from a stakeholder or comes to our attention through other channels, we will add it to the Frequently Asked Questions (FAQs) section of the consultation website, so that the information is available to everyone.

The online response form

- 5.2. Please respond using the online response form which can be found at:
www.Consultation.TAGFarnboroughAirport.com
- 5.3. This consultation launches 09:00 Monday 3rd February, and closes 23:00 Friday 2nd May 2014. This is just under thirteen weeks.
- 5.4. You are encouraged to use the postcode search facility provided on the website to help you identify the relevant part(s) of the material, and to consider those parts that meet your interests.
- 5.5. We welcome those responses that study the proposal as a whole, but we understand that not all parts of the proposal will interest all stakeholders. Please remember that we are interested in your response **even** if you do not think it will affect you - that fact itself is useful to us.

Postal (paper) responses

- 5.6. The online response form is the quickest, most secure and easiest method of responding. However, we understand that not everyone is able to use this method. If you prefer, you may respond by post to the address below:

Farnborough Airspace Consultation Responses

PO Box 584

Hounslow

TW3 9QP

Please be aware that we cannot guarantee that responses submitted directly or indirectly by **any other** means of delivery will be accounted for in the consultation exercise.

Regarding postal (paper) responses:

- 5.7. Please seek to answer the questions we ask in this consultation document.

- 5.8. We are unable to acknowledge receipt of postal responses (even if you enclose a pre-addressed envelope) – if delivery confirmation is required we recommend that you use a recorded delivery service so that you can be sure your response has reached us.
- 5.9. Provide a clear indication of your area of interest to ensure we categorise it correctly. If you have a particular local interest you could provide the postcode of that area (if different from your home or business address), or you could refer to the part of the consultation document where it is discussed (Parts B, C, D or E). Alternatively your interest may be best described as a subject or theme, such as 'global climate change effects' or 'noise' or 'light aviation'. You are welcome to identify a range of interests.
- 5.10. Similarly, if your feedback relates to a specific question we have asked, you should tell us which question you're answering. Questions in the consultation material are individually numbered and highlighted in a box like this.
- 5.11. Failure to clearly match your comment to a question we ask (or to a specific area of interest, subject or theme) could mean that your response is not associated with your intended issue - this may reduce its effectiveness.
- 5.12. Please ensure you allow adequate time when you post your response. Postal responses received after the consultation closes will be logged and stored, but not analysed. We cannot be held responsible for postal responses that arrive late, whatever the reason.
- 5.13. All feedback is welcomed and will be treated equitably regardless of origin or delivery medium - however, please do answer the questions asked, because that will be the most effective way of responding.

What happens to my response, and my personal information?

- 5.14. In order to provide a meaningful response, we need to know your name, home address or business address, and for online responses we need the email address to which the automatic copy of your response should be sent.
- 5.15. All the feedback from the consultation will be made available to the CAA as part of our airspace change proposal. This will allow them to assess independently whether we have drawn appropriate conclusions in the development of the proposed design.
- 5.16. Responses will be treated with due care and sensitivity by us, by the consultation specialists we employ, and by the CAA.
- 5.17. If you do not wish your personal details (e.g. name/full address) to be forwarded to the CAA, our online response form has an 'anonymous' check box.
- 5.18. This will not make your response anonymous to us, rather it tells us that we need to make your response appear anonymous to the CAA before we forward it to them. Instead, your postcode and unique ID reference number will be sent to the CAA, who will not have the decoding list.

- 5.19. If you send a paper response, please make it clear right at the beginning whether you wish us to make your submission anonymous before we pass it to the CAA.
- 5.20. Apart from the CAA, we undertake not to disclose personal data to any other party without prior permission. We, the consultation specialists we employ, and the CAA are all bound by the Data Protection Act.

6. Compliance with the consultation process

- 6.1. The legal framework for this consultation is detailed from paragraph 3.14.
- 6.2. Comments regarding the Airspace Charter (CAP724, see Appendix A) and our compliance with the consultation process as set out in the CAA's guidelines for airspace change (CAP725, see Appendix A) should be directed to the CAA at:

Airspace Business Coordinator - Airspace, ATM and Aerodromes

Re: Farnborough Airspace Consultation

Safety and Airspace Regulation Group

CAA House

45-59 Kingsway

London WC2B 6TE

E-mail: airspace.policy@caa.co.uk

- 6.3. These contact details **must not** be used for your response to this consultation. If you do so, your views may not be counted, or they may be significantly delayed.

7. Next steps

Feedback analysis

- 7.1. We will take your relevant feedback and analyse it, balancing safety, operational requirements and constraints, benefits/disbenefits and competing feedback from other respondents. We will take into account guidance from the Government and the CAA.

The feedback report

- 7.2. A summary of the issues raised in the consultation, including any revisions to the proposal based on the analysis, will be provided in a feedback report to be published on our website, probably between four and eight weeks after the end of the consultation.
- 7.3. The website will be updated to inform everyone about the expected publication date of this report.
- 7.4. The report will also provide further details of next steps in the airspace change process. This will most likely involve the preparation and submission of an Airspace Change Proposal (ACP) to the CAA, which is a technical document.

Planned implementation date

- 7.5. Subject to many factors including the results of this consultation, we currently plan to implement the airspace change in the first quarter of 2015. In this consultation we have provided forecast air traffic data for 2015 and 2019.

The following sections contain more detailed background information about air traffic control, runways, aviation overview, the rationale behind our proposal, environmental impacts and other design options.

8. Overview of Air Traffic Control (ATC) at Farnborough

The remainder of this introductory Part of the consultation document aims to provide background information on the proposal. It is not necessary for stakeholders who have only an interest in the local impacts of the proposal to read these following sections; if your interest is only in local impacts, you should use the maps in Figures A1 and A2 to identify which of the Parts B, C and/or D are of interest and go directly to those parts. However, if you wish to gain an understanding of the background, rationale and objectives behind our proposal you should continue reading this and the subsequent sections of this part of the consultation document.

We have aimed to provide explanations that can be understood by those without a technical aviation background, and as such we describe aviation terms as they are introduced. However, it should be noted that whilst we have endeavoured to simplify this as much as possible, air traffic control and aviation in general is a technical subject area.

If you have an interest in the aviation background you may wish to skip to paragraph 9.1 below, which briefly introduces the proposal from a pilot/ATC point of view. A full aviation technical discussion of the proposal can be found in Part E.

What is 'airspace'?

- 8.1. Airspace is everywhere above us; however for air traffic purposes it is split into different types and classifications that dictate who can fly in it, and the role of ATC in that classification. The main types are 'controlled airspace' where ATC is responsible for directing **all** aircraft and 'uncontrolled' airspace where they are not. Only aircraft that have submitted a plan to fly, or who have had a request for entry accepted by ATC, may fly within controlled airspace – this means it is primarily used by aircraft that fly passengers and goods. Uncontrolled airspace is open to all flyers, including the passenger/goods flights but also GA; the microlights, balloonists and recreational flyers who don't have to communicate with ATC. ATC still provides a service to aircraft in this airspace, but because they are not controlling **all** the aircraft it is generically referred to as 'uncontrolled'.
- 8.2. Controlled airspace is generically referred to as 'CAS' and is further split into classifications (A to E) which dictate the kind of ATC service provided within – these are described later in paragraph 8.11. Uncontrolled airspace is also referred to as Class G airspace when using this classification scheme.
- 8.3. Farnborough currently lies outside CAS, within airspace categorised as Class G (uncontrolled) airspace.

- 8.4. An Aerodrome Traffic Zone (ATZ) is a circle⁹ established around the airport with a radius of 2.5 nautical miles¹⁰ (nm) from the Aerodrome Reference Point (ARP, defined as the centre of the runway). The ATZ extends from the surface to 2,000ft above the runway, which itself is 238ft above mean sea level, making the altitude of the top of our ATZ 2,238ft. Our ATZ extends to approximately 2nm along the final arrival and departure paths and is the **only** airspace within which **all** aircraft are required to make their presence known to ATC at Farnborough, and must comply with ATC instructions. Between 2,239ft and 3,499ft directly above us, any aircraft may fly anytime without speaking to any ATS provider. Figure A5 on Page A27 illustrates Farnborough and Blackbushe ATZs. Most airports in the vicinity, shown by the blue circles with crosshairs, have a circular ATZ like this (including Heathrow, Gatwick and others with or without existing CAS).
- 8.5. From an altitude of 3,500ft upwards, Farnborough is overlaid with CAS classified as Class A (see paragraph 8.11). This area is known as the London Terminal Manoeuvring Area (LTMA). The LTMA is under the control of NATS En-Route at London Terminal Control (LTC), Swanwick, Hampshire, and has been established and developed over many years to serve the high-density air traffic operations routing to and from all the major London airports.
- 8.6. Changes to CAS proposed around Farnborough airport are illustrated in Figure A5 overleaf and are briefly described below, for an audience without a specific aviation technical background. Existing unchanged CAS is not shown in this map.
- 8.7. Aviation specialists may wish to skip to paragraph 9.1 onwards, from Page A33, where there is also an extract from a UK CAS VFR chart.
- 8.8. The consultation areas shown previously in Figure A1 are generally much wider than the CAS changes shown overleaf in Figure A5. This is because the effect of the proposed routes and CAS near an airport can cause changes to aircraft flight-paths much further away.
- 8.9. Regarding the volumes of CAS shown in Figure A5 overleaf:
- Shaded orange area from ground level, known as a 'Control Zone' (CTR)
 - Orange outlined areas start above the ground, ending below 4,000ft - these are 'Control Areas' (referred to as CTAs)
 - Blue dashed outlined area indicates part of Gatwick's CTA we are considering *removing* from current use, subject to ongoing negotiations (this is most relevant to stakeholders with an aviation technical interest)
 - Black outlined areas start above 4,000ft and link the airport with the main route system 7,000ft and above (also CTAs)

⁹ Because Blackbushe Airport is close by, and has its own ATZ, these ATZs are separated using the M3 motorway as the boundary. Blackbushe has a slightly smaller ATZ (2nm radius) because its runway is shorter.

¹⁰ Aviation measures distances in nautical miles. One nautical mile (nm) is 1,852 metres. One 'road' mile (statute mile) is 1,609 metres, making a nautical mile about 15% longer than a road mile.

- e. Pink outlined areas are proposed changes to 'airways'. These are routes in the sky, and these ones converge towards southwest London. Changes here would affect aircraft 7,000ft and higher in the en-route phase of flight, but would also enable flight-path changes in lower volumes of airspace such as Southampton and Bournemouth arrivals (see Part D).

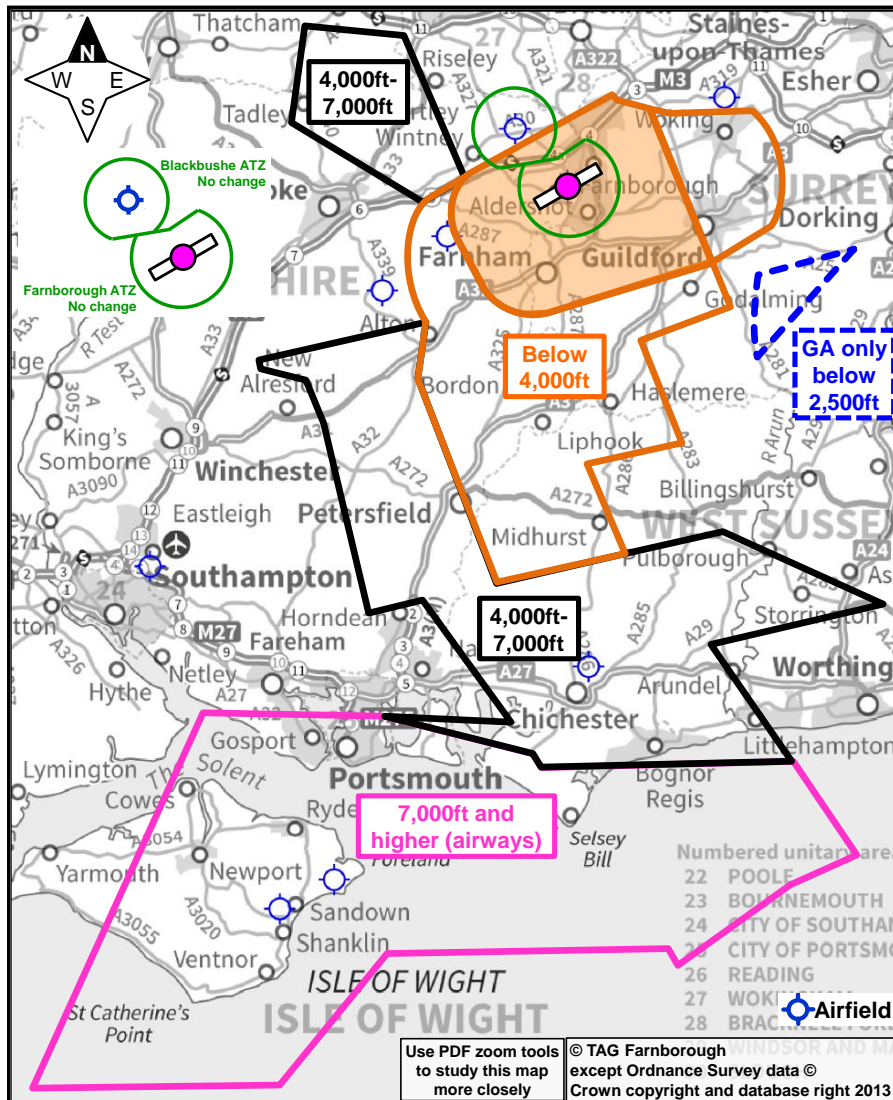


Figure A5: Proposed changes to these volumes of CAS

- 8.10. Everywhere in Figure A5 is covered in airspace, air routes, or some other sort of airspace structure. Only the **changing** volumes are shown here.
- 8.11. Airspace is defined in accordance with an internationally agreed set of categories, by the International Civil Aviation Organization (ICAO, part of the United Nations family of organizations). The most restrictive, Class A airspace, is generally used where protecting commercial traffic at higher altitudes is most important. There are specific pilot qualification and aircraft equipment requirements for operating in Class A, and all aircraft are under ATC control. Most airways are Class A, as is most of the London TMA.

- 8.12. The least restrictive classification, Class G, is uncontrolled airspace. Anyone may fly there, in any type of aircraft, at any time, without speaking to any air traffic organisation, by following the most basic of rules.
- 8.13. Class G is the default classification for UK airspace, unless a higher class is needed for a specific reason such as to protect an airport or air route. The establishment of CAS would mean changes to the Class G environment used by GA.
- 8.14. The most commonly used CAS classifications in the UK are Classes A and D, with some Class C.
- 8.15. Most UK airports that have associated CAS use a control zone (CTR) and CTAs of Class D airspace around the airport, because these provide protection for the operations of the airport, yet still allow access to GA traffic (with ATC permission). This is what we are applying for, and is the reason for this consultation.

ATC in the vicinity of Farnborough

- 8.16. Currently Farnborough Airport does not have dedicated permanent¹¹ CAS, and there are currently no formal routes directly linking the runways with the air route network. All airport traffic is directed manually by air traffic controllers in this outside-CAS environment.
- 8.17. Most busy airports benefit from the protection for air traffic provided by CAS. Heathrow, Gatwick, Southampton, Bournemouth and London City are the five nearest airports to Farnborough with CAS.
- 8.18. In addition to controlling aircraft departing from and arriving at TAG Farnborough Airport, the responsibilities of ATC at the airport include the Lower Airspace Radar Service (LARS). This is for participating General Aviation (GA¹²) in a very wide area surrounding London (extending from Didcot to Letchworth to Braintree and Maidstone, to Eastbourne and along the south coast to Portsmouth round to Andover). LARS gives participating aircraft flight information on request, such as weather or the proximity of other air traffic known to ATC.
- 8.19. There is **no** requirement for GA aircraft to communicate with any ATS agency provided they remain outside CAS, either horizontally or vertically - indeed, that freedom is part of the appeal for many GA pilots. Whilst the airspace surrounding London is amongst the busiest and most complex in the world, the uncontrolled classification of the airspace surrounding Farnborough means that currently the airspace is used by a wide variety of aircraft ranging from gliders and microlights to large jet aircraft (e.g. Boeings and Airbuses).
- 8.20. There is **no** requirement for GA aircraft to cooperate with ATC if they are operating outside CAS, even though they may be participating in an ATS. They may be unable to comply for reasons such as weather issues, incompatibility with the task they are performing, pilot qualification, aircraft equipment and others.

¹¹ Special (but temporary) airspace is established for the biennial Farnborough International Air Show and for other reasons if required.

¹² See Footnote 3 on Page A4 for more information about GA.

- 8.21. GA aircraft, whether participating in LARS or not, mix with arriving and departing Farnborough air traffic in this outside-CAS environment. Farnborough ATC manages this to the highest safety standards, even though some of the GA traffic may not be speaking with them and may therefore only be seen as a radar target (often known as a 'blip') with unknown intentions (these are referred to as 'unknown traffic', as opposed to 'known traffic' which are flights that have made contact with ATC).
- 8.22. Avoiding these non-participating radar blips (or those unable to cooperate) is routine, and the ATC team does this daily. Whilst working around them is safe, it compromises the efficiency and predictability of Farnborough aircraft, other aircraft receiving an air traffic service from LARS, and neighbouring airports.
- 8.23. The effect of this is that some arrivals to Farnborough are instructed to fly longer distances at inefficient altitudes to avoid unknown aircraft, and some departures can be held on the ground until the unknown aircraft moves away or an alternate route can be offered by the radar controller (or if already airborne, the departure might need to be detoured). This causes delay and more fuel is burnt than planned (increasing CO₂ emissions¹³ unnecessarily). Also, aircraft that are forced to stay at low altitudes on these extended routes or detours (whether departing or arriving) produce more noticeable noise.
- 8.24. It is not just Farnborough aircraft that are displaced due to the complexity of the local airspace and non-participating aircraft. It also means that, for example, small slow GA aircraft might suddenly encounter a much larger faster aircraft than they would normally expect to see. A gliding competition could be disrupted by RAF helicopters having to move to new areas. Pleasure flights could need to route elsewhere due to intense microlight activity.
- 8.25. These 'knock-on' consequences are ***almost always invisible*** to the unknown/non-participating aircraft.
- 8.26. This is not the most efficient way of managing the wider air traffic situation in the vicinity of Farnborough, because the airspace environment is not predictable, so it cannot be automated or systemised¹⁴.
- 8.27. In February 2011, the Government granted TAG planning permission to increase the maximum annual number of aircraft movements¹⁵ to 50,000 to the year 2019.
- 8.28. Now that Farnborough has planning permission for more movements, it is important for all users that the airspace becomes more efficient and predictable whilst maintaining as much freedom for GA as possible, and retaining or enhancing the highest safety standards.

13 Burning fossil fuel means that CO₂ is produced. For aviation fuel, 1kg of fuel burnt typically means 3.18kg of CO₂ is emitted.

14 Systemisation of the airspace environment means that aircraft operators can plan and predict their take-off and landing times, and their fuel calculations, much more accurately. It also reduces workload for the pilot and the controller.

15 One aircraft 'movement' is either a landing or a take-off. An aircraft landing, dropping off or collecting passengers, then taking off again counts as two movements.

- 8.29. It is also crucial that any changes we propose 'fit' with the main air route network and neighbouring airports. Changes in one area can affect flight-paths elsewhere, sometimes a long way away. We can take the opportunity to help make the wider airspace management more efficient for others as well as just for ourselves.
- 8.30. We propose that the introduction of CAS and routes, as detailed in this consultation, would fulfil this need for predictability and efficiency of airspace management. The planning permission's allowance for an increase in aircraft movements could not be accommodated in the current airspace system without imposing additional delays.

What is a 'runway'? How are they used now, and in the future?

- 8.31. Farnborough has one long stretch of concrete and asphalt which aircraft use to take off and land. However, because it can be used in either direction, this length of concrete is officially classed as being **two** runways (Runway 24 and Runway 06)¹⁶.
- 8.32. Airspace near the airport is used by departing aircraft as they climb after takeoff, and by arriving aircraft as they descend to land. The wind direction on any given day (or hour) dictates which direction the runway is used for take-off and landing. This in turn influences the traffic patterns seen in the surrounding airspace.
- 8.33. If the wind is from the west or calm, aircraft take off and land using the westerly facing runway (Runway 24) and if the wind is from the east they take off and land using the easterly facing runway (Runway 06). Due to local airspace restrictions and prevailing wind conditions, Runway 24 is used approximately 80% of the time and Runway 06 used 20% of the time.

What proportions of Farnborough flights currently depart to, and arrive from, each direction? Would this change under the proposal?

- 8.34. See Figure A6 below for an illustration of how Farnborough's flights are proportioned. The text following this illustration gives more detail on the changes.
- 8.35. Note that Farnborough aircraft cannot fly directly to (or from) the east or west. They instead fly north or south to join one of the air route networks, or they arrive from one of the air route networks and fly towards Farnborough from the north or south. This is a constraint imposed by the route networks themselves and surrounding airports.

¹⁶ The runway numbers '24' and '06' refer to the magnetic heading an aircraft would display on its compass, if it was aligned with the runway centreline. Farnborough's runways are aligned 064° and 244°, abbreviated to 06 and 24. If possible, runways are usually aligned with the most common prevailing wind direction, in the south of England this is usually from the west.

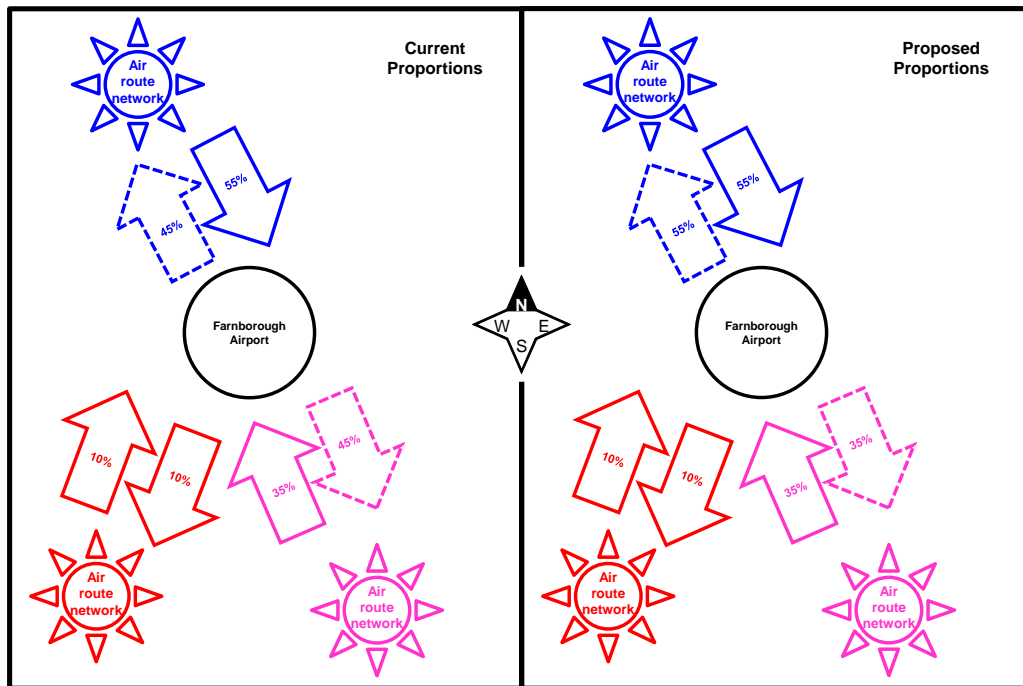


Figure A6: Schematic for the proportions of Farnborough departing and arriving aircraft (current and proposed) - this is an illustration and is not geographically correct. Dashed arrows show the different proportions that would occur due to this proposal.

- 8.36. About 10% of our departures leave the UK to the east, via Dover. Currently, these depart to the south before turning east (part of the pink southbound dashed arrow on the left side of Figure A6).
- 8.37. In the future, at the request of NATS En-Route (the next link in the air traffic control 'chain'), these Dover departures would instead route to join the northern air route network (blue) before turning east. The pink southbound dashed arrow on the right side of Figure A6 has decreased by 10%, and the blue northbound dashed arrow on the right side has increase by 10%.
- 8.38. This means that there would be a change to the proportions of our air traffic that depart to the north and south, but not to any other departure or arrival proportions.
- 8.39. Using this illustration, and the amount of time each runway is used (paragraph 8.33), we calculated the specific numbers of aircraft routing to the north, the south and the southwest, for each runway, for today's traffic and for the proposed traffic. We have provided data tables in Parts B and C so you can understand the number of aircraft flying in those areas today, and the changes under this proposal.
- 8.40. This will help you determine today's impact, and any changes of impact this proposal may have on where you live or work.
- 8.41. Part D is solely about changing one specific arrival route from the east, to Southampton and Bournemouth airports. This is explained fully in Part D.

Normal operations and unusual circumstances

- 8.42. In the vicinity of an airport, controllers instruct the aircraft to fly in swathes of arrivals and departures. These swathes determine the areas most commonly over-flown. These are described in more detail in Parts B and C for Farnborough, and in Part D for one particular arrival route serving Southampton and Bournemouth.
- 8.43. Like all airports, air traffic may be seen anywhere in the vicinity at various altitudes, if there are compelling reasons for the aircraft to be positioned there.
- 8.44. These might include (but are not limited to):
- a. Emergency situations
 - b. Unplanned runway closures
 - c. Avoidance of extreme weather
 - d. Aircraft that are authorised to fly non-standard routes or to operate in locations otherwise rarely over-flown; and
 - e. Other unusual scenarios.
- 8.45. The impacts caused by unusual circumstances would not change due to this proposal. If a situation arises that is unusual, controllers would direct the aircraft to fly anywhere they deem necessary, exactly as they would today.

9. Aviation technical introduction to this proposal

- 9.1. This section is specifically for stakeholders with an aviation background. Figure A7 illustrates the outlines of the proposed CTR and CTAs. See Part E for more details on proposed SIDs and STARs, and for a comprehensive technical description of why each volume is required.
- 9.2. There would be no changes to other CAS boundaries due to this proposal. Existing CAS boundaries on this VFR chart extract have been faded out in order to highlight the proposal.
- 9.3. The black outlined areas are proposed to be Class D. The blue outlined areas are proposed to be Class A (added to the Worthing CTA group) to join up with the London TMA to the east and north, with LTC being the controlling authority. The black dashed outlined area could potentially be released from Class D back to Class G, subject to negotiation with Gatwick Airport.
- 9.4. The majority of the proposed changes involve adding slim volumes of Class D to the underside of Class A CAS to protect our proposed SIDs and STARs.

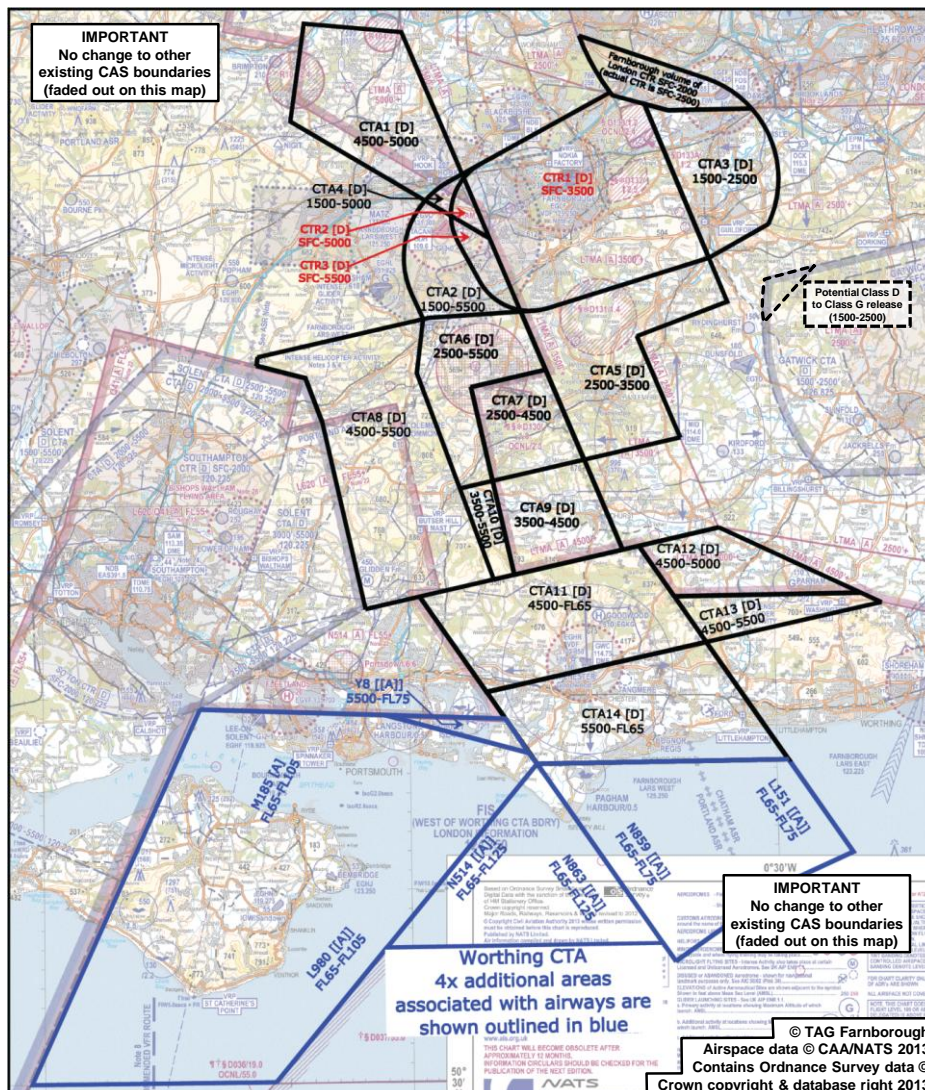


Figure A7: Proposed changes to CAS (Overlaid on an aviation VFR chart)

10. Environmental benefits and impacts of the proposal

- 10.1. It is important to note that attempting to improve the efficiency of the airspace, and enhance safety for all, will inevitably result in changes.
- 10.2. For example, the conversion of a conventional¹⁷ route to a PBN route will, at the very least, mean that aircraft fly more accurately along the centre of a route, giving air traffic control and aircraft operators more predictability in planning and managing operations.
- 10.3. Environmentally, our proposal will narrow the areas where most impact is felt, reducing the population significantly affected, in line with Government guidance. However, it also means that those below the narrower band would be over-flown more often. In some cases, our aircraft would over-fly new locations, in other cases there would be a reduction or removal of aircraft over-flight due to this proposal. In general, if locations get over-flown more often due to this proposal, the aircraft would usually be at a higher altitude. Aircraft that are higher appear smaller and quieter to someone on the ground.
- 10.4. Given that we are seeking changes and that these changes would cause impacts, we want to ensure that the proposal as a whole achieves the most optimal set of outcomes, balancing impact against benefit.
- 10.5. There will always be factors that constrain what we can achieve, for example the proximity of London's airports to one another and the limitations of the flight performance of aircraft (e.g. when climbing or turning).
- 10.6. Understanding stakeholder requirements is key to striking an optimal balance of benefits and impacts; locally relevant information is therefore the main focus of this consultation.

Constraints to flexibility

- 10.7. Farnborough airport is between Heathrow, Gatwick and Southampton airports, with several smaller non-commercial (but very busy) GA airfields close by. RAF Odiham is also very close to Farnborough. The air traffic interactions are a highly complex 3D choreography.
- 10.8. There are limitations as to what can be achieved in terms of route positioning, and balances must be struck between operational and environmental requirements.

¹⁷ In this case, 'conventional route' includes those flight-paths where a controller manually provides navigation instructions to a pilot, by means of radar headings. This is known as 'vectoring'.

Noise management methods below 7,000ft

- 10.9. As discussed in the Legal framework section earlier, the Government provides guidance on environmental objectives. This highlights minimising noise impact and minimising the number of people over-flown below 7,000ft above ground level as being key environmental objectives: The lower the routes in question, the greater the potential for noise impacts.
- 10.10. The Government puts an additional emphasis on noise impacts from flights flying below 4,000ft above ground level.
- 10.11. Above 7,000ft the balance shifts away from noise, towards flight efficiency.
- 10.12. Aircraft noise can be balanced within the operational needs of an airport using four main methods:

Method A: Reduce the overall number of people over-flown at low altitudes

This means longer flight-paths for some Farnborough departures and/or arrivals, and some Southampton and Bournemouth arrivals. This could be over open countryside (which may, however, be valued by some people for its relative tranquillity) or over the sea if possible. Government guidance also says that it is preferable to concentrate flights along a few routes rather than disperse the flights widely. This means that fewer people would have a higher proportion of noise, because there would be fewer flight-paths for the same number of aircraft to follow.

We have used this method in the design process, and will continue to do so.

Method B: Vary the areas over-flown at low altitudes by having more than one route to or from the same runway heading in the same direction. This is sometimes known as a 'respite routes' system

This runs counter to the guidance in Method A, and is only utilised if there are specific noise-sensitive areas that need to be mitigated and there are no other overriding constraints. It results in a greater area being over-flown some of the time, but with predictable periods of respite. Farnborough is very close to Heathrow, RAF Odiham, Blackbushe, Fair Oaks, Lasham and Gatwick, which places overriding constraints on the possible flight-paths into and out of the airport.

These constraints mean that we cannot use this method in the design process - there isn't enough room around Farnborough between the other airports. We also cannot use this for Southampton or Bournemouth because we are only affecting one arrival route out of several that would remain unchanged.

Method C: For departing aircraft, climb them higher, quicker

Currently, Farnborough departures are prevented from climbing above 3,400ft in the vicinity of the airport (2,400ft if the aircraft take off from Runway 06), due to route interactions with adjacent major airports (e.g. Heathrow and Gatwick). These interactions prevent a continuous climb to cruising altitude, which is the most efficient way to fly. If these routes are changed it would be possible to climb to higher altitudes directly after take-off, 'lifting the lid' on current departure restrictions to a certain extent. This proposal would not guarantee continuous climbs to cruising levels, but it would increase the likelihood of higher, quicker climbs for most departures more of the time.

We have used this method in the design process, however this results in the flight-paths of some aircraft being longer so they have space to climb clear of Heathrow and Gatwick aircraft. We are not affecting Southampton or Bournemouth departures.

Method D: For arriving aircraft, keep them higher, for longer

Farnborough arrivals from the south currently descend below Gatwick air traffic, and maintain a low altitude of 3,400ft for around ten nautical miles and then descend into the arrival traffic pattern (usually between 2,400ft and 2,000ft). Under this proposal, Farnborough arrivals from the south would descend in the same way beneath the Gatwick traffic, but would stay at a slightly higher altitude (4,000ft) for longer.

Arrivals from the north are also likely to be slightly higher for longer.

Gatwick and Heathrow route interactions prevent continuous descents to final approach without levelling off.

We have used this method in the design process, however this results in the flight-paths of some aircraft being longer so they have space to descend clear of Heathrow and Gatwick aircraft. For Southampton and Bournemouth arrivals, we have used this method as far as practicable.

Overall population affected

- 10.13. We calculated the **overall** populations in the 'current' areas of aircraft flight-paths, and the populations in the 'proposed' areas where the flight-paths would be, if implemented.
- 10.14. The simple difference between the two numbers is not intended to imply that all areas benefit from this proposal – some areas would, but others would not. It is intended to show that, as a net calculation, fewer people would be over-flown by the flight-paths described in this proposal than are currently over-flown.

- 10.15. As per paragraph 10.3, a smaller number of people would be over-flown more often. Also, some places that are not currently over-flown by this traffic would get over-flown due to this proposal. Use the maps and data in Parts B, C and D to decide the specific impact on your areas of interest.
- 10.16. As a net figure, almost one million fewer people¹⁸ would be over-flown by flight-paths relevant to this proposal, if it was implemented.
- 345,000 fewer people would be over-flown by these flight-paths at low altitudes (Part B, in the vicinity of Farnborough)
 - 130,000 fewer people would be over-flown by these flight-paths at intermediate altitudes (Part C, further away from Farnborough)
 - 475,000 fewer people would be over-flown by these flight-paths at altitudes from 2,500ft-7,000ft around Southampton and Bournemouth (Part D).

Fuel use and CO₂ emissions vs. local noise impacts

- 10.17. This consultation seeks input to help us form a picture of environmental requirements across the board. Information on aircraft fuel consumption and CO₂ emissions is presented below, and local impacts are explained in detail in Parts B, C and D.
- 10.18. There is a balance to be struck between local noise impacts and flight efficiency.
- 10.19. Airspace changes have the potential to improve the efficiency of the UK route network, reducing the fuel burned and therefore the CO₂ emitted per flight. However, one option for managing local noise impact is to avoid flying over populated areas by making aircraft fly around them.

Farnborough

- 10.20. The area around Farnborough is also highly popular with GA and gliders. We would need to accommodate these airspace users, again by designing longer routes avoiding the areas most commonly used by GA, and also by 'sharing' airspace. Farnborough is hemmed in between Heathrow and Gatwick, constraining where we can put routes and airspace.
- 10.21. We have combined these considerations by proposing routes that avoid populated areas as much as possible and that avoid the areas most used by GA as much as possible, at the same time.
- 10.22. This has added extra length to the flight-paths for some of our aircraft, increasing fuel burned and CO₂ emitted over today.
- 10.23. Our initial analysis indicates that, within the vicinity of Farnborough, fuel use and CO₂ emissions would increase in the short term, due to these longer flight-paths.

¹⁸ Population data based on information supplied by CACI for 2012. Total net population difference is 950,000.

- 10.24. This translates to an estimated increase in CO₂ emissions of approximately 1,400 tonnes in 2015, rising to 1,700 tonnes of CO₂ for our most likely traffic forecast for 2019.
- 10.25. For our most common aircraft type on the longest routes, this approximates to 44kg extra fuel per flight, and for our largest aircraft type about 130kg extra fuel per flight. However, many of the routes would be the same or similar in length, meaning there would be no significant change to fuel use for aircraft using those routes.
- 10.26. We make modelling assumptions for the analysis of arrivals and departures (both today and for the proposal). The assumptions made for the analysis are conservative. We expect these figures to be an overestimate, i.e. the actual increase in fuel used and CO₂ emitted¹⁹ by our aircraft is likely to be somewhat less than the numbers here.
- 10.27. In the longer term, we believe that the improved predictability and efficiency that our proposed airspace offers would lead to a reduction in average fuel per flight compared with the 'do nothing' scenario. This would be the result of reduced holding on the ground and in the air, improved fuel planning by aircraft operators, and through flight efficiencies elsewhere in the ATC system which will be enabled by our changes but not fully realised until other airspace in the vicinity is also modernised. However, whilst we can make qualitative arguments about these savings, they are too complex for us to be able to capture in our calculations.
- 10.28. The figures presented in previous paragraphs should therefore be considered very much the worst case; we want to ensure you are aware of the potential CO₂ impacts based on the most conservative assumptions, but also to bear in mind the potential for the impact to be much less and even positive in the longer term.
- 10.29. Additional fuel/CO₂ impacts could be caused, infrequently, by the airspace sharing arrangement introduced in paragraph 10.20 above. These infrequent additional impacts would not, however, impact the overall fuel figures significantly; these are explained in Part C.

Southampton and Bournemouth

- 10.30. Under this proposal, arrivals to these airports from the east would be affected. Arrivals from other directions, and departures in all directions, would not.
- 10.31. The consequence of improving the predictability and efficiency of management of this region of airspace is the realignment of the route used by these arrivals. This route is slightly longer for certain arrival configurations, slightly shorter or unchanged for others.
- 10.32. See paragraph 10.16 above for the net population affected by this proposal.
- 10.33. As for Farnborough above, we have considered populated areas as much as possible and popular GA areas at the same time, in order to propose a balanced route.

¹⁹ See footnote 13 on Page A29 regarding fuel and CO₂

10.34. Our initial analysis indicates that, in the areas covered by Southampton and Bournemouth's current and proposed arrival routes from the east, fuel use and CO₂ emissions would slightly increase in the short term, due to the longer flight-paths marginally outweighing the benefits brought by the shorter flight-paths.

10.35. For Southampton arrivals from the east:

- a. An overall estimated increase in CO₂ emissions of 102 tonnes of CO₂ in 2015. Using traffic forecast data for 2018 (the latest we have), this would rise to about 113 tonnes of CO₂ for that year.
- b. For Southampton's most common aircraft type, this approximates to 17kg extra fuel per flight, and for their largest aircraft type about 25kg extra fuel per flight.

10.36. For Bournemouth arrivals from the east:

- a. An overall estimated increase in CO₂ emissions of 9 tonnes of CO₂ in 2015. In the event that Bournemouth increased their traffic by 10% in 2018, this would rise to about 10 tonnes of CO₂ for that year.
- b. For Bournemouth's most common aircraft, this approximates to less than 5kg extra fuel per flight, and for their largest aircraft about 15kg extra fuel per flight.

10.37. There would be improvements to flight efficiencies and airspace management elsewhere in the ATC system, both locally and UK-wide due to our proposal. This additional benefit cannot be easily analysed, and is not presented here.

Changes due to feedback

10.38. We are seeking your feedback on our proposed designs. We will consider making changes to the design once we have analysed everyone's responses. We do not yet know if these potential changes might be minor or significant or if they might improve the noise and/or CO₂ results or make them worse.

10.39. If we do decide to change the design, and the change is significant, there would be the possibility of additional consultation in accordance with CAA guidance. The CAA, as our Regulator, would provide guidance to us on what a 'significant change' would be.

10.40. We will ask you what you think about the balance of local noise impact against CO₂ emissions and airspace efficiency in Parts B, C and D.

Noise contours and footprints

- 10.41. The CAA guidance on airspace change (see Appendix A) requires us to assess potential changes to certain noise measurements, in areas where certain conditions could apply. These measurements are referred to as noise contours and footprints.
- 10.42. The design has demonstrated to the satisfaction of the CAA that there would either be no change to the areas covered by these measurements, or that only totally unpopulated areas could potentially be affected under unlikely scenarios.

11. What options were considered?

- 11.1. We have considered and discarded many permutations of airspace and routes in the vicinity, which is why this consultation presents only one main design option.
- 11.2. Before reaching the one presented here, the major options were all discussed with operational ATC experts, aircraft operators, and the local GA community amongst others.
- 11.3. Doing nothing is always an option that must be considered.
- 11.4. The table below provides an overview of the main design options we considered, and why we refined them further or rejected them.

| Major option considered | Result |
|--|---|
| Do nothing | The predicted increase in TAG Farnborough movements would not be supported in the current (lack of) airspace infrastructure, for all users of the airspace. The current environment would not support an efficient, predictable operation, so doing nothing was discounted. |
| Use airspace structures that are not CAS | Avoiding the establishment of CAS was looked at extensively, and options were considered using a combination of Transponder Mandatory Zones (TMZ) and Radio Mandatory Zones (RMZ)# without establishing CAS. In such an environment with forecast Farnborough traffic levels, a TMZ/RMZ combination would still not provide adequate predictability and controllability. This design concept was rejected, but elements of RMZ are retained in the proposed design. |
| Options 1-12 | Initial designs attempted to manage air traffic near to Farnborough. Connectivity to the main air route network remained undeveloped. Option 12 had routes for arriving and departing aircraft remaining largely as today. This option received challenge from stakeholders involved in GA activity due to the amount of required CAS required northwest of Farnborough. Because of the lack of connectivity to the network, this option was discounted. |
| Options 13-17 | Option 17 attempted to deliver network connectivity, by means of two laterally separated routes from the south (one for arrivals, one for departures), and a 'split' route to/from the north. The split route would be bi-directional, but achieve lateral separation between an arrival and a departure, by means of timed departure release. The required CAS north of Farnborough was reduced. However, this option received challenge from stakeholders involved in gliding activity at Lasham, due to the relatively low base of CAS areas in the normal areas for glider operations (3,500ft). After further discussions with LTC Swanwick, the proposed network connectivity was also rejected, as complexity in the Compton VOR area had not been addressed. This option was therefore not developed further. |
| Options 18-24 | Alternate routing options were explored, balancing the requirements for CAS against GA requirements and challenges. Option 24 was formally put through an ATC simulation involving many controllers from the relevant ATC agencies. From this simulation, operational issues were encountered that needed addressing. |
| Option 25 | Option 24 was refined and the simulation issues addressed. This is the option upon which we are consulting. |

Table A1: Options considered, before consultation

These technical terms refer to alternate non-CAS methods of ensuring ATC would be aware of all aircraft in the vicinity.

- 11.5. We are open minded and welcome your feedback, especially if you think there is something we should know that we have not already considered.

12. Summary of how to respond

- 12.1. Please provide your response via our website – this is the quickest, easiest and most secure method:

www.Consultation.TAGFarnboroughAirport.com

- 12.2. If you prefer, please send a paper response to this address:

Farnborough Airspace Consultation Responses

PO Box 584

Hounslow

TW3 9QP

- 12.3. This consultation launches 09:00 Monday 3rd February, and closes 23:00 Friday 2nd May 2014. This is just under thirteen weeks.