Farnborough Airport

Airspace Consultation

Part A: Introduction and Overview

Contents

List of Figures

List of Tables

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 altitudes[1], 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 project[2].

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 CO_2 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 region[4]. 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.

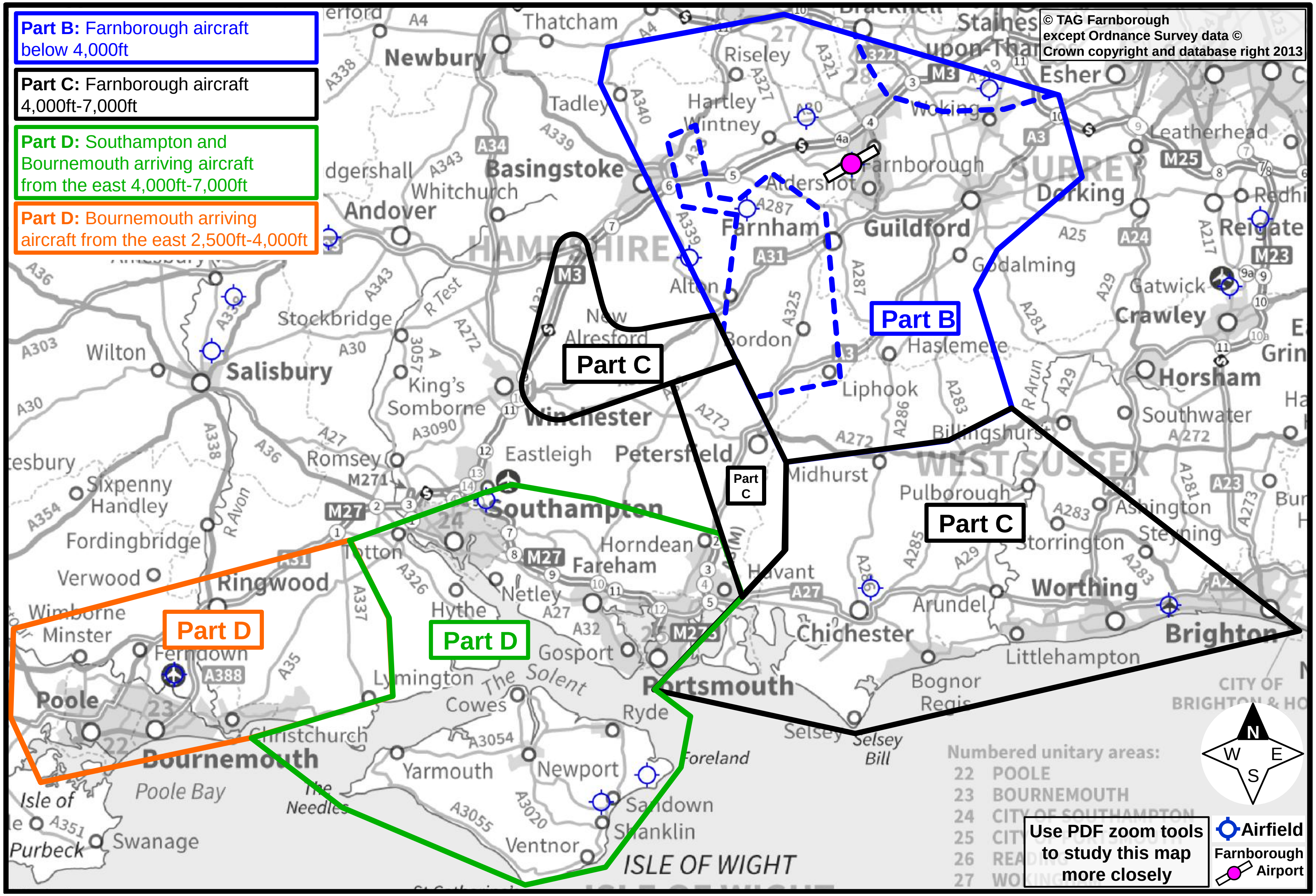


Figure A1: Consultation areas overview

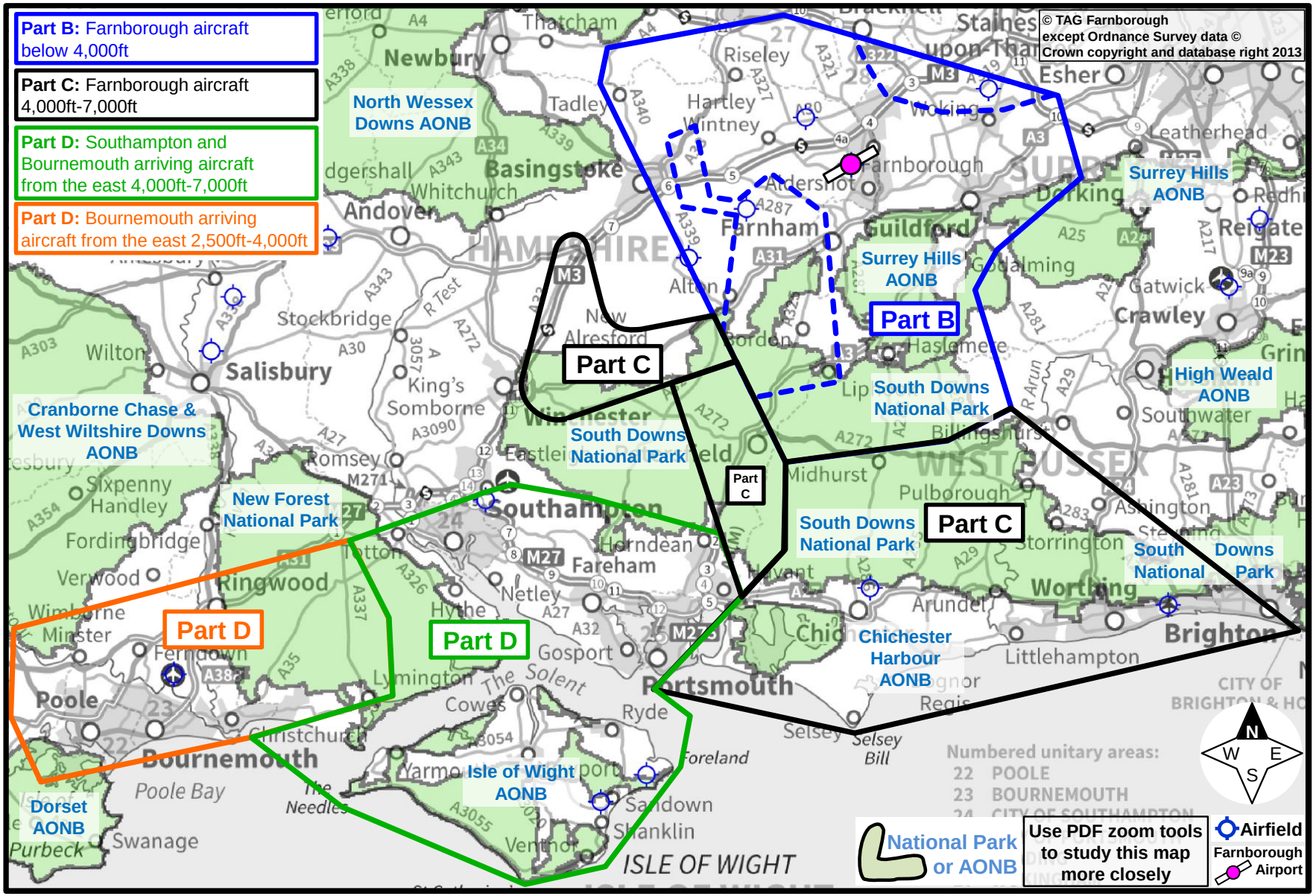


Figure A2: Consultation areas overview (National Parks and AONBs highlighted)

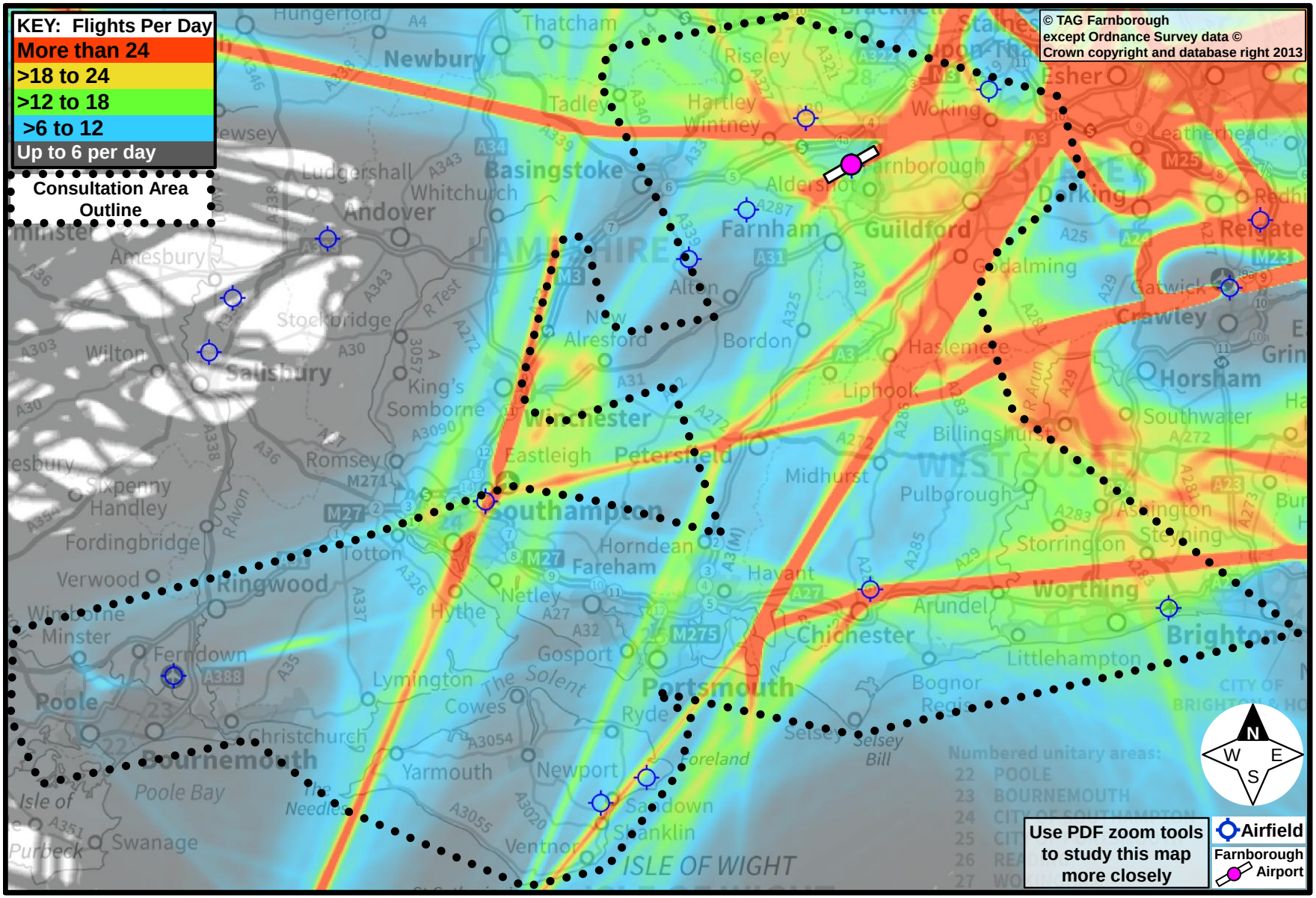


Figure A3: All commercial air traffic to/from all airports (up to 20,000ft)

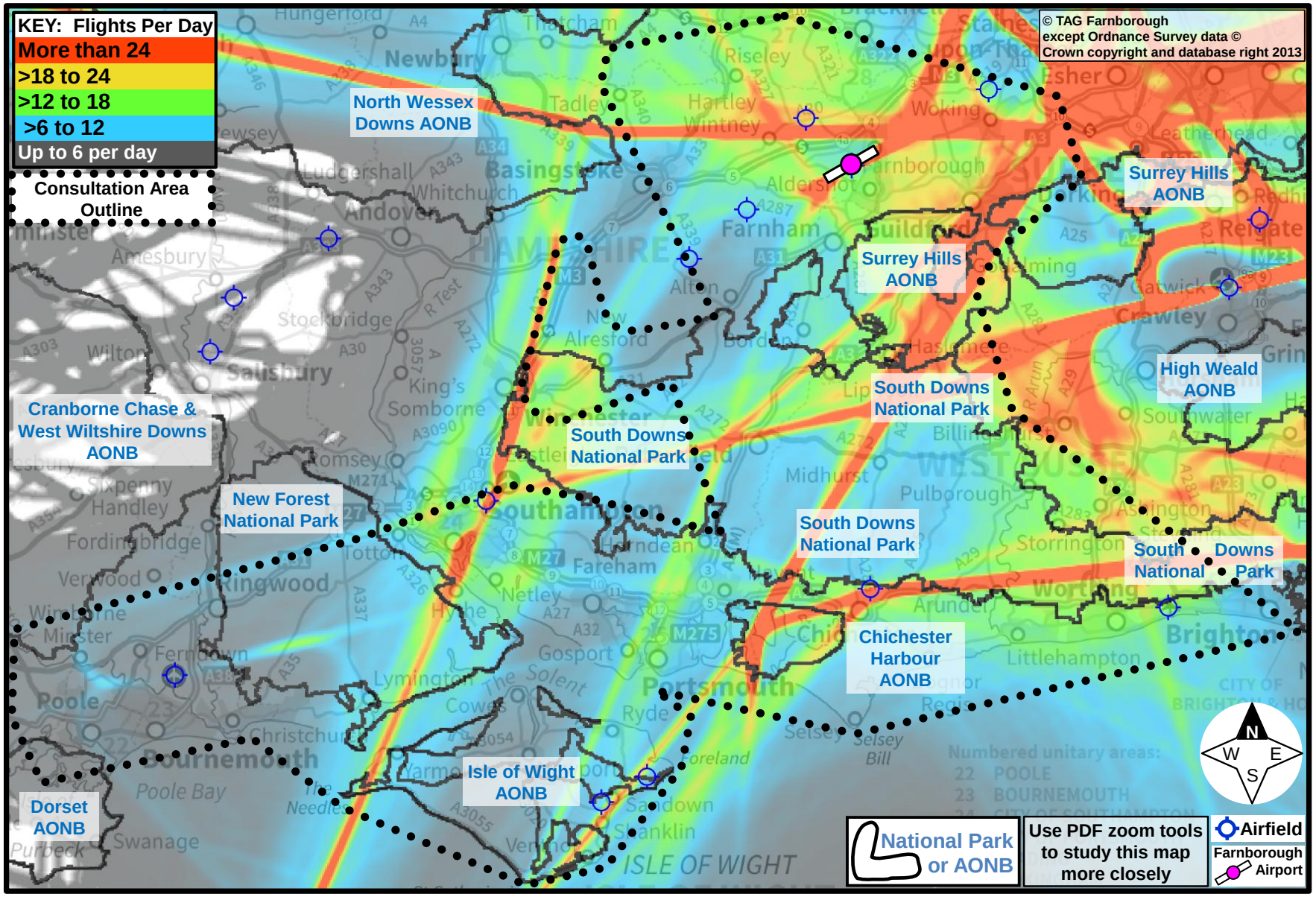


Figure A4: All commercial air traffic to/from all airports (up to 20,000ft), National Parks and AONBs highlighted

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 (FAS[5]), 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 CO_2 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.

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 it's 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 objectives[7].

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 circle[9] established around the airport with a radius of 2.5 nautical miles[10] (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:

a. Shaded orange area from ground level, known as a 'Control Zone' (CTR)

b. Orange outlined areas start above the ground, ending below 4,000ft - these are 'Control Areas' (referred to as CTAs)

c. 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)

d. 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).

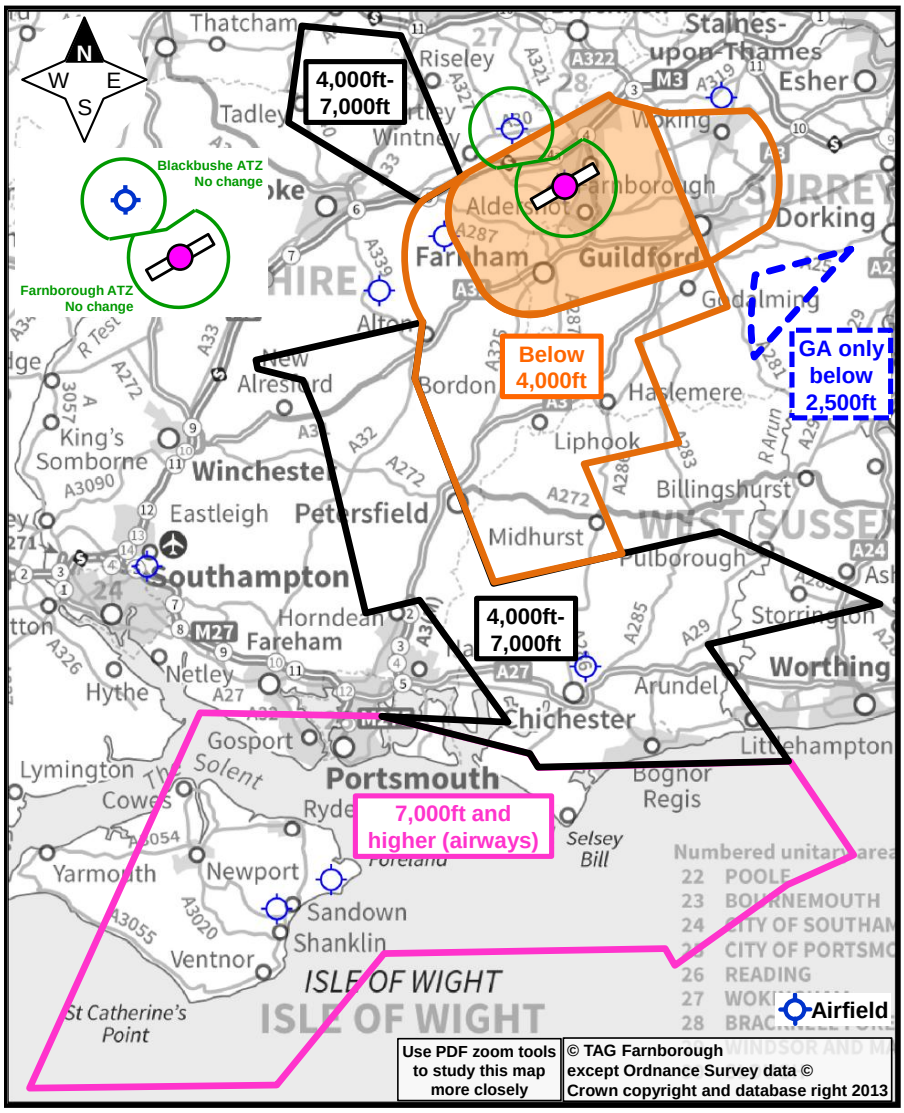


Figure A5: Proposed changes to these volumes of CAS

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 permanent[11] 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 (GA[12]) 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 CO_2 emissions[13] 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 systemised[14].

8.27. In February 2011, the Government granted TAG planning permission to increase the maximum annual number of aircraft movements[15] 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 CO_2 is produced. For aviation fuel, 1kg of fuel burnt typically means 3.18kg of CO_2 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.

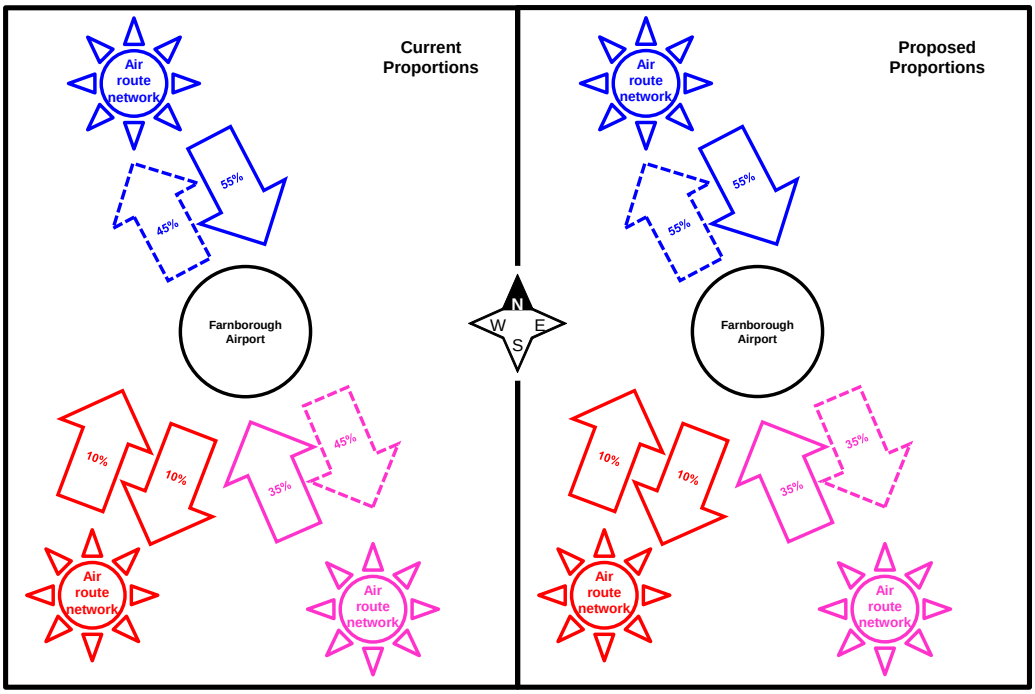


Figure A6: Schematic for the proportions of Farnborough departing and arriving aircraft (current and proposed) - this is an illustration and is not geographically correct. Dashed arrows show the different proportions that would occur due to this proposal.

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.

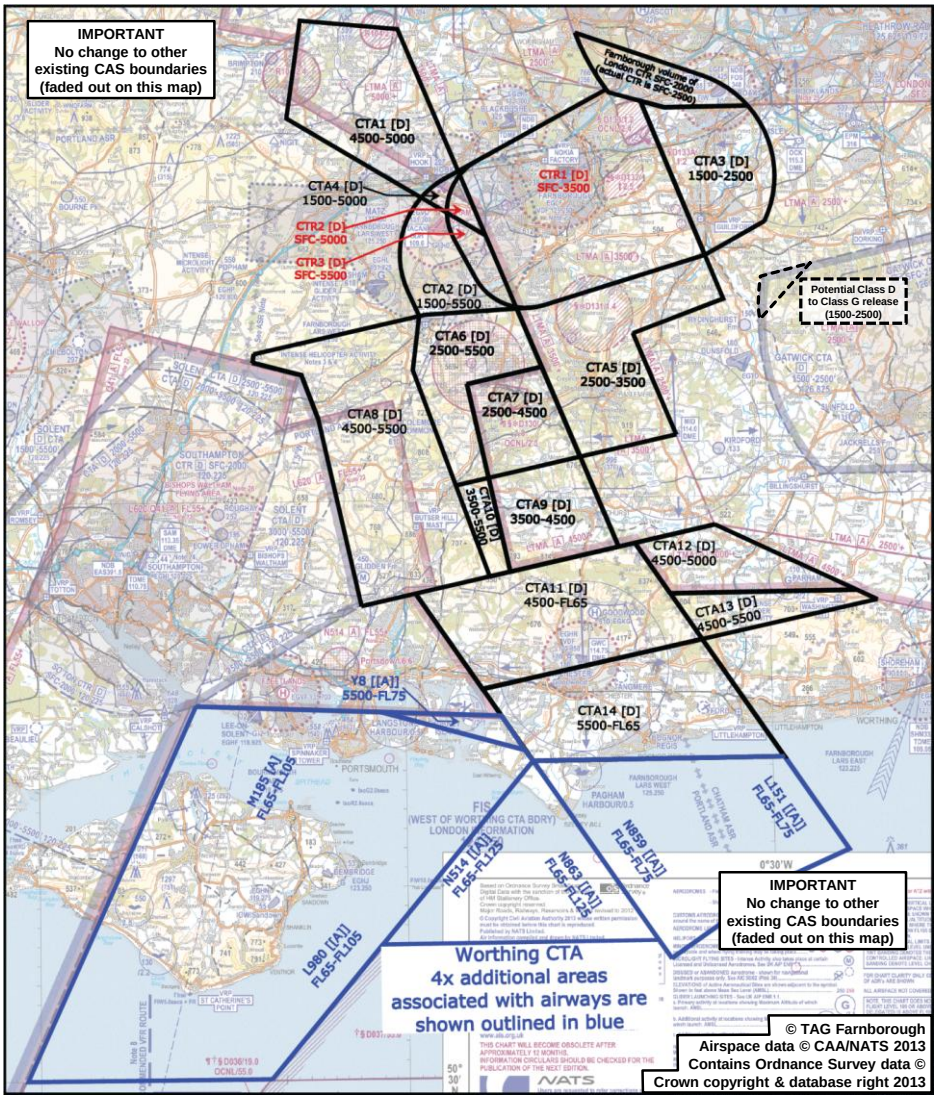


Figure A7: Proposed changes to CAS (Overlaid on an aviation VFR chart)

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 conventional[17] 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, Fairoaks, 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 people[18] 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 CO_2 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 CO_2 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 CO_2 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 CO_2 emitted over today.

10.23. Our initial analysis indicates that, within the vicinity of Farnborough, fuel use and CO_2 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 CO_2 emissions of approximately 1,400 tonnes in 2015, rising to 1,700 tonnes of CO_2 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 CO_2 emitted[19] 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 CO_2 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/CO_2 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 CO_2

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 CO_2 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 CO_2 emissions of 102 tonnes of CO_2 in 2015. Using traffic forecast data for 2018 (the latest we have), this would rise to about 113 tonnes of CO_2 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 CO_2 emissions of 9 tonnes of CO_2 in 2015. In the event that Bournemouth increased their traffic by 10% in 2018, this would rise to about 10 tonnes of CO_2 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 CO_2 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 CO_2 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

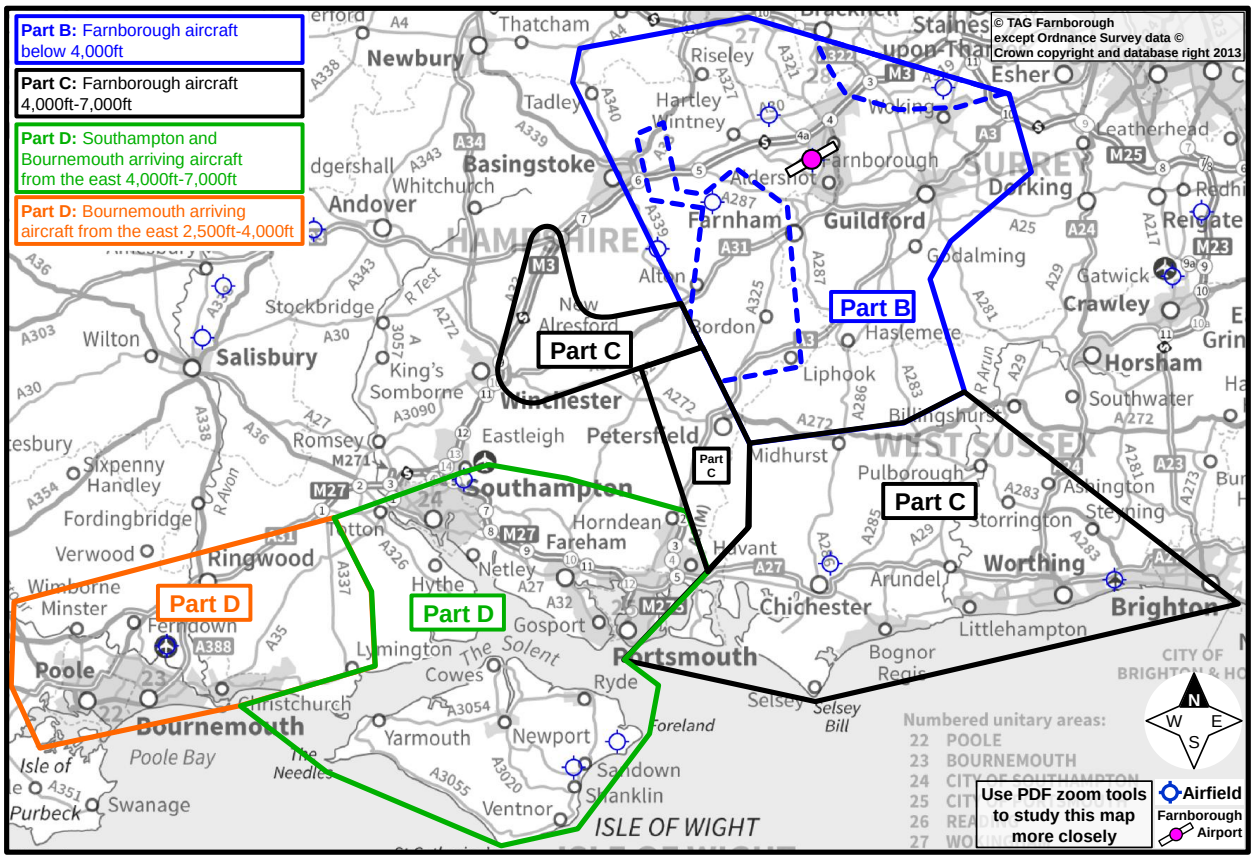
12.3. This consultation launches 09:00 Monday 3rd February, and closes 23:00 Friday 2nd May 2014. This is just under thirteen weeks.

Farnborough Airport

Airspace Consultation

Part B: Proposed changes below 4,000ft in the vicinity of Farnborough Airport

(Affecting Parts of Hampshire, Surrey, West Sussex and Berkshire)



Contents

List of Figures

List of Tables

This page intentionally left blank

1. Introduction to Part B

1.1. This part of the consultation material describes the airspace changes proposed from the surface to less than 4,000ft above mean sea level[1]. The region which may be affected is shown enclosed by the solid blue line in Figure B1 below. The dashed blue outlined areas are specific sub-areas of the main Part B region.

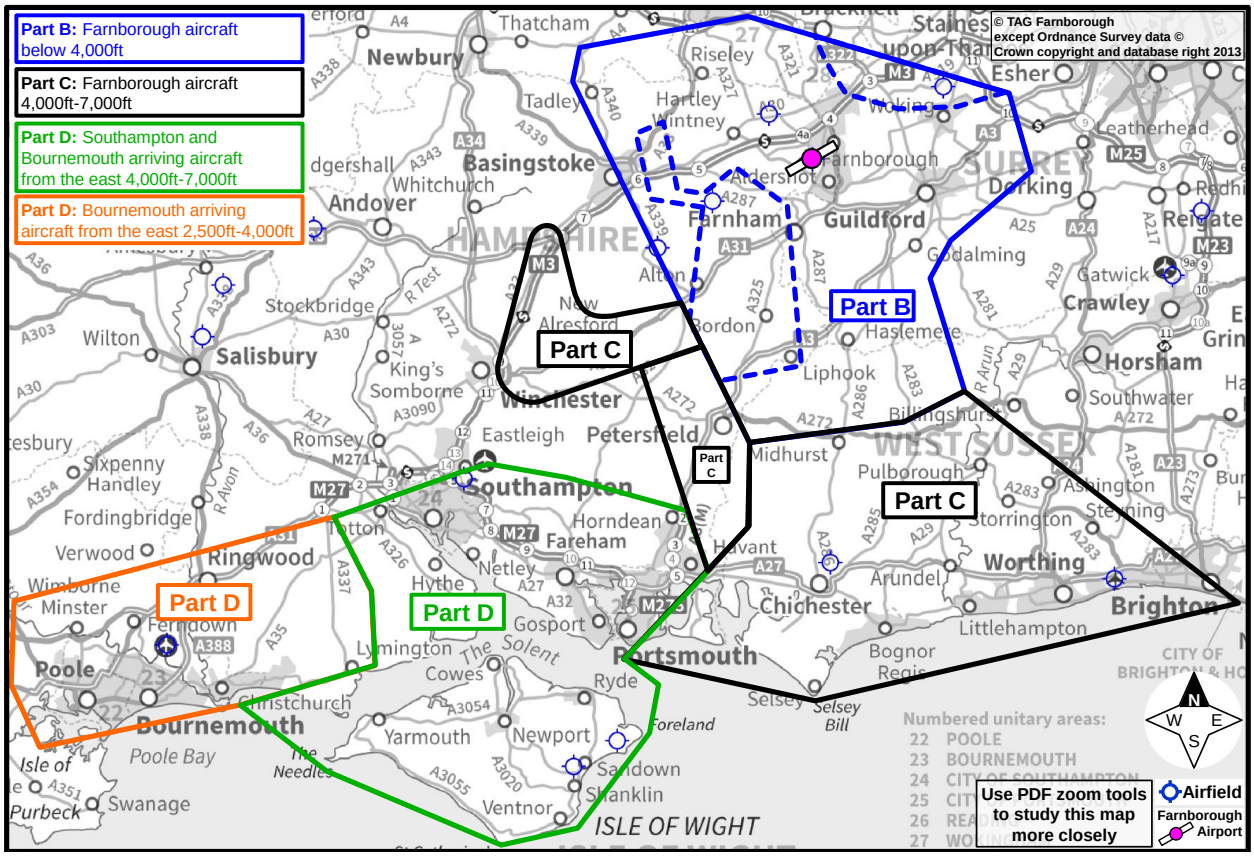


Figure B1: Consultation areas overview

1.2. Part B assumes that:

a. You have read and understood the first half of Part A (this sets the context for the proposed changes)

b. You have identified that the geographic areas (shown outlined in blue in Figure B1) above are of interest to you, and

c. You understand that this consultation only covers the areas identified in Figure B1 where changes to air traffic flows are likely to occur as a result of this proposal.

1 Altitudes of flights and airspace are given in feet above mean sea level (AMSL). Farnborough Airport is at 238ft AMSL. The terrain around Farnborough within the area shown in Figure B1 varies between about 100ft to about 900ft in elevation. To calculate the height above ground level (AGL) where you are, subtract your elevation from the altitudes in this document.
For example, if you live on a 200ft hill (AMSL), and aircraft fly over you at an altitude of 3,400ft, that aircraft is 3,400 – 200 = 3,200ft AGL (above you).

1.3. This part explains the proposed changes to routes and airspace in the near vicinity of TAG Farnborough Airport. In particular, we aim to provide an understanding of the impacts that the proposed changes would have on people within the solid blue outlined area shown in Figures B1 (above) and B2 (on Page B7, a zoomed in view). The main focus of this document is on the impacts of establishing Farnborough departure and arrival routes which are covered in detail in Sections 1-4 of this document. We advise you to consider this information to determine the local impact on your area of interest.

1.4. We also explain consequential changes to light General Aviation (GA[2]) traffic flows, and to a very small number of RAF Odiham departures that would generate further potential impacts. The areas where GA and RAF Odiham flights would be affected are shown by the **dashed blue outlined areas** shown in Figures B1 and B2. Each is described separately in this document; Sections 5 and 6 in the document respectively for the Northern and Western blue dashed areas. Even if your primary interest is within the blue dashed areas, you should still consider Sections 1-4 as there may be other flights in the region (discussed in those Sections) that are relevant to you.

1.5. Other air traffic flows, such as Heathrow and Gatwick departures, also use the same airspace at higher altitudes in the vicinity of Farnborough. Within the solid blue outlined area of this proposal, we are not considering changes to flows other than Farnborough arrivals and departures.

1.6. We need to gather feedback from stakeholders, to enable us to understand how the change may impact you. We have included questions and a statement which are highlighted in a box like this. The easiest way to respond to the consultation is to answer these questions via the website:

www.Consultation.TAGFarnboroughAirport.com

1.7. Care has been taken to make this consultation accessible to anyone who may wish to respond. The design and operation of airspace is, by its nature, a complex and technical issue. We aim to avoid technical jargon, but in order to help readers fully understand the rationale behind the changes being proposed we have, where appropriate and necessary, gone into some technical details and used relevant terminology. Any technical terms used are explained briefly, and summarised as a glossary in Appendix B.

2 GA is often light slow-moving aircraft flying at relatively low altitudes for pleasure or training. See Glossary for more information on GA.

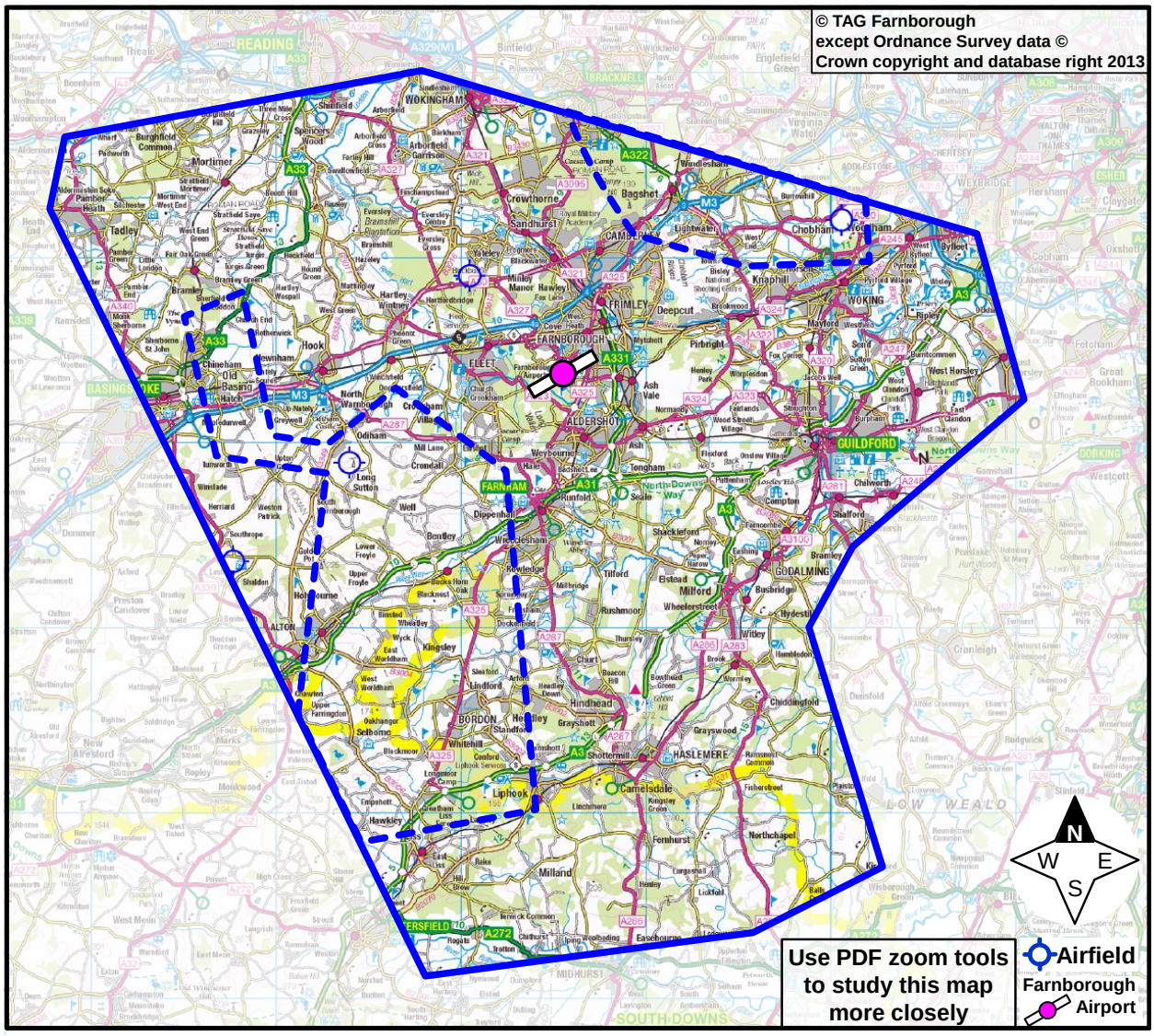


Figure B2: Consultation areas in the vicinity of Farnborough

1.8. In this part, we will describe:

a. Today's airspace usage - a description of today's flight-paths including maps of where aircraft are generally seen;

b. The objectives and justification for the proposed changes – describing the routes we are seeking to implement and their potential benefits and impacts; and

c. Local considerations for route positioning; describing potential local impacts. We ask for your feedback on any location that may require special consideration in the ongoing design process, and why you think we should consider it special. This will help us assess and balance the impacts of the design.

1.9. We will ask you questions, and will also refer to Part A.

How do I work out the change in impact within the solid blue outlined area?

1.10. Later in this document, there are worked examples of how to assess the change of impact on a place. Use it for where you live or work, in order to decide how the change might affect you. These worked examples start in Section 4 on Page B25.

1.11. Sections 2 and 3 provide background information that is provided to give an understanding of our objectives for this proposal.

2. Today's airspace usage

2.1. The airspace around London, which includes Farnborough, is one of the busiest and most complex volumes of airspace in the world. The Farnborough area is over-flown by aircraft originating from many different airports, as shown in Figure B3 on Page B35, which is a 'density plot' (see explanation below). This map shows all commercial air traffic in the region, up to 20,000ft. Most notably there are several arrival and departure routes to and from Heathrow and Gatwick airports crossing the region. We have also highlighted National Parks and Areas of Outstanding Natural Beauty so you can see how often these places are over-flown by commercial aircraft today.

2.2. This part of the consultation document focuses on changes to the routes to/from Farnborough at altitudes **below 4,000ft**. The areas that would be affected by these changes are identified in Figure B2, specifically the solid blue outlined area.

Aircraft flight-path density plots

2.3. In order to illustrate where commercial aircraft currently fly, we have provided maps overlaid with aircraft flight-paths (Figures B3-B7). These are known as density plots, which are produced using radar data, and show how many aircraft over-flew a particular place. These maps start from Page B35.

2.4. The density plots show all flights for one month[3], and hence give a good representation of where flights are most concentrated. A colour key explains the average number of flights per day over a particular place.
Note that, because Farnborough has far fewer flights than Heathrow or Gatwick, the colour keys are different between density plots that show ***all*** airports and those that ***only*** show flights relating to Farnborough.

2.5. We have filtered the radar data so we can show you different views:

a. Figure B3 shows **all** flights to/from **all** airports up to 20,000ft;

b. Figure B4 shows **only** flights to/from **Farnborough** up to 20,000ft;

c. Figures B5, B6, B7 and B8 show **only** flights to/from Farnborough, below 4,000ft.

2.6. The density plots are provided to illustrate the spread of tracks today. The diagrams also have arrows which show the general direction of the traffic flows to aid your interpretation of these plots. The arrows are *illustrative* of the general flow directions because there are no current formal airspace routes.

3 Period chosen: September 2012. This month was chosen because it was a representative sample of aircraft types and destinations, and was outside the 2012 Olympics period. During the Olympics, special airspace was applied to the London region for parts of July and August - those special flight-paths did not represent the typical paths normally flown.

Runway directions

2.7. 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) [4].

2.8. 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; for safety reasons the runway used is generally the one that has aircraft taking off and landing into the wind. This in turn influences the traffic patterns seen in the surrounding airspace.

2.9. 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.

2.10. When departures get high enough, Air Traffic Control (ATC) at Farnborough hand them over to the next 'link' in the ATC chain (the national 'en-route' ATC). After this handover they are directed to join air routes that head off in the direction of their ultimate destination.

2.11. Arriving aircraft initially come from the general direction of their departure airport via the air route network, but when they get close to our airport (and have descended sufficiently) they leave the air route and are directed to final approach for whichever runway is in use.

2.12. Initially these arriving aircraft are controlled from the national 'en-route' ATC centre, but are transferred at an appropriate time to the local airport controllers at Farnborough to be directed onto final approach.

2.13. See Part A for more details on runway direction, usage, and designation. Farnborough's Runway 06 and Runway 24 air traffic patterns are explained below.

General information about Farnborough departures

2.14. ATC currently manages departing aircraft by manually directing each flight as there are no formal departure routes from Farnborough. When ATC manually directs a flight it is known as 'vectoring'. The controller that is responsible for the aircraft immediately after take-off plans a safe flight-path avoiding arrivals and any GA in the area. This regularly includes 'unknown' aircraft (not in contact with a Farnborough controller) – these are represented only by blips on the radar screen with no confirmed information about their height or their intentions (Part A has more background information on 'known' and 'unknown' aircraft). For safe passage through the airspace, some departures are given longer flight-paths, and some

4 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.

shorter, depending on the specific situation at the time. Equally, some aircraft are climbed early, or late, for the same reason.

2.15. This variance/manual intervention due to other flights in the region means that departure flight-paths at altitudes below 7,000ft do not currently follow specific paths and tend to be spread over a wide area, as shown by Figures B5 and B6.

Today's Farnborough departures – Runway 06 (20% of all departures) See Figure B5 on Page B37

2.16. Figure B5 shows all departures from Runway 06 fly straight ahead immediately after take-off until they pass a distance of 2 nautical miles[5] (nm) from the runway. Usually this is at about 1,000ft, but it varies because different aircraft climb at different rates. They then perform a U-turn to the right whilst still climbing to about 2,000ft, before climbing further and turning to join the route network mainly to the north or south, with some heading southwest. This U-turn to the right is necessary to avoid Heathrow Airport airspace northeast of Farnborough.

2.17. Arrow 1 illustrates Runway 06 departures to the north. About 9% of all our departures route this way.

2.18. Arrow 2 illustrates Runway 06 departures to the south. About 9% of all our departures route this way.

2.19. Arrow 3 illustrates Runway 06 departures to the southwest. About 2% of all our departures route this way.

2.20. Remember that these percentages **only** apply to Runway 06 departures. If you live or work in an area over-flown by Runway 06 departures, you may also be over-flown by Runway 24 departures, and arrivals to either runway. Please consider all the maps in this document to assess how your area of interest might be affected.

Today's Farnborough departures – Runway 24 (80% of all departures) See Figure B6 on Page B38

2.21. Some aircraft departing Runway 24 turn slightly left, some climb straight ahead, and a few turn immediately right after takeoff. When above about 2,000ft they are turned to join the route network mainly to the north or south (see Figure B6), with some heading southwest.

2.22. Arrow 1 illustrates Runway 24 departures to the north. About 36% of all our departures route this way.

2.23. Arrow 2 illustrates Runway 24 departures to the south. About 36% of all our departures route this way.

5 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.

2.24. Arrow 3 illustrates Runway 24 departures to the southwest. About 8% of all our departures route this way.

2.25. Remember that these percentages **only** apply to Runway 24 departures. If you live or work in an area over-flown by Runway 24 departures, you may also be over-flown by Runway 06 departures, and arrivals to either runway. Please consider all the maps in this document to assess how your area of interest might be affected.

Points to note about Farnborough departures

2.26. Where the tracks end in Figures B5 and B6, the aircraft have climbed above 4,000ft. For example, for Runway 06 departures to the south, most are above 4,000ft by the time they get south of Haslemere. This may seem later than necessary, but they need to keep underneath Gatwick and Heathrow air traffic until clear – these are shown in Figure B3. Note a red (departure) flow from Gatwick heading west, passing just south of Haslemere. Also note a wide red (departure) flow from Heathrow, towards the southwest, crossing the Gatwick flow around Haslemere.

2.27. For both runways, unknown aircraft on the radar often cause controllers to turn our departures a long way left and/or right, and they may have to change the climb instructions as per paragraphs 2.14-2.15. Occasionally, they need to be delayed on the runway at the last moment, ready for takeoff, waiting for a gap between other air traffic (known or unknown). This means the specific takeoff time, flight-path and altitude are not often predictable, making the controller's (and the departing pilot's) work more difficult until they can climb into the air route network. Joining the network may take a long time depending on other air traffic, causing an unpredictable delay and an unpredictable extra distance to be flown.

General information about Farnborough arrivals

2.28. Aircraft must line up with the runway as they begin their final approach to land. The final approach flight-path descends directly to the runway and is fixed in line with the extended centreline of the runway[6]. Aircraft today generally join our final approach path between five and eight nautical miles from touchdown, typically at an altitude of about 2,000ft.

2.29. Because Runway 06's final approach path gets very close to other aerodromes (Lasham and RAF Odiham), arrivals to Runway 06 tend to join final approach nearer than those to Runway 24.

2.30. ATC must ensure that aircraft on final approach have been organised into an efficient sequence for landing. This is where aircraft are safely spaced, ensuring the runway is utilised efficiently and that flights are not unnecessarily delayed in the air.

6 Technology and operational practices are being developed to enable curved final approach tracks; however, this is not sufficiently mature for consideration at this time.

2.31. ATC currently manages arriving aircraft into the required sequence by vectoring (see paragraph 2.14). As the aircraft descend from about 7,000ft towards the runway, our radar controller takes command of the arrival and is planning a safe flight-path avoiding our departures, unknown radar blips or other aircraft known to be in the area. Some arrivals are given longer flight-paths, and some shorter, depending on the specific situation at the time. Equally, some aircraft are descended early, or late, for the same reason.

2.32. This variance/manual intervention due to unknown air traffic means that arriving flight-paths below about 7,000ft do not currently follow specific paths and tend to be spread over a wide area, as shown by Figures B7 and B8.

Today's Farnborough arrivals – Runway 06 (20% of all arrivals) See Figure B7 on Page B39

2.33. Figure B7 depicts the pattern of traffic arriving to land on Runway 06.

2.34. Arrow 1 illustrates Runway 06 arrivals from the south. About 7% of all our arrivals route this way.

2.35. Arrows 2 and 3 illustrate Runway 06 arrivals from the north. About 11% of all our arrivals route from the north, with half of those (Arrow 2) routing directly to final approach and the other half (Arrow 3) crossing to the south of the airport, joining final approach via a U-turn from there.

2.36. Arrow 4 illustrates Runway 06 arrivals from the southwest. About 2% of all our arrivals route this way.

2.37. Remember that these percentages **only** apply to Runway 06 arrivals. If you live or work in an area over-flown by Runway 06 arrivals, you may also be over-flown by Runway 24 arrivals, and departures from either runway. Please consider the maps in this document to assess how your area of interest might be affected.

Today's Farnborough arrivals – Runway 24 (80% of all arrivals) See Figure B8 on Page B40

2.38. Figure B8 depicts the pattern of traffic arriving to land on Runway 24.

2.39. Arrow 1 illustrates Runway 24 arrivals from the south. About 28% of all our arrivals route this way.

2.40. Arrows 2 illustrates Runway 24 arrivals from the north. About 44% of all our arrivals route from the north, crossing to the south of the airport, joining Arrow 1's flow towards the U-turn onto final approach.

2.41. Arrow 3 illustrates Runway 24 arrivals from the southwest. About 8% of all our arrivals route this way, joining Arrows 2 and 3 south of the airport.

2.42. Remember that these percentages **only** apply to Runway 24 arrivals. If you live or work in an area over-flown by Runway 24 arrivals, you may also be over-flown by Runway 06 arrivals, and departures from either runway. Please consider the maps in this document to assess how your area of interest might be affected.

Points to note about Farnborough arrivals

2.43. Where the tracks start in Figures B7 and B8, the aircraft have descended below 4,000ft. For example, for Runway 24 arrivals from the north, many start descending below 4,000ft by the time they cross the A33 between Reading and Basingstoke. This may seem earlier than necessary, but they need to be descended below, and kept clear of, Heathrow air traffic – these are shown in Figure B3. Note a red (departure) flow from Heathrow heading southwest towards Farnborough, and a red (arrival) flow from west to east crossing just north of Farnborough.

2.44. For both runways, unknown aircraft on the radar often cause controllers to turn our arrivals a long way left and/or right, and they may have to change the descent instructions (as per paragraphs 2.31-2.32). Occasionally, they have to be placed in a holding pattern in a safe area. This means the specific arrival time, flight-path and altitude are not often predictable, making the controller's (and the arriving pilot's) work more difficult until they land. This causes an unpredictable delay and an unpredictable extra distance to be flown.

Traffic to/from other airports, and the environmental impact of General Aviation (GA)[7] aircraft

2.45. Figure B3 shows that, in the vicinity of Farnborough, everywhere is over-flown to some extent – there are no white areas on the map. Figures B4 to B8 only depict Farnborough traffic flows and show that Farnborough air traffic is a relatively small part of that overall picture shown in Figure B3 – remember that the colour key for Figure B3 is bigger than that used in the other density plots because Farnborough is much less busy than Heathrow or Gatwick. Regardless of our proposal, the traffic to/from other airports will continue to be seen and heard over-flying these areas (in particular Heathrow and Gatwick arrivals and departures) at similar altitudes to today. These aircraft are currently, and would continue to be, at higher altitudes than our aircraft within the solid blue area.

2.46. Whilst this proposal will not change the tracks of air traffic into and out of Heathrow and Gatwick, it is likely to have an effect on where some light GA aircraft (and a small number of military aircraft) fly. The change of impacts to people on the ground due to this is impossible to predict accurately as GA flights do not follow predictable tracks in the way that passenger and freight flights do. However, we make an estimate later in this document based on the experience of our controllers in dealing with such flights.

7 General Aviation (GA) aircraft are usually private light aircraft, gliders, recreational aircraft etc. See Part A for more details.

2.47. We know that there are popular areas of GA activity that we have tried to avoid as far as practicable, given our own requirements for consistent and predictable routes.

2.48. We also know that changing flight-paths or airspace boundaries can be challenging to GA, and our intention is for as little disruption as possible by striking a fair balance.

3. Objectives and justification for proposed changes below 4,000ft

3.1. This section describes our objectives for changing the routes to/from Farnborough Airport; it describes what we are trying to achieve and the generic benefits/impacts that would result. We welcome your feedback on these objectives. The effects on specific aviation users are discussed in Part E. Specific local considerations are discussed below in Section 4.

3.2. This consultation is to develop airspace solutions, assuming unchanged airport infrastructure. It is not associated with the work being undertaken by the Airports Commission. Any further proposals arising from any recommendations made by the Airports Commission would be subject to separate consultation at a later date.

3.3. The introduction of PBN, as recommended by the aviation industry's CAA-supported FAS, means the route system **must** undergo change (these terms are explained in Part A). This provides the opportunity to consider changes that will enable us to make best use of the runways and to improve the management of noise impact.

3.4. **Specific justifications:** We are seeking to optimise the route structure to bring benefits to the ATC operation. We intend to do this whilst enabling environmental benefits at these low altitudes (noise over fewer people), and considering GA activity areas as far as practicable, making airspace more efficient for as many users as possible. In particular we are proposing to introduce formal departure routes from both runways, and to improve the management of arrivals, by using the RNAV navigation standards which would make the flight-paths more consistent and predictable (see Part A for details of RNAV). The more consistent and predictable the routes, the more efficient they can be, and the already-high safety standards can be further enhanced. The airspace management would be more efficient for all users as well as the airport itself.

3.5. Maintaining Farnborough's competitive position in the UK and international market is important both for the airport and for the local communities that benefit from having a commercially successful airport as a neighbour.

Improving noise management - Positioning routes away from populated areas and noise sensitive areas as much as possible

3.6. The proposed routes would enable the position of the aircraft to be more precisely controlled. In particular, with careful design the routes can be optimised so that they minimize over-flight of noise sensitive areas, such as populated areas.

3.7. We estimate that, due to the design proposed in this part of the consultation, ***345,000 fewer people***[8] would be over-flown by flight-paths at low altitudes (below 4,000ft).

8 Population data based on information supplied by CACI for 2012. This is a net figure based on a simple comparison of the populations within the areas covered by the current flight-paths vs the (smaller) areas covered by the proposed flight-paths. It is not intended to imply that all (continued over)

3.8. In addition to positioning the routes to reduce noise impact, we are also proposing changes that will keep arrivals higher for longer and climb departures higher earlier. The higher an aircraft is, the quieter and smaller it appears and so these changes would further reduce overall noise impact, however we are not able to quantify this benefit.

Potential negative impacts

3.9. Avoiding over-flight of one area inevitably means flights over neighbouring ones instead. For example, avoiding over-flight of a town almost always means flying over the surrounding countryside, which may be valued for its relative tranquillity[9]. This applies equally to departure and arrival routes.

3.10. As a result of this proposal, some areas would experience new or more flights overhead, some fewer, and some would be unchanged.

3.11. The proposed routes mean some aircraft would have to fly longer tracks than today. Part A Section 10 describes how these longer routes, avoiding populated areas and GA activity areas as much as possible, causes aircraft to use more fuel.

Concentration versus dispersal

3.12. Aircraft following RNAV routes have more reliable and accurate track-keeping, and hence most aircraft follow the same paths within closer tolerances. Flights are concentrated along the routes, rather than being dispersed more widely across an area. This means that net fewer people are over-flown, but those that are, would be over-flown more often.

Airspace sharing with gliders – infrequent use of an alternate southbound departure route

3.13. This change would have an impact on the gliding community. We intend to reduce this impact as much as possible, whilst still achieving our operational and environmental objectives.

3.14. In Figure B9, there are notes regarding a proposed alternate departure route to the south that would only be used under certain circumstances.

3.15. Outside the blue outlined area, we propose sharing certain volumes of airspace with the gliding community, on a limited number of days of the year. This would change the southbound departure flow *within* the blue outlined area, but *only* when this sharing arrangement was activated. It would also only happen once the departing aircraft was at or above 4,000ft, in the grey shaded area of Figure B9.

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.

9 Route positioning is limited by aircraft manoeuvrability. Aircraft fly at high speeds; this limits how tightly, and how often, aircraft can turn in order for the route to be considered flyable and safe (this is governed by international design standards); hence avoiding one sensitive area can often mean over-flying another.

3.16. For more details of this sharing arrangement, known as Flexible Use of Airspace (FUA), see Part C.

Overall benefit

3.17. Our assessment of impacts is based on our interpretation of the Government's priorities described in Part A, which focusses on minimising the numbers of people over-flown by aircraft flying below 4,000ft. Whilst the proposed design would have both positive and negative impacts, we believe that by reducing the net number of people overflown at low altitudes and by avoiding disruption of GA areas as far as practicable, our design achieves the best balance. We therefore believe that the change is justified. In the questions below we ask about the principles behind our design decisions, and in Section 4 we are seeking local views in order to help determine whether our design can be improved further.

Questions B1-B3

The following three questions are intended to gather your views regarding our ***justification*** for the proposed change, and the ***balances*** we strike between competing priorities.

Please remember that these three questions are ***not*** asking about specific locations, only the ***principles*** behind why and how we designed the proposed routes.

Answering these questions does not prevent you from providing information on local sensitivities in answer to the questions in Section 4; for example you may support the objective of improving noise management but have strong views on areas that should be avoided. Equally you may have information that we have not considered that leads you to oppose the objective of improving noise management, regardless of local issues. Please use the questions below to express your views on the general principles.

Question B4 will ask about the impact on specific locations.

Question B1 – Routes and airspace structures

This question is about ***justification for change***.

In Section 3 above, we say that the more ***predictable*** aircraft flight-paths are, the more ***efficient*** their safe management can be.

This applies both to Farnborough flights within CAS, and to GA flights outside CAS.

This proposal is seeking to introduce new departure and arrival routes, and airspace structures to surround them, which would change some flight-paths below 4,000ft.

This would improve the consistency of aircraft flight-paths on those routes, using modern navigational capabilities. Consistent flight-paths would be predictable and more efficient to manage safely.

The use of CAS structures would help separate Farnborough aircraft from recreational and military flights that also operate in the area. This means that everything inside the structures would be known and predictable, which would also be more efficient to manage safely. GA users outside CAS would fly more predictable paths due to the presence of the CAS structures themselves, and could make requests to cross them, again using predictable paths.

To what extent do you agree with our justification:

Introducing new routes and airspace would make aircraft flight-paths more predictable. Making them more predictable makes them more efficient to manage safely.

1 Strongly agree

2 Somewhat agree

3 No preference

4 Somewhat disagree

5 Strongly disagree

You are welcome to provide a statement to support your answer.

Question B2 – Balance between local noise impact and CO_2 emissions

This question is about ***balance***.

In Section 3 above we say that the proposed flight-paths at low altitudes would reduce the net number of people over-flown by these flight-paths. This would help noise management, in line with Government guidance that we are required to consider, as discussed in Part A.

The consequence of following this guidance is that some routes are longer than today's typical flight-paths. This means that some aircraft need to use more fuel, leading to more CO_2 emissions.

It's not possible to reduce the local noise impact *and* make all our aircraft fly shorter routes at the same time, so we prioritised reducing local noise impact at the expense of more fuel.

To what extent do you agree with our balance:

Making our aircraft fly longer routes is justified, if it reduces the over-flight of populated areas at low altitudes.

1 Strongly agree

2 Somewhat agree

3 No preference

4 Somewhat disagree

5 Strongly disagree

You are welcome to provide a statement to support your answer.

Question B3 – Balance between affecting GA activities and CO_2 emissions

This question is also about ***balance***.

In Section 3 above (and also in Part A) we say that we have designed routes to avoid areas of popular GA activity as much as possible.

The consequence of this is that some routes are longer than today's typical flight-paths. This means that some aircraft need to use more fuel, leading to more CO_2 emissions.

It's not possible to avoid popular GA areas ***and*** make all our aircraft fly shorter routes at the same time, so we prioritised avoiding GA areas at the expense of more fuel.

To what extent do you agree with our balance:

Making our aircraft fly longer routes is justified, if it reduces the impact on GA activities at low altitudes.

1 Strongly agree

2 Somewhat agree

3 No preference

4 Somewhat disagree

5 Strongly disagree

You are welcome to provide a statement to support your answer.

4. Local considerations for route positioning

4.1. Figures B4-B8 show current air traffic flows, and Figures B9-B11 show the proposed air traffic flows. You can also view the maps interactively at:

www.Consultation.TAGFarnboroughAirport.com

and use the postcode search function. The website will also allow you to zoom in on maps, and to easily switch between the current day traffic picture and the consultation swathes for the new routes.

How to use the maps and data to assess potential effects

4.2. We have provided information to help answer the questions 'Would the change mean more or fewer over-flights? And if so, how many aircraft and what is the potential change in impact?' This information is in the form of maps and data that indicates potential noise and visual impacts across the consultation swathe. These swathes cover all options for the positioning of the new routes described in this document (they do not cover existing flight-paths that would not change). The consultation swathes themselves are shown in Figures B9 to B11, including data indicating the predicted numbers of flights affected. These Figures may be directly compared to the maps in Figures B2 to B8 which show today's air traffic flows.

4.3. The information we have provided describes:

a. The potential number of aircraft that would fly on the route. Tables are provided on the data pages preceding the maps

b. The lowest, and the most likely, altitudes these aircraft would be at. This is shown by the shading on the maps themselves and is discussed in more detail in the paragraphs below; and

c. A measurement of the maximum noise impact aircraft over-flying at that height would generate at ground level (referred to as L_{max}). This is also dependent on the aircraft types expected. A summary is provided on the data pages preceding the maps.

Swathes

4.4. The swathe maps have shaded areas to show where flight-paths would normally be as a consequence of this proposal. The areas enclosed by the dashed black lines denote the widest extent of the likely traffic spread, and the solid black lines show where traffic would normally be concentrated. We have not yet finalised the exact position of the routes we are proposing, but they would need to be within the area enclosed by the solid black lines.

Arrows

4.5. The swathe maps have arrows which indicate the general direction of the traffic flows, provided to help you interpret the maps. These arrows are illustrative and do not represent the precise position of any formal airspace route.

Altitude data

4.6. The altitude information presented on the maps shows a worst case (lowest) altitude and an indication of typical (most likely) altitude for aircraft during normal operations. The worst case represents the lowest altitude we would normally expect an aircraft to be on the flight-path in question. For example, the start of the 'minimum 3,000ft' altitude band on a map for a departure route is the area by which we would normally expect all aircraft to have reached 3,000ft. This would include the worst case of a slow climbing aircraft. Slow climbers are generally the larger/older aircraft types – most aircraft significantly outperform these slow climbers and would therefore usually be higher. Most Farnborough aircraft tend to be amongst the highest performing types.

4.7. The typical altitude is shown to indicate that most aircraft would usually be above the worst case; however, predicting typical altitudes for aircraft for a future airspace design is not an exact science. We have therefore erred on the side of caution with these typical values, and even they do not represent the true range of altitudes that many aircraft are expected to achieve. It is worth noting that, in general, we expect the proposed changes to mean that, for a given location, aircraft will be at least the same, but most probably at higher, altitudes than today.

4.8. Whilst this variation in altitudes would happen in reality, it is difficult to represent in a consultation document. We therefore suggest that, as a default, stakeholders should consider the potential impact of aircraft at the minimum altitudes shown on Figures B9 to B11.

Tranquillity

4.9. Another factor that may determine the significance of a potential impact is tranquillity. CAA guidance for airspace change does not provide a method for assessing tranquillity. Any assessment will therefore be subjective and dependent on the specific location in question. The Government guidance (see Appendix A) specifically mentions AONBs and National Parks and so we have highlighted them in Figure B3 and in the worked examples later in this section. You may wish to consider the potential effect on tranquillity when providing feedback.

Assumptions

4.10. In order to ensure you do not underestimate the number of over-flights over a particular location, and to ensure we get feedback across the range of options within the swathes presented in this consultation, we ask you to make the following assumptions if your area of interest falls within the shaded areas bounded by the black lines on the maps:

a. Assume the flight-path may be positioned directly above you at the altitudes shown (so the maximum number of over-flights would apply to this area, as described in the data tables); and

b. Assume that all aircraft would consistently fly along the flight-path in question rather than being vectored elsewhere in the vicinity by ATC.

4.11. These assumptions, combined with the worst-case assumptions regarding minimum altitude described above, mean that the potential impact may be overestimated in this document. This is because the consultation swathes presented are wider than the routes which would be positioned within them, so not all the areas would be directly over-flown by the route; and because vectoring off route would happen some of the time (albeit less than today).

4.12. We believe that this is a prudent and favourable approach over one which risks you underestimating the potential effects as it is better for us to analyse and filter the salient points from a wide consultation response, than to risk stakeholders not responding because they assume the impact is lower than it might in fact be. For this reason, please think about what feedback you would supply us *if* you were directly over-flown by one, some or all of the routes and provide your feedback by answering the questions we ask.

General characteristics of proposed changes

4.13. The following paragraphs present the consultation swathes and describe the key factors that determine where they sit.

4.14. The traffic data shown on the pages preceding Figures B3 to B11 show a forecast of the average daily number of flights.

Farnborough's proposed departure routes – See Figure B9 on Page B41

4.15. Figure B9 shows the consultation swathe for the departure routes from both runways. Compare this with Figures B5 and B6. You may prefer to view the website where you can switch between these maps on screen.

4.16. Figure B9 illustrates that the areas over-flown would generally be in a smaller region than today (enclosed by the dashed lines), and the flights would be mostly concentrated somewhere within an even narrower corridor (between the solid black lines). Also, it illustrates where the departures from either runway would most likely climb past 4,000ft (grey shaded region).

4.17. Under this proposal, northerly departures would head southwest first. This means that places to the **west and northwest of Farnborough** would not be over-flown by our departures below 4,000ft in normal circumstances.

4.18. Some southerly departures would head further to the southwest before turning south, but many of them would follow a similar path to today albeit in a narrower stream (especially those from Runway 24).

Farnborough's proposed arrival routes
See Figures B10 on Page B42 and Figure B11 on Page B43

4.19. Figures B10 and B11 show the consultation swathes for positioning the proposed arrival routes below 4,000ft to final approach. Compare Figure B10 with Figure B7, and Figure B11 with Figure B8. You may prefer to view the website where you can switch between these maps on screen.

4.20. Figure B10 illustrates that Runway 06 arrivals would generally be in a smaller region than today (enclosed by the dashed lines) and the flights would be mostly concentrated somewhere within an even narrower corridor (between the solid black lines). Also, it illustrates where the arrivals would most likely still be at or above 4,000ft (grey shaded region).

4.21. Comparing Figure B10 with Figure B7, it would be highly unlikely that arrivals from the northwest would join final approach directly from the north, as happens today for approximately half of Runway 06 arrivals that join final approach via Hook, North Warnborough and Crookham. Under this proposal, these flights would stay higher whilst northwest of the M3 motorway, cross to the south of the airport and join the flow of arrivals from the southwest of the airport.

4.22. Figure B11 illustrates that Runway 24 arrivals would generally be in a smaller region than today (enclosed by the dashed lines) and the flights would be mostly concentrated somewhere within an even narrower corridor (between the solid black lines). Also, it illustrates where the arrivals would most likely still be at or above 4,000ft (grey shaded region). The basic structure of the flight-paths from both north and south would be similar to that seen today, i.e. the flows would join together to the south of the airport and sweep around to land in a westerly direction, but it would be narrower and more consistent.

4.23. The alignment of the final approach to either runway would not change, so the areas nearest the airport highlighted by the brightest colours in Figures B7 and B8 are likely to remain.

4.24. The precise positions of the routes within the swathes shown in Figures B10 and B11 will be determined after consultation feedback has been analysed. We believe they would be best placed within the solid black lines shown on those maps.

Current and forecast air traffic information for Figures B9-B11

4.25. Below, Tables B1-B12 show the potential number of flights that could pass directly overhead if that is where a route gets positioned.

4.26. Areas beneath the final routes would expect more over-flights than today due to the more consistent and accurate flight-paths. Areas away from the routes would expect fewer over-flights.

4.27. The hourly numbers given in Tables B1-B12 (Pages B30-B33) are *averages*[10]. Like any airport, there are busy periods where flights per hour are greater than the average, likewise there are quiet periods where there are few flights, or none at all. At Farnborough, these peaks and troughs are based on too many factors to be predictable, though weekends and public holidays tend to be less busy than weekdays. This would not change due to the proposal.

Noise impact for Figures B9-B11

4.28. Below, Tables B13-B14 show the potential noise impact of a single flight directly overhead at a given height. This measurement is known as L_{max}.

What is the impact now, and what would it be in the future? Worked examples

4.29. The following paragraphs explain how to work out the changes in impact for real places, as an example. Follow these examples, use the maps to find where you live or work, and run through the same method for your area of interest.

4.30. We have worked two examples, using the towns of Hook and Haslemere. To follow the examples we suggest you have the maps nearby, or have the consultation website open with the map pages on display.

4.31. We describe what impacts Hook and Haslemere are exposed to now, what they would be exposed to in the future if this proposal was not implemented, and what they would be exposed to in the future if this proposal was implemented.

4.32. To describe the impact today, we used radar data and aircraft numbers from 2012. In 2019, if the proposal was not implemented, aircraft would continue to follow the same flight-paths as today. We have provided forecast numbers for both the most likely and the highest cases.

4.33. In these examples, we will compare today's movement numbers with the most likely forecast movement numbers for 2019.

4.34. Please remember the assumptions in paragraphs 4.10-4.12.

4.35. The relevant Figures (B3-B11) are on Pages B35-B43. The relevant Tables (B1-B15) are on Pages B30-B34.

10 These averages were calculated based on Farnborough being open 253 weekdays for 15 hours, and 110 weekend/ Bank Holiday days for 12 hours, with two days closed (Dec 25th and 26th). The weekend limit set by the Planning Deed will be observed (maximum 17.8% of all annual flights are allowed at weekends).

4.36. We will use:	In order to:
Figures B3-B8	See where the place is, in relation to current flight-paths
Figures B9-B11	See where the place is, in relation to proposed flight-paths
Tables B1-B12	Find out how many flights affect the place
Tables B13-B15	Understand the noise impacts involved for that place.

Hook

4.37. From Figure B3, Hook is currently over-flown by commercial air traffic to and from many airports, including Heathrow and Gatwick. This density plot shows Hook covered by green and yellow colours. This means that, on average over a month, Hook is over-flown by more than twelve and up to twenty four flights per day. Hook is not within a National Park or AONB.

4.38. From Figure B4, Hook is currently regularly overflown by Farnborough air traffic. This density plot shows Hook covered by the light blue colour[11]. This means that, on average over a month, Hook is over-flown one to three times per day by Farnborough flights. The spread of the colours means that other Farnborough aircraft fly through the vicinity.

Hook today, and if the proposal was not implemented

4.39. Using Figure B5, Hook is partly over-flown by Farnborough Runway 06 departures to the north. Table B1 shows that, in 2012, about 1,035 aircraft flew that route. In 2019 the most likely number to fly that route would be 1,760.

4.40. Using Figure B6, Hook is over-flown by Farnborough Runway 24 departures to the north. Table B4 shows that, in 2012, about 4,140 aircraft flew that route In 2019 the most likely number to fly that route would be 7,040.

4.41. Using Figure B7, Hook is partly over-flown by Farnborough Runway 06 arrivals from the north. Table B7 shows that, in 2012, about 1,265 aircraft flew that route. In 2019 the most likely number to fly that route would be 1,760.

4.42. Using Figure B8, Hook is partly over-flown by Farnborough Runway 24 arrivals from the north. Table B10 shows that, in 2012, about 5,060 aircraft flew that route. In 2019 the most likely number to fly that route would be 7,040.

11 Remember that the colour key for Figure B3 is different from Figures B4-B8 because Figure B3 includes traffic for ***all*** airports

4.43. The vicinity of Hook is therefore currently over-flown by:

1,035 + 4,140 = 5,175 departures

1,265 + 5,060 = 6,325 arrivals

4.44. If the proposal was not implemented (*no change* to tracks), in 2019 the vicinity of Hook would be over-flown by:

1,760 + 7,040 = 8,800 departures

1,760 + 7,040 = 8,800 arrivals.

Hook under this proposal

4.45. Using Figure B9, Hook would not usually be over-flown by any Farnborough departures at all. Therefore there is no need to look at the tables for any departure numbers.

4.46. Using Figure B10, the vicinity of Hook would be partly over-flown by Farnborough Runway 06 arrivals from the north in a similar way to today, normally at or above 4,000ft. From Table B7, in 2019 the most likely number to fly that route would be 1,760.

4.47. Using Figure B11, the vicinity of Hook would be partly over-flown by Farnborough Runway 24 arrivals from the north in a similar way to today, normally at or above 4,000ft. From Table B10, in 2019 the most likely number to fly that route would be 7,040.

4.48. Under this proposal, in 2019 the vicinity of Hook would be over-flown by:

Few or no departures Insignificant departure noise impact

1,760 + 7,040 = 8,800 arrivals For noise impacts, see Table B14

Haslemere

4.49. From Figure B3, Haslemere is currently over-flown by commercial air traffic to and from many airports, including Heathrow and Gatwick. This density plot shows Haslemere covered by yellow and red colours. This means that, on average over a month, Haslemere is over-flown by more than eighteen flights per day, with eastern Haslemere experiencing more than twenty four flights per day. Haslemere is not within a National Park or AONB, but it is bordered by Surrey Hills AONB to the north and east, and the South Downs National Park to the south.

4.50. From Figure B4, the vicinity of Haslemere is currently regularly overflown by Farnborough air traffic. This density plot shows Haslemere covered by the light grey colour[12]. This means that, on average over a month, the vicinity of Haslemere is over-flown up to once per day by Farnborough flights. The spread of the grey area means that other Farnborough flights pass nearby.

12 Remember that the colour key for Figure B3 is different from Figures B4-B8 because Figure B3 includes traffic for ***all*** airports

Haslemere today, and if the proposal was not implemented

4.51. Using Figure B5, the vicinity of Haslemere is over-flown by Farnborough Runway 06 departures to the south. Table B2 shows that, in 2012, about 1,035 aircraft flew that route. In 2019 the most likely number to fly that route would be 1,120.

4.52. Using Figure B6, Haslemere is rarely over-flown by Farnborough Runway 24 departures. Therefore there is no need to look at Table B5 for Runway 24 departure numbers.

4.53. Using Figure B7, Haslemere is over-flown by Farnborough Runway 06 arrivals from the south. Table B8 shows that, in 2012, about 805 aircraft flew that route. In 2019 the most likely number to fly that route would be 1,120.

4.54. Using Figure B8, the vicinity of Haslemere is over-flown by Farnborough Runway 24 arrivals from the south. Table B11 shows that, in 2012, about 3,220 aircraft flew that route. In 2019 the most likely number to fly that route would be 4,480.

4.55. the vicinity of Haslemere is therefore currently over-flown by:

1,035 + zero = 1,035 departures

805 + 3,220 = 4,025 arrivals

4.56. If the proposal was not implemented (*no change* to tracks), in 2019 the vicinity of Haslemere would be over-flown by:

1,120 + zero = 1,120 departures

1,120 + 4,480 = 5,600 arrivals

Haslemere under this proposal

4.57. Using Figure B9, the vicinity of Haslemere would not usually be over-flown by any Farnborough departures at all. Therefore there is no need to look at the tables for any departure numbers.

4.58. Using Figure B10, the vicinity of Haslemere would be partly over-flown by Farnborough Runway 06 arrivals from the south in a similar way to today, normally between 3,000ft and 4,000ft. From Table B8, in 2019 the most likely number to fly that route would be 1,120. However, they would be joined by arrivals from the southwest as per Figure B10 and the text below Table B8, which says that we should add the number from Table B9. So from Table B9, in 2019 the most likely additional number to join from the southwest would be 320.

4.59. Using Figure B11, Haslemere would be over-flown by Farnborough Runway 24 arrivals from the south a similar way to today, normally between 3,000ft and 4,000ft. From Table B11, in 2019 the most likely number to fly that route would be 4,480. However, they would be joined by arrivals from the southwest as per Figure B11 and the text below Table B11, which says that we should add the number from Table B12. So from Table B12, in 2019 the most likely additional number to join from the southwest would be1,280.

4.60. Under this proposal, in 2019 the vicinity of Haslemere would be over-flown by:

Few or no departures Insignificant departure noise impact

(1,120+320) + (4,480+1,280) = 7,200 arrivals For noise impacts, see Table B14

Noise impacts

4.61. Comparing the noise impacts for departures (Table B13) and arrivals (Table B14) against Table B15 (which gives examples of everyday noises) allows you to understand the approximate scale of the noise impact. Farnborough aircraft are generally moving quickly, so each noise impact would build then disappear as each aircraft got closer then moved away.

End of worked examples

4.62. Completing this exercise for yourself will allow you to form your own opinion on the change in impact this proposal could have on where you live or work.

4.63. Remember that, if this proposal is ***not*** implemented, the forecast 2019 traffic numbers would ***still*** apply to today's flight-paths.

Runway 06 Departing Aircraft Numbers[13]: Figures B5 and B9

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	1,035	1,485	2,475	1,760	2,750
Average Per Hr Weekday	0.22	0.32	0.54	0.38	0.60
Average Per Hr Weekend	0.14	0.20	0.33	0.24	0.37

Table B1: Runway 06 Departures to the north

Under this proposal, future departures to the north would route southwest first, and departures to the east would initially route north instead of south.

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	1,035	945	1,575	1,120	1,750
Average Per Hr Weekday	0.22	0.20	0.34	0.24	0.38
Average Per Hr Weekend	0.14	0.13	0.21	0.15	0.24

Table B2: Runway 06 Departures to the south

Under this proposal, future departures to the south would route in a similar manner to today. Departures to the east would initially route north instead of south.

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	230	270	450	320	500
Average Per Hr Weekday	0.05	0.06	0.10	0.07	0.11
Average Per Hr Weekend	0.03	0.04	0.06	0.04	0.07

Table B3: Runway 06 Departures to the southwest

Under this proposal, future departures to the southwest would route west first. There would be no change to the proportion of departures routing this way.

13 As per Part A, the proportion of departures to the north would change due to requests from NATS En-Route, the next 'link' in the ATC chain. This has been included in these calculations.

Runway 24 Departing Aircraft Numbers[14]: Figures B6 and B9

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	4,140	5,940	9,900	7,040	11,000
Average Per Hr Weekday	0.90	1.29	2.14	1.52	2.38
Average Per Hr Weekend	0.56	0.80	1.34	0.95	1.48

Table B4: Runway 24 Departures to the north

Under this proposal, future departures to the north would route southwest first, and departures to the east would initially route north instead of south.

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	4,140	3,780	6,300	4,480	7,000
Average Per Hr Weekday	0.90	0.82	1.36	0.97	1.52
Average Per Hr Weekend	0.56	0.51	0.85	0.60	0.94

Table B5: Runway 24 Departures to the south

Under this proposal, future departures to the south would route in a similar manner to today. Departures to the east would initially route north instead of south.

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	920	1,080	1,800	1,280	2,000
Average Per Hr Weekday	0.20	0.23	0.39	0.28	0.43
Average Per Hr Weekend	0.12	0.15	0.24	0.17	0.27

Table B6: Runway 24 Departures to the southwest

Under this proposal, future departures to the southwest would route west first. There would be no change to the proportion of departures routing this way.

14 As per Part A, the proportion of departures to the north would change due to requests from NATS En-Route, the next 'link' in the ATC chain. This has been included in these calculations.

Arriving Aircraft Numbers for Runway 06: Figures B7 and B10

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	1,265	1,485	2,475	1,760	2,750
Average Per Hr Weekday	0.27	0.32	0.54	0.38	0.60
Average Per Hr Weekend	0.17	0.20	0.33	0.24	0.37

Table B7: Runway 06 Arrivals from the north

Under this proposal, all future arrivals from the north would cross to the south of the airport before positioning to make their approach to land. Currently, this crossover happens about half the time.

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	805	945	1,575	1,120	1,750
Average Per Hr Weekday	0.17	0.20	0.34	0.24	0.38
Average Per Hr Weekend	0.11	0.13	0.21	0.15	0.24

Table B8: Runway 06 Arrivals from the south

Under this proposal, all future arrivals from the south would route in a similar manner to today, and would be joined by the arrivals from the southwest (adding from Table B9).

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	230	270	450	320	500
Average Per Hr Weekday	0.05	0.06	0.10	0.07	0.11
Average Per Hr Weekend	0.03	0.04	0.06	0.04	0.07

Table B9: Runway 06 Arrivals from the southwest

Under this proposal, all future arrivals from the southwest would route at a higher altitude heading eastwards, turning left to join the arrivals from the south (adding to Table B8).

Arriving Aircraft Numbers for Runway 24: Figures B8 and B11

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	5,060	5,940	9,900	7,040	11,000
Average Per Hr Weekday	1.10	1.29	2.14	1.52	2.38
Average Per Hr Weekend	0.68	0.80	1.34	0.95	1.48

Table B10: Runway 24 Arrivals from the north

Under this proposal, all future arrivals from the north would route in a similar manner to today.

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	3,220	3,780	6,300	4,480	7,000
Average Per Hr Weekday	0.70	0.82	1.36	0.97	1.52
Average Per Hr Weekend	0.43	0.51	0.85	0.60	0.94

Table B11: Runway 24 Arrivals from the south

Under this proposal, all future arrivals from the south would route in a similar manner to today, and would be joined by the arrivals from the southwest (adding from Table B12).

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	920	1,080	1,800	1,280	2,000
Average Per Hr Weekday	0.20	0.23	0.39	0.28	0.43
Average Per Hr Weekend	0.12	0.15	0.24	0.17	0.27

Table B12: Runway 24 Arrivals from the southwest

Under this proposal, all future arrivals from the southwest would route at a higher altitude heading eastwards, turning left to join the arrivals from the south (adding to Table B11).

Departure Noise Information

Height above ground	Peak noise impact of most common aircraft types Executive Jets (75%)	Peak noise impact of noisiest aircraft types A320/ Boeing 737 (10%)
Up to 2,000ft	75-92 dBA	75-93 dBA
2,000ft-3,000ft	69-75 dBA	70-75 dBA
3,000ft-4,000ft	64-69 dBA	66-70 dBA

Table B13: Departures - Typical loudest noise level (Lmax dBA) at various heights for the most common aircraft types, and the noisiest aircraft types, using Farnborough

The highest L_{max} dBA would be for the aircraft at the lowest altitude in each band.

Arrival Noise Information

Height above ground (ft)	Peak noise impact of most common aircraft types Executive Jets (75%)	Peak noise impact of noisiest aircraft types A320/ Boeing 737 (10%)
Up to 2,000	66-87 dBA	69-87 dBA
2,000-3,000	60-66 dBA	64-69 dBA
3,000-4,000	57-60 dBA	61-64 dBA

Table B14: Arrivals - Typical loudest noise level (Lmax dBA) at various heights for the most common aircraft types, and the noisiest aircraft types, using Farnborough

The highest L_{max} dBA would be for the aircraft at the lowest altitude in each band.

Table of Equivalent Sounds

Example Sound	Noise level (dBA)
Chainsaw, 1m distance	110
Disco, 1m from speaker	100
Diesel truck pass-by, 10m away	90
Kerbside of busy road, 5m away	80
Vacuum cleaner, 1m distance	70
Conversational speech, 1m away	60
Quiet office	50
Room in quiet suburban area	40

Table B15: Table of noise levels (Lmax dBA) for equivalent sounds[15]

15 Based substantially on www.sengpielaudio.com/TableOfSoundPressureLevels.htm

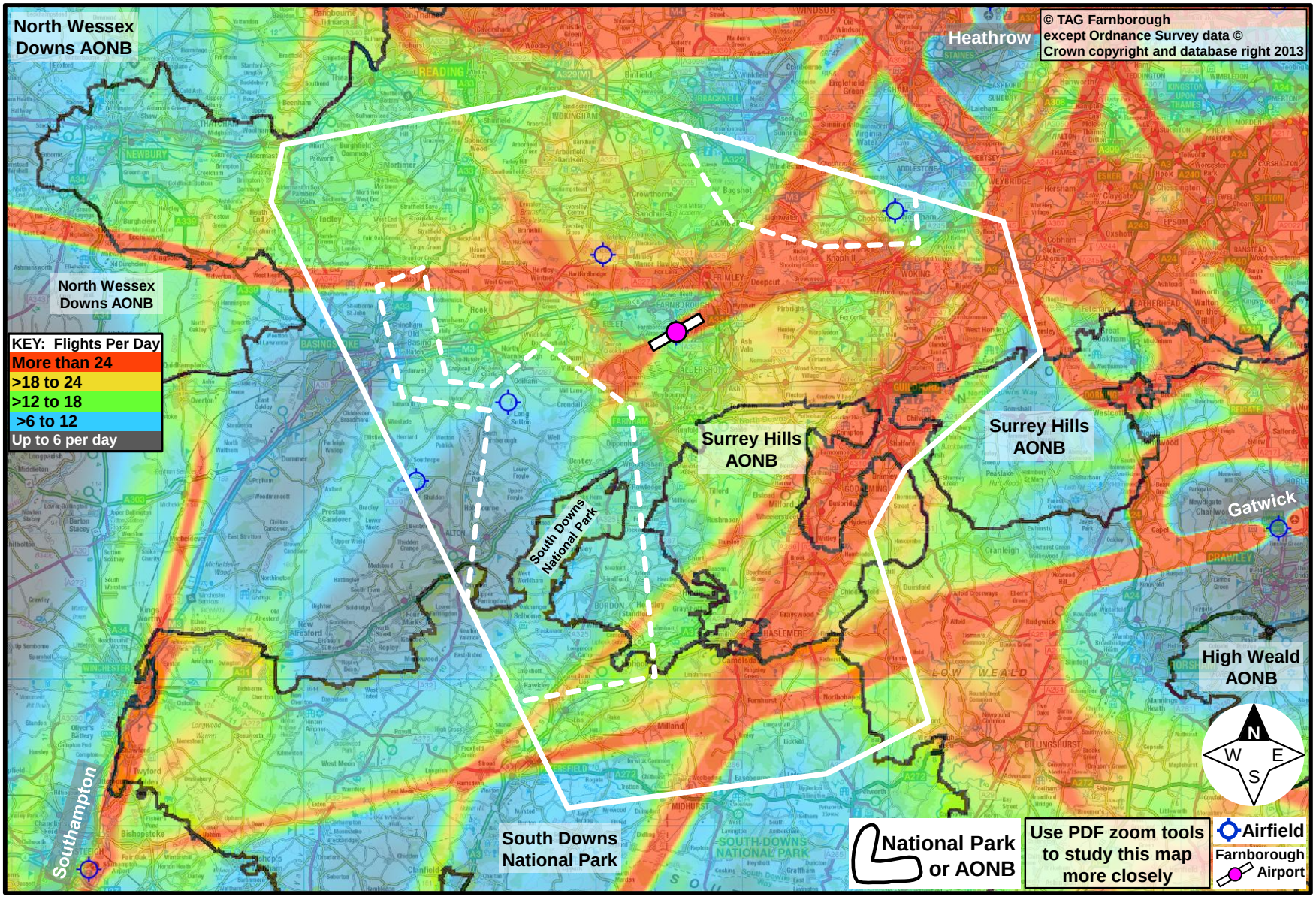


Figure B3: All commercial flights (up to 20,000ft) density plot with National Parks and AONBs

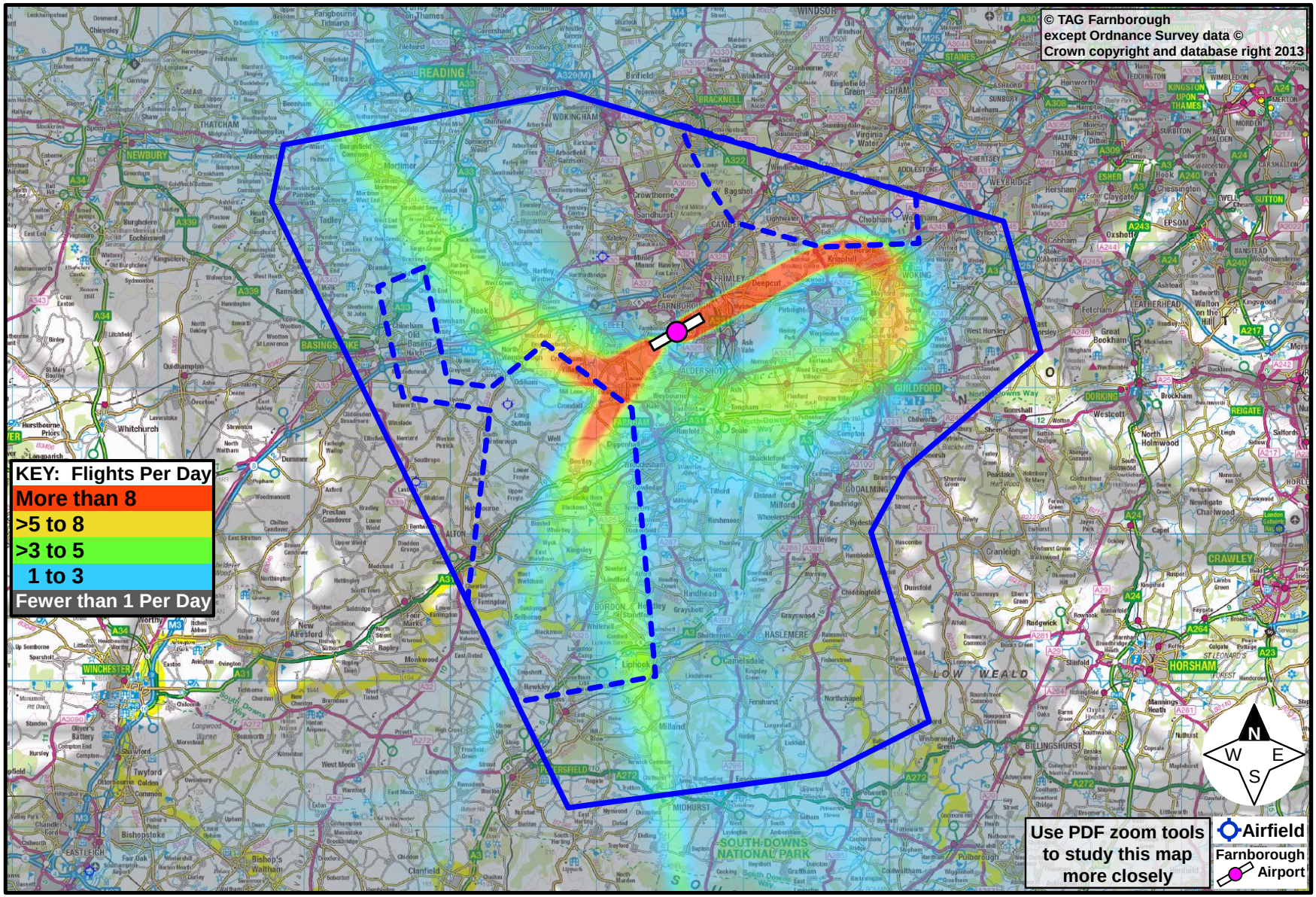


Figure B4: Farnborough departures and arrivals (up to 20,000ft) density plot

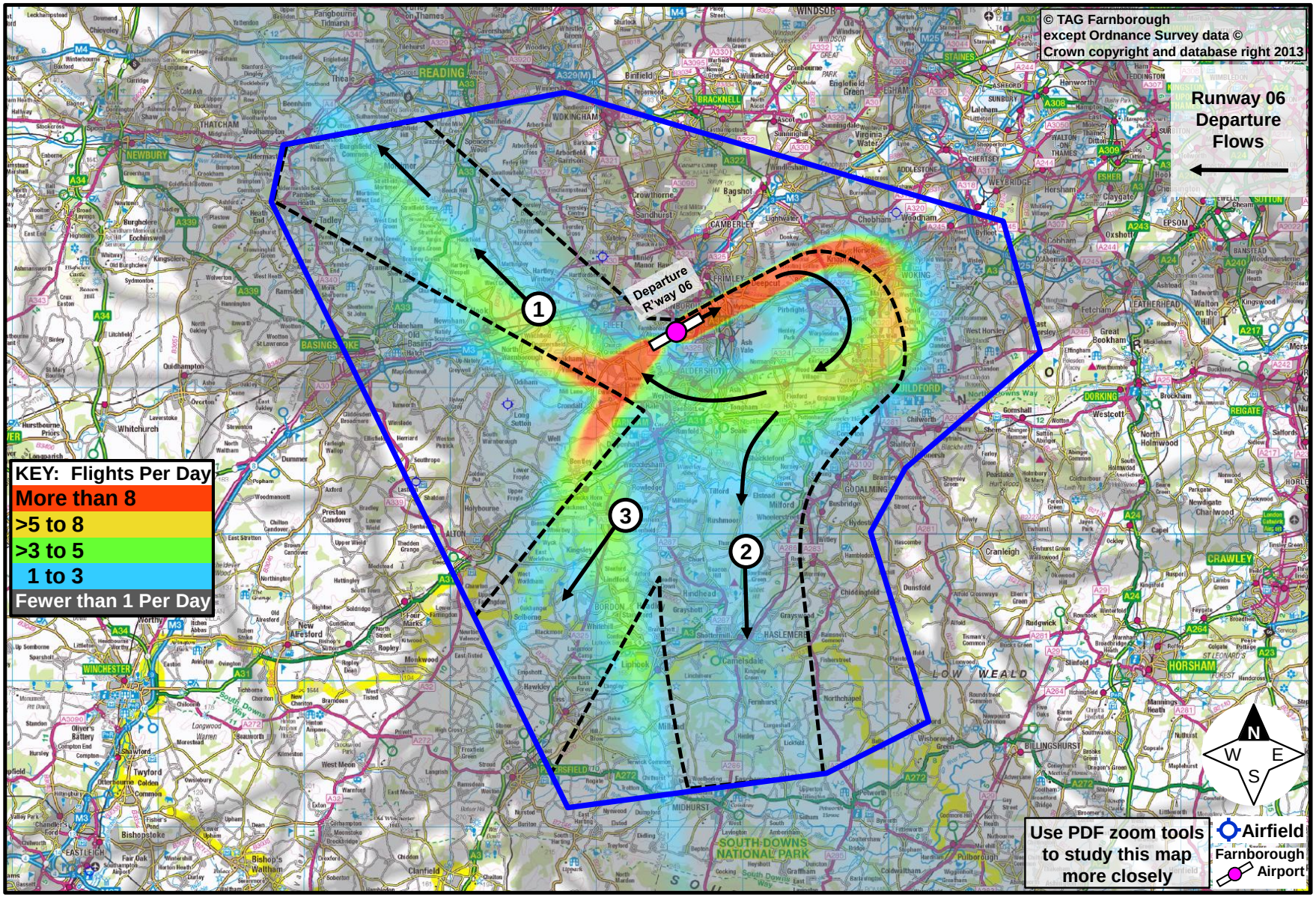


Figure B5: Arrows/dotted lines show Runway 06 departure flows (Radar data shows all Farnborough air traffic below 4,000ft)

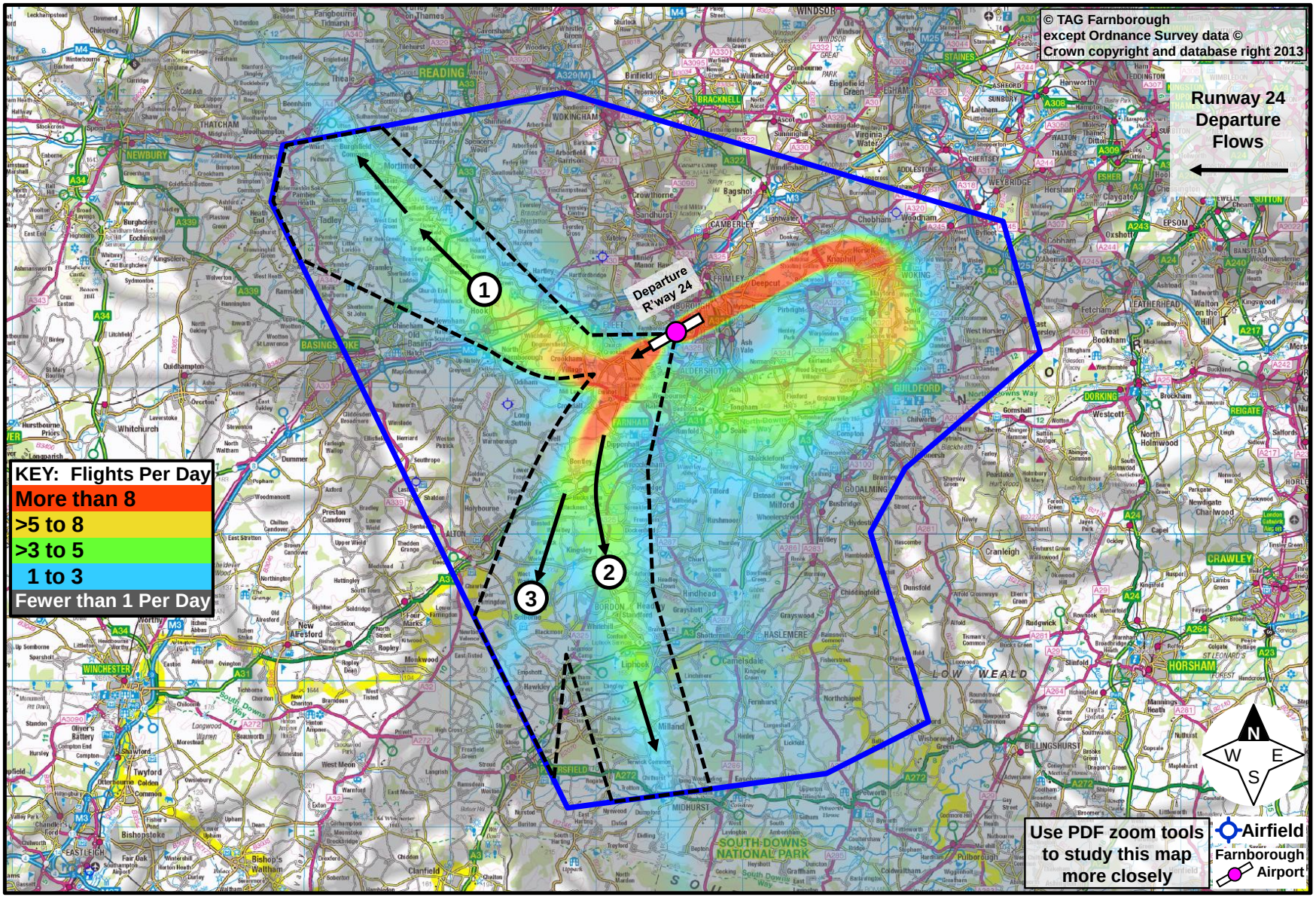


Figure B6: Arrows/dotted lines show Runway 24 departure flows (Radar data shows all Farnborough air traffic below 4,000ft)

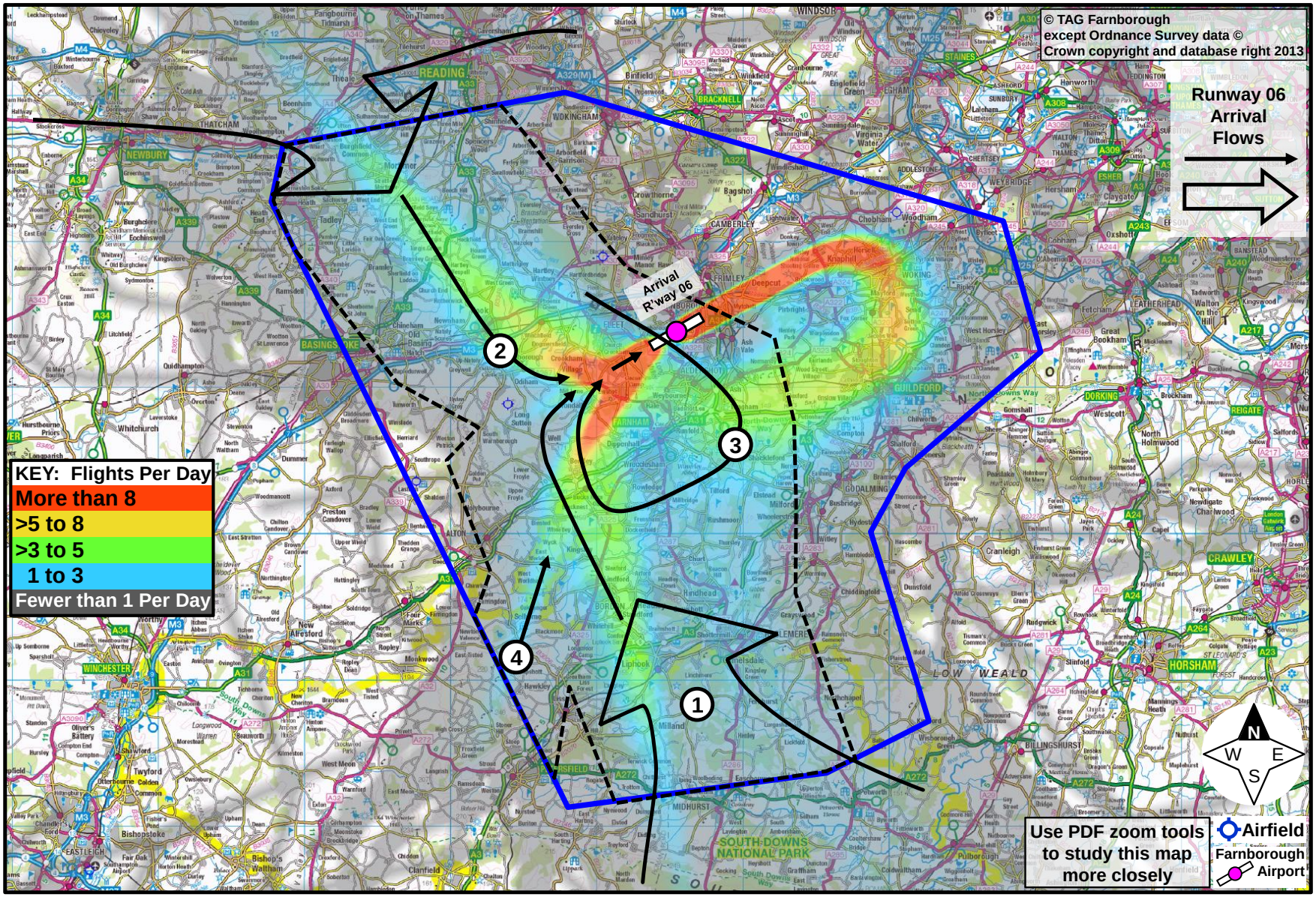


Figure B7: Arrows/dotted lines show Runway 06 arrival flows (Radar data shows all Farnborough air traffic below 4,000ft)

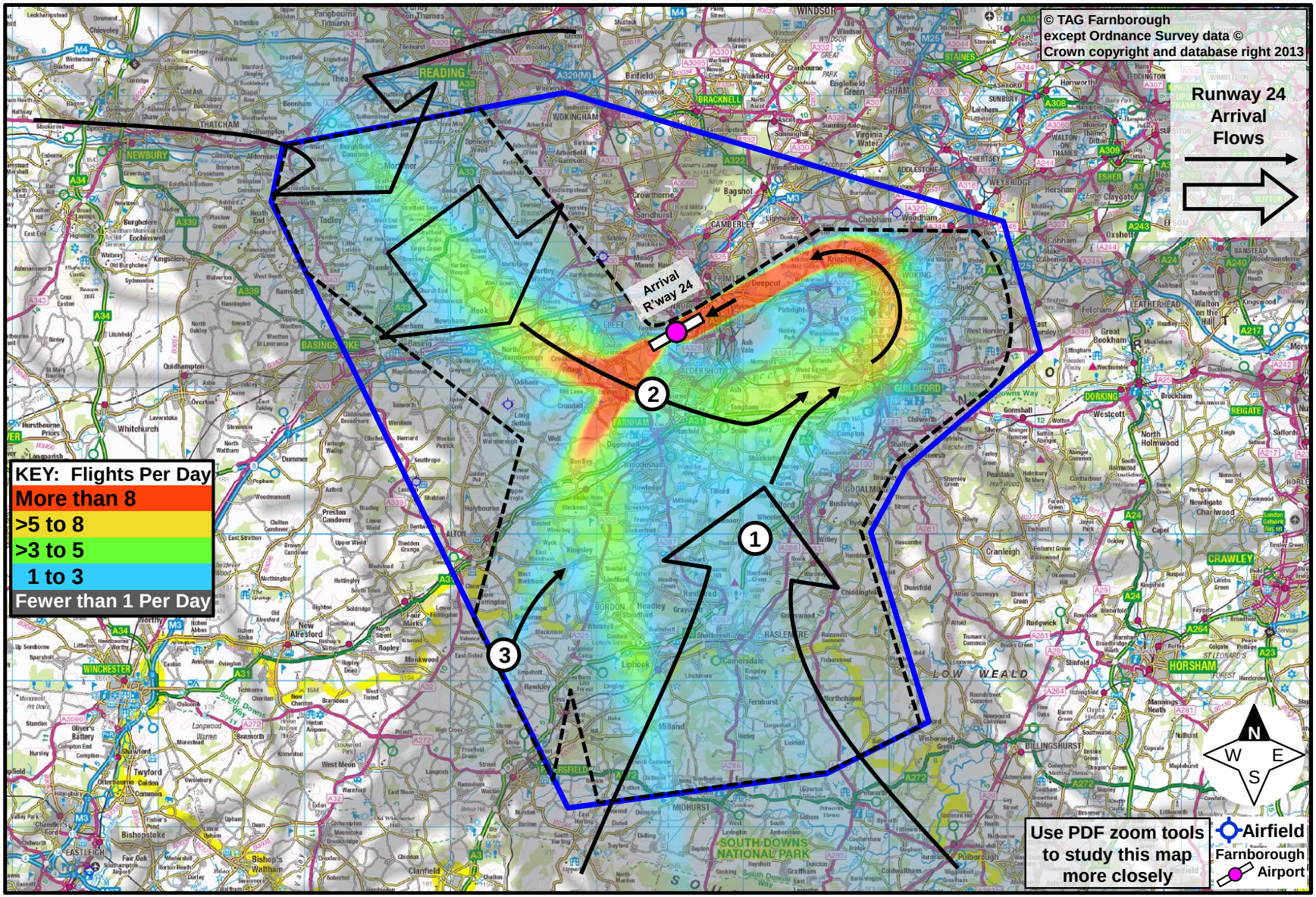


Figure B8: Arrows/dotted lines show Runway 24 arrival flows (Radar data shows all Farnborough air traffic below 4,000ft)

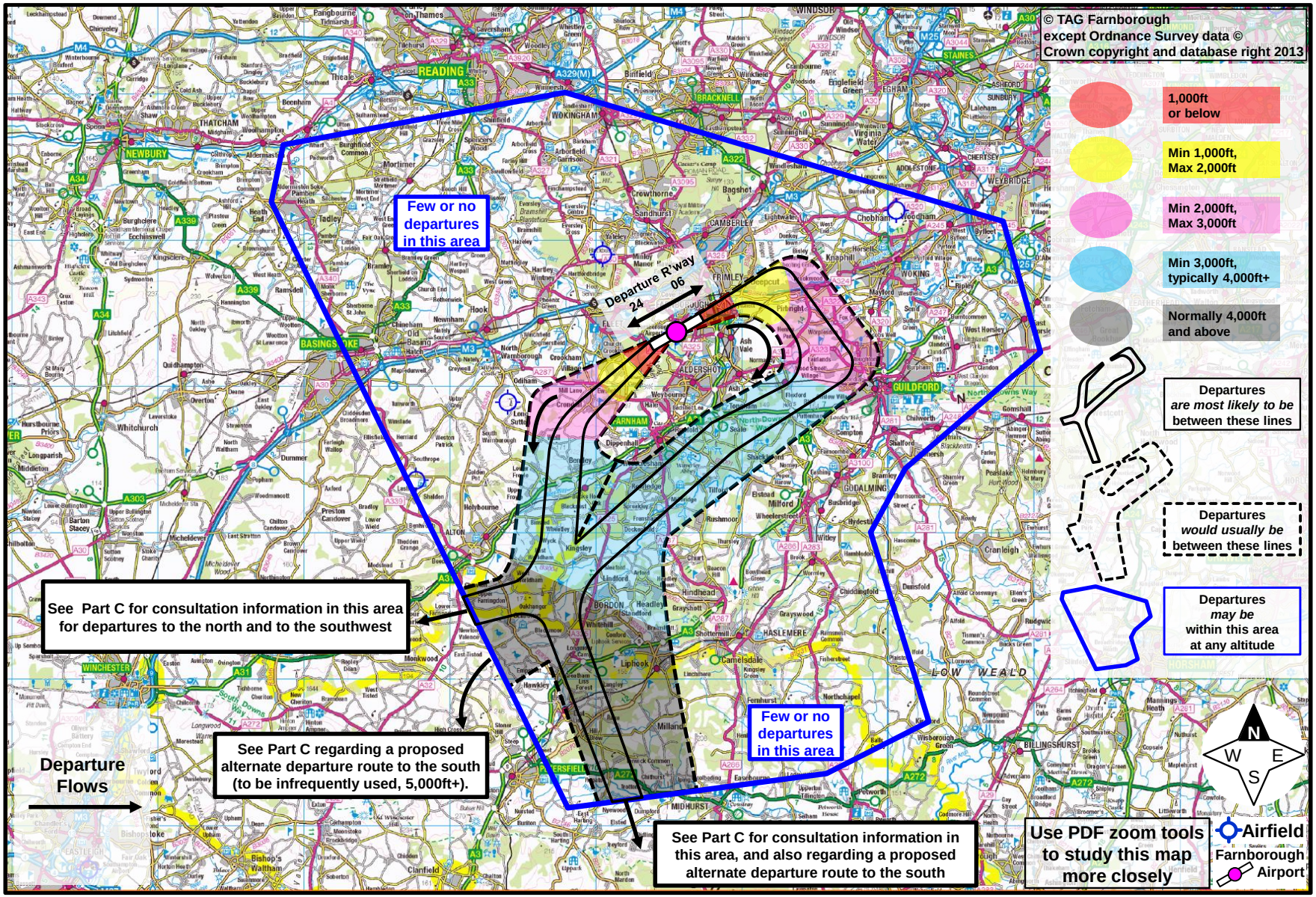


Figure B9: Proposed Farnborough departures from both runways below 4,000ft

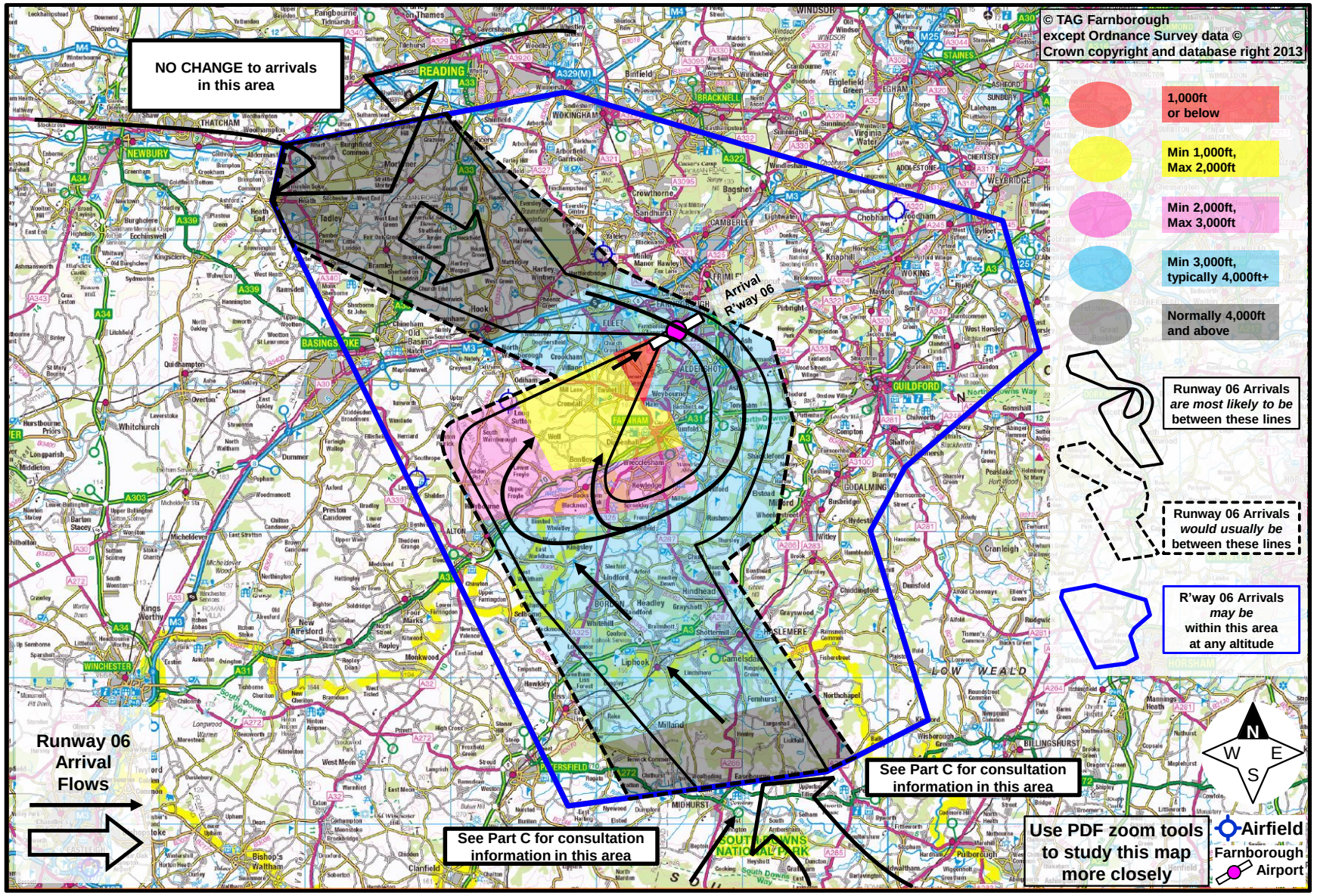


Figure B10: Farnborough arrivals to Runway 06 below 4,000ft

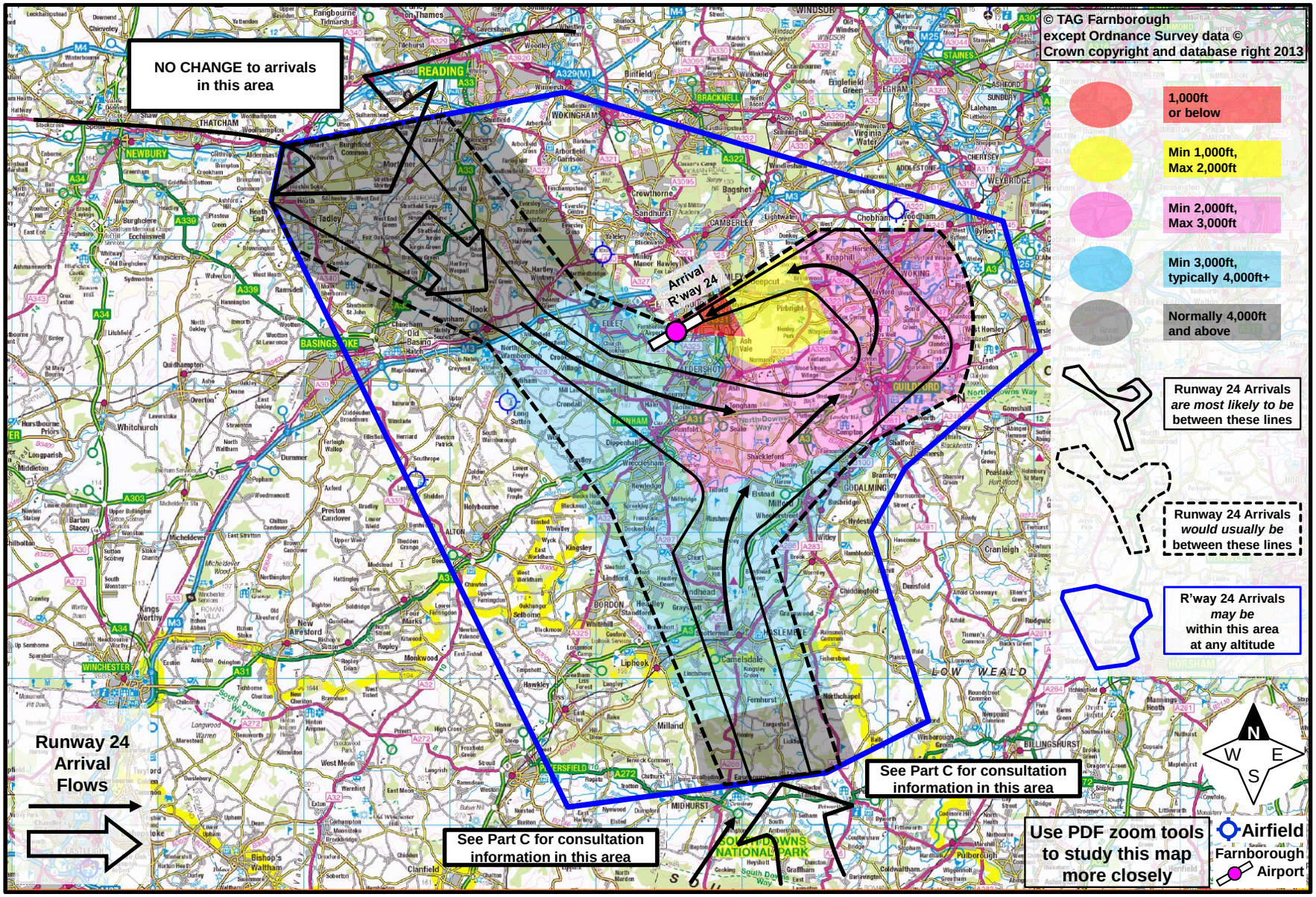


Figure B11: Farnborough arrivals to Runway 24 below 4,000ft

Question B4 – Specific Locations

This question is about ***places*** within the consultation swathes.

In Section 4 we asked you to consider your area(s) of interest using the maps, and compare the impact now with the impact under this proposal.

We want you to tell us about places within the blue consultation region that you think require special consideration in the ongoing design process.

Ideally, you would supply us with a postcode of the location. Otherwise, please use town or village names, the names of National Parks/AONBs, or other easily identifiable location. This means we can find the right place more easily.

Tell us broadly what type of place this is by choosing the closest type from the online menu. Do you think these places would benefit from the proposed change, or not, and to what extent? Describe the characteristics of these places, stating whether they should be considered special due to concerns about noise impact, visual impact or other reason.

You can do this for as many locations as you wish. We have provided a template for you below. Choose the closest or most important option from those suggested, or add your own if none are suitable.

Structuring your response like this will make it easier for us to analyse your feedback, which in turn makes it more effective on your behalf.

Location

Postcode, or name of easily identifiable place.

What type of place is this? *I consider this a…*

Populated residential area / Busy commercial area (town centre, retail park) / Industrial area (including military use) / Recreational area / Tranquil area / Sensitive area (e.g. hospital) / Village / Nature area / Tourist attraction / Transport link (railway, motorway, airport) / Other (brief description)

What would the change in impact be, on this place? *If the change occurred, this place would…*

Benefit significantly from the change / Benefit slightly / Probably not notice the change / Be slightly negatively impacted / Be very negatively impacted by the change

Why would the impact change, on this place? *If I was at this place…*

I would hear less aircraft noise / I would see fewer aircraft / It wouldn't make much difference to me / I would hear more aircraft noise / I would see more aircraft / Other (brief description)

Choose the ***most relevant***, or ***most important***, item from the suggestions, or add your own if none are suitable.

Please repeat this process until you have finished telling us about specific locations that you think require special consideration

.

5. Northern dashed blue area – GA impact in the vicinity

5.1. The northern blue dashed area shown in Figure B1, and zoomed in Figure B12 below, is currently sometimes used by light GA aircraft, helicopters to/from London, and flights to/from Fairoaks airport.

5.2. No Farnborough flights operate within this area.

5.3. GA aircraft wishing to route between the east and west must currently avoid Heathrow by routing outside the red *and* blue areas, so they fly around the southern blue edge. This makes them more likely to interact with our departures and arrivals (see the yellow arrow on Figure B12). To manage this safely, our controllers apply a delay or a longer routing to our aircraft. This is unpredictable and inefficient for Farnborough flights, Fairoaks flights, and other GA aircraft in the vicinity.

5.4. As part of the airspace redesign, we have the opportunity[16] to use this blue area. If requested, we could give these light GA aircraft a shortcut between east and west (or vice versa). It would also take them away from Farnborough's departure and arrival flight-paths, reducing overall delay and increasing airspace efficiency.

5.5. The consequence of this increased efficiency and predictability would be a probable increase in light GA aircraft within the blue area, mainly routing along the 'corridor' in either direction. From anecdotal evidence and through speaking with local experts, we estimate an *average* of four to five light GA flights per day would use this blue corridor, and they would most likely be between 1,000ft and 2,000ft.

5.6. This number would vary day by day. We would expect more when the weather is good, far fewer when dark, and fewer still (or none at all) when the weather is bad. We also know that GA flight-paths tend to be relatively unpredictable, so we cannot say precisely where they might fly within the blue area.

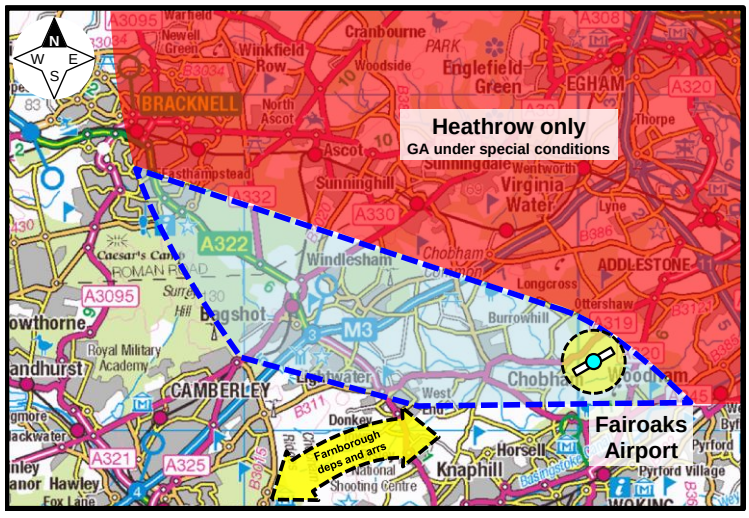


Figure B12: Fairoaks and other light aircraft – Increased access

16 Those with a General Aviation (GA) interest should also see Part E where this is discussed from a GA pilot's perspective. The 'London CTR Reclassification' is driven by European legislation, in order to provide more consistency between member States regarding the use of certain airspace classifications for certain purposes. Heathrow's airspace is currently Class A and is likely to change to Class D late 2014.

Question B5 – Northern Dashed Blue Area – GA impact in the vicinity

This question is about ***justification for change, and impacts*** within this area.

In Section 5 we describe our proposal to improve the predictability and efficiency of airspace management for all airspace users. This would be due to the provision of greater access for light GA aircraft to fly inside the blue area.

To what extent do you support or oppose this change, and why?

B5a - Extent

How strongly do you support or oppose this change?

1 Strongly support
2 Somewhat support
3 No preference
4 Somewhat oppose
5 Strongly oppose

B5b – Reason why

This airspace is already used by some light GA aircraft between 1,000ft and 2,000ft.
It includes Fairoaks traffic, and also helicopters serving central London.

Choose the most relevant, or the most important, or supply your own reason.

1 More efficient use of this airspace would be better overall
2 I wouldn't really notice the difference if this change happened
3 I would definitely notice the difference if this change happened
4 I see no reason to change the current arrangements
5 I object to all existing and future GA flights within this area
6 Other (please add brief reason)

6. Western blue dashed area - RAF Odiham – Changes to departure routes

6.1. RAF Odiham is six nautical miles away from Farnborough. This means that we work very closely with their ATC staff at all times, to ensure our aircraft and theirs operate safely and efficiently.

6.2. The changes we are proposing inevitably affect RAF Odiham. Some of Odiham's existing departure routes (called the CPT 27 Group, and HAZEL/SAM 09, respectively) are being considered for change, in order to reduce controller and pilot workload.

6.3. There would also be subtle changes to Odiham's local traffic, known as the 'radar circuit pattern'. Our operational experts have agreed with Odiham controllers that these technical changes would lie within the normal extents and variance of today's radar circuit pattern. It is extremely unlikely that these subtle changes would be discernible to people on the ground beneath today's radar circuit pattern.

6.4. Other departure routes would not change at all, and the arrival routes would not be affected.

6.5. RAF Odiham have permitted changes to these two types of departure route to be proposed here. These changes would increase both Odiham's flexibility and ours, should the proposal be implemented, and would keep the ATC workload to a minimum in the new airspace.

6.6. RAF Odiham's aircraft currently have the freedom to operate anywhere at any altitude within Class G airspace in accordance with their military tasks. This would not change under the proposal – their aircraft would continue to fly in similar places at similar altitudes most of the time. The departure route changes described here would facilitate the airspace structure we propose to implement.

6.7. The best known of RAF Odiham's aircraft is the Boeing CH-47 'Chinook' helicopter. Other helicopter types such as the Westland Lynx, the Agusta-Westland Puma and the Merlin sometimes use Odiham, as do some fixed-wing aircraft.

6.8. The Chinook is the most likely aircraft type to be using these routes, and is also the noisiest.

6.9. RAF Odiham does not usually fly military operations on weekends or public holidays. The statistics we present here are from September 2013, which contained 21 weekdays and no public holidays. This is a good example of a typical month.

6.10. The RAF does not comment on changes to fleet distribution, therefore it is not possible to provide an accurate forecast for flights in 2015 or 2019. For the same reason, we are not able to give current-day radar data illustrating these routes.

Route Changes

6.11. Figure B13 on Page B50 contains two maps. The smaller map shows the CPT 27 Group route, the larger map shows the HAZEL/SAM 09 route.

6.12. Each map illustrates the current (red) and proposed (black) flight-paths so you can see the difference.

6.13. The lines represent the most likely average centre of the proposed tracks. There are no swathe corridors in these maps because we do not have information on military aircraft navigation standards and cannot predict how far either side of the centreline they may fly.

CPT 27 Group route

6.14. This is the more commonly used route. The track it follows would change slightly under this proposal.

6.15. It was used 26 times in the month of September 2013, averaging 1.2 departures per day.

6.16. Today, aircraft typically climb straight ahead (west) until passing 900ft, which is when they start their first turn (to the right, still climbing), to 2,500ft.

6.17. The traffic on this route generally climbs above 2,000ft between the M3 and the A33, reaching 2,500ft on passing the A33 northbound. Under this proposal, the climb is expected to operate in a similar manner.

HAZEL/SAM 09 route

6.18. This is used much less often. The track it follows would change significantly under this proposal.

6.19. It was used twice in the month of September 2013, averaging 0.1 departures per day.

6.20. Today, aircraft typically climb straight ahead (east) until passing 900ft, which is when they start their first turn (to the left still climbing, back overhead RAF Odiham), to 2,500ft.

6.21. The traffic on this route generally climbs above 2,000ft overhead RAF Odiham, reaching 2,500ft when established southbound. Under this proposal, the climb is expected to pass 2,000ft at about the A31, reaching 2,500ft shortly after (probably on passing the A325).

Noise information

6.22. The following draft noise information was written by the US Army's Public Health Command (see Appx A References). It is intended to illustrate the likely noise impact of Chinooks at certain heights.

Height of Chinook (ft)	Peak noise level (L_{max} dBA)
500	84
1,000	77
2,000	70
3,000	66

Table B16 relating to Figure B13: Chinook noise information, extract from a USAPHC report

6.23. Compare this with Table B15 on Page B34.

Summary

6.24. The CPT 27 Group route is used more regularly, but would only have a minor track change. The HAZEL/SAM 09 route is only used occasionally, but would have a major track change.

6.25. On average between the two routes, they are used ***fewer*** than twice per weekday and rarely (or not at all) at weekends. Some weekdays they may not be used at all, some weekdays they may be used several times. Given this number of flights, we believe that the impact of this part of the proposed change is relatively small.

6.26. The information in this section allows you to consider the impacts you may currently experience due to these routes, and compare it with the impacts you could experience if they were changed as per Figure B13.

6.27. **Important:** In this western dashed blue area, there could also be a change of impact due to Farnborough aircraft as described in Sections 1-4 of this document.

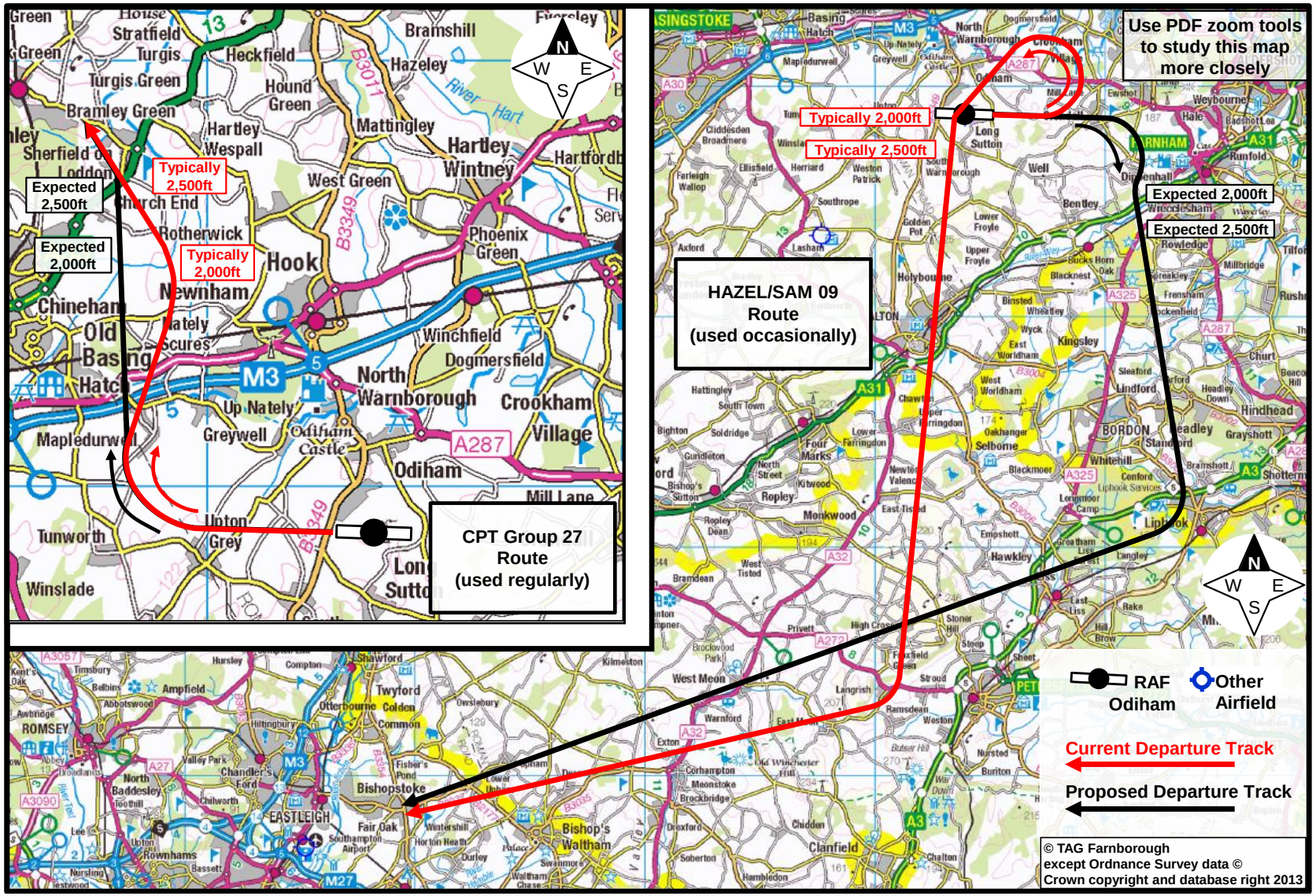


Figure B13: Proposed change to RAF Odiham departure routes (Western blue area)

Question B6 – Western Dashed Blue Area - Departure routes from RAF Odiham

This question is about ***places*** near these departure routes.

In Section 6 we gave you information to help you decide the current and proposed impacts this change might have, near these routes.

Consider your area(s) of interest using the maps, and compare the impact now with the impact under this proposal. We want you to tell us about places near these routes that you think require special consideration in the ongoing design process.

Ideally, you would supply us with a postcode of the location. Otherwise, please use town or village names, the names of National Parks/AONBs, or other easily identifiable location from the maps in Figure B13. This means we can find the right place more easily.

Tell us broadly what type of place this is by choosing the closest type from the online menu. Do you think these places would benefit from the proposed change, or not, and to what extent? Describe the characteristics of these places, stating whether they should be considered special due to concerns about noise impact, visual impact or other reason.

You can do this for as many locations as you wish. We have provided a template for you below. Choose the closest or most important option from those suggested, or add your own if none are suitable. Structuring your response like this will make it easier for us to analyse your feedback, which in turn makes it more effective on your behalf.

Location

Postcode, or name of easily identifiable place.

What type of place is this? *I consider this a…*

Populated residential area / Busy commercial area (town centre, retail park) / Industrial area (including military use) / Recreational area / Tranquil area / Sensitive area (e.g. hospital) / Village / Nature area / Tourist attraction / Transport link (railway, motorway, airport) / Other (brief description)

What would the change in impact be, on this place? *If the change occurred, this place would…*

Benefit significantly from the change / Benefit slightly / Probably not notice the change / Be slightly negatively impacted / Be very negatively impacted by the change

Why would the impact change, on this place? *If I was at this place…*

I would hear less aircraft noise / I would see fewer aircraft / It wouldn't make much difference to me / I would hear more aircraft noise / I would see more aircraft / Other (brief description)

Choose the ***most relevant***, or ***most important***, item from the suggestions, or add your own if none are suitable.

Please repeat this process until you have finished telling us about specific locations that you think require special consideration.

7. Changes above 4,000ft

7.1. For information relating to changes from 4,000ft to 7,000ft in this vicinity, see Part C of this consultation document.

7.2. Changes above 7,000ft are designed for flight efficiency because they are far less likely to be noticeable from the ground. Changes due to this proposal above 7,000ft are mostly over the sea wherever possible, or are within modified areas of the current air route network where aircraft are already common.

General Question

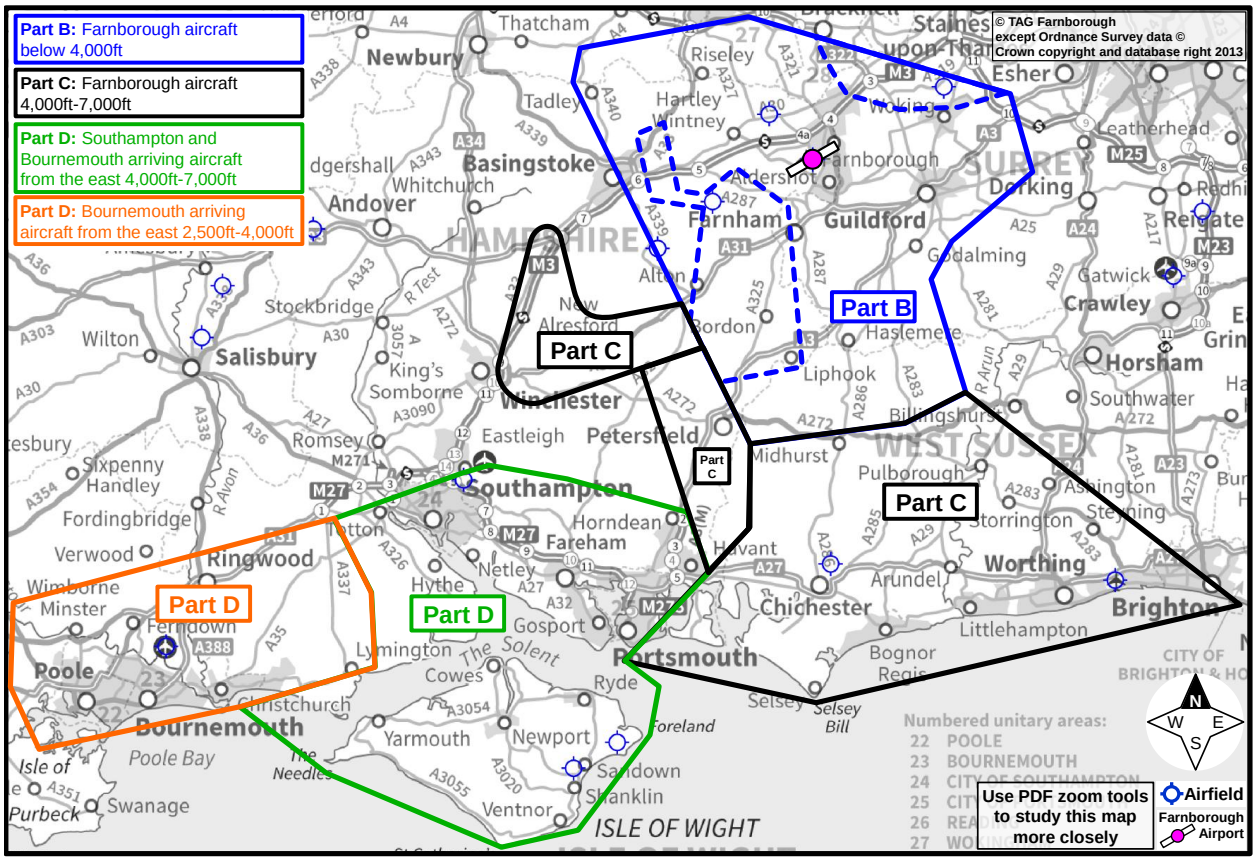
If there is something that you think we should know that hasn't already been covered by the questions in this document (or by other questions in other parts of this consultation), please provide a statement.

Farnborough Airport

Airspace Consultation

Part C: Proposed changes between 4,000ft and 7,000ft further away from Farnborough Airport

(Affecting Parts of Hampshire and West Sussex)



Contents

List of Figures

List of Tables

1. Introduction to Part C

1.1. This part of the consultation material describes the airspace changes proposed from 4,000ft to 7,000ft above mean sea level[1]. The three regions which may be affected are shown enclosed by the solid black lines in Figure C1 below.

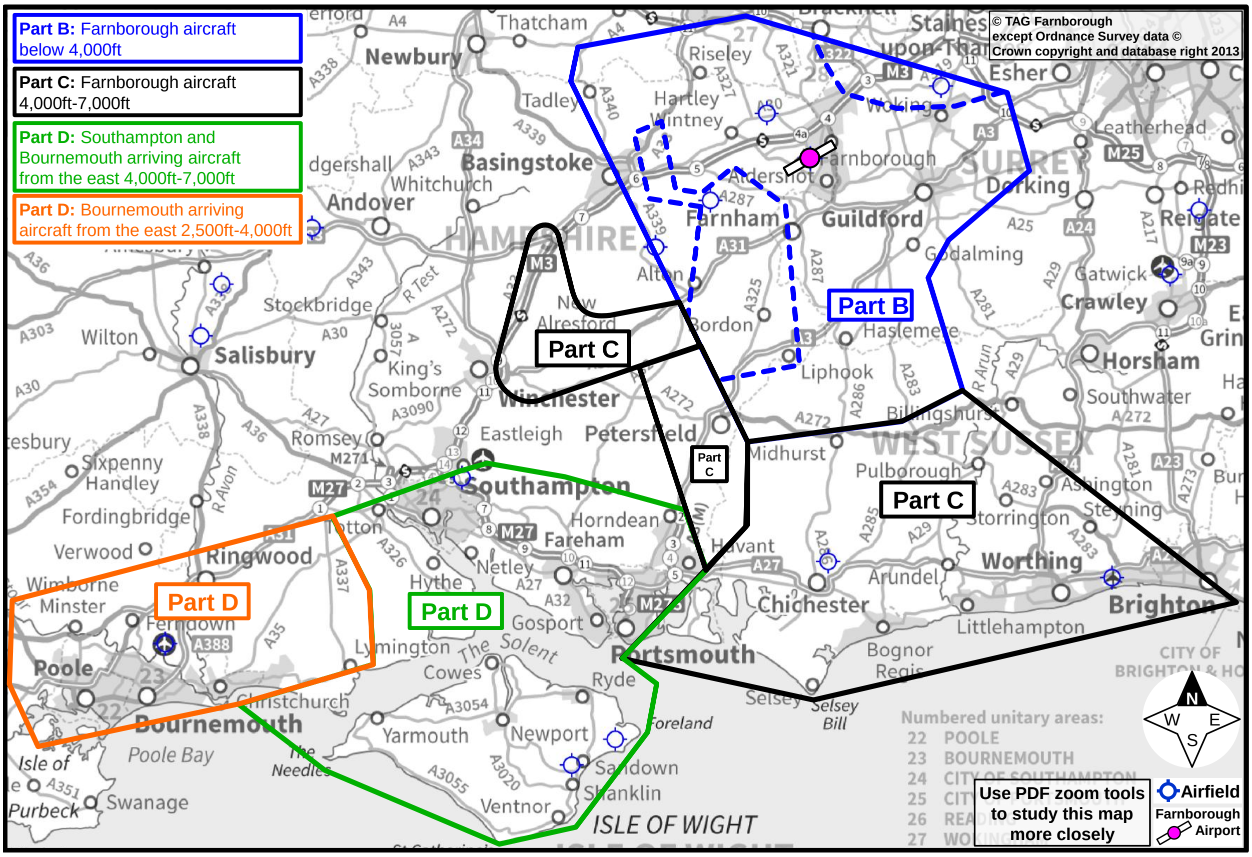


Figure C1: Consultation areas overview

1.2. Part C assumes that:

a. You have read and understood the first half of Part A (this sets the context for the proposed changes)

b. You have identified that the geographic areas (shown outlined in black in Figure C1) above are of interest to you, and

c. You understand that this consultation only covers the areas identified in Figure C1 where changes to air traffic flows are likely to occur as a result of this proposal.

1.3. This part explains the proposed changes to routes and airspace further away from TAG Farnborough Airport.

1 Altitudes of flights and airspace are given in feet above mean sea level (AMSL). Farnborough Airport is at 238ft AMSL. The terrain around Farnborough within the area shown in Figure C1 varies between about 100ft to about 900ft in elevation. To calculate the height above ground level (AGL) where you are, subtract your elevation from the altitudes in this document.
For example, if you live on a 200ft hill (AMSL), and aircraft fly over you at an altitude of 5,400ft, that aircraft is 5,400 – 200 = 5,200ft AGL (above you).

1.4. In particular, we aim to provide an understanding of the impacts that the proposed changes would have on people living or working within the **solid black outlined areas** shown in Figure C1 (above) and Figure C2 (on Page C5, a zoomed in view).

1.5. The main focus of this document is on the impacts of establishing Farnborough departure and arrival routes which are covered in detail in Sections 1-4 of this document. You may consider this information to determine the local impact on your area of interest.

1.6. Other air traffic flows, such as Heathrow and Gatwick departures, also use the same airspace at higher altitudes throughout the region. Within the black outlined areas of this proposal, we are not considering changes to flows other than Farnborough arrivals and departures.

1.7. We need to gather feedback from you as a stakeholder, to enable us to understand how the change may impact you. Later in this part, we have included questions which are highlighted in a box like this. The easiest way to respond to the consultation is to answer these questions via the website:

www.Consultation.TAGFarnboroughAirport.com

1.8. Care has been taken to make this consultation accessible to anyone who may wish to respond. The design and operation of airspace is, by its nature, a complex and technical issue. We aim to avoid technical jargon, but in order to help readers fully understand the rationale behind the changes being proposed we have, where appropriate and necessary, gone into some technical details and used relevant terminology. Any technical terms used are explained briefly, and summarised as a glossary in Appendix B.

1.9. In this part, we describe:

a. Today's airspace usage - a description of today's flight-paths including maps of where aircraft are generally seen;

b. The objectives and justification for the proposed changes – describing the routes we are seeking to implement and their potential benefits and impacts; and

c. Local considerations for route positioning; describing potential local impacts. We ask for your feedback on any location that may require special consideration in the ongoing design process, and why you think we should consider it special. This will help us assess and balance the impacts of the design.

How do I work out the change in impact within the black outlined areas?

1.10. Later in this document, there are worked examples of how to assess the change of impact on a place. Use it for where you live or work, in order to decide how the change might affect you. These worked examples start in Section 4 Page C17.

1.11. Sections 2 and 3 provide background information to give an understanding of our objectives for this proposal.

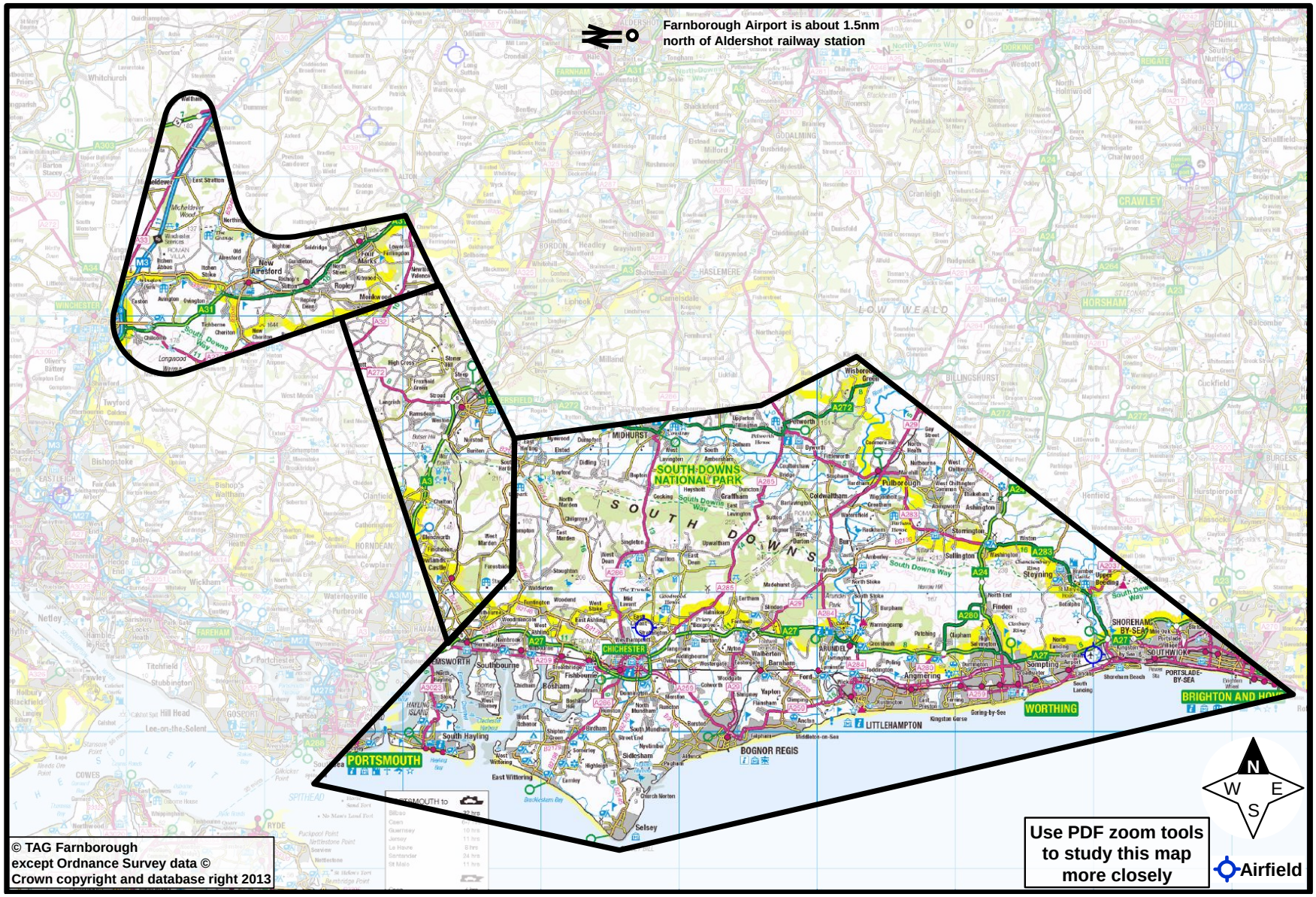


Figure C2: Consultation areas for Farnborough air traffic between 4,000ft-7,000ft

2. Today's airspace usage

2.1. The airspace south of London, which includes that used by Farnborough, is one of the busiest and most complex volumes of airspace in the world. The Farnborough area is over-flown by aircraft originating from many different airports, as shown in Figure C3 on Page C30, which is a 'density plot' (see explanation below). This map shows all commercial air traffic in the region, up to 20,000ft. Most notably there are several arrival and departure routes to and from Heathrow, Gatwick and Southampton airports crossing the region. In Figure C4 we have highlighted National Parks and Areas of Outstanding Natural Beauty so you can compare Figures C3 and C4 to see how often these places are over-flown by commercial aircraft today.

Aircraft flight-path density plots

2.2. In order to illustrate where commercial aircraft currently fly, we have provided maps overlaid with aircraft flight-paths (Figures C3 and C5-C7). These are known as density plots, which are produced using radar data, and show how many aircraft over-flew a particular place. These maps start from Page C30.

2.3. The density plots show all flights for one month[2], and hence give a good representation of where flights are most concentrated. A colour key explains the average number of flights per day over a particular place. **Note** that, because Farnborough has far fewer flights than Heathrow or Gatwick, the colour keys are different between density plots that show ***all*** airports and those that ***only*** show flights relating to Farnborough.

2.4. We have filtered the radar data so we can show you different views:

a. Figure C3 shows all flights to/from all airports up to 20,000ft

b. Figure C5 shows only flights to/from Farnborough up to 20,000ft

c. Figures C6 and C7 show only flights to/from Farnborough, up to 7,000ft.

2.5. The density plots are provided to illustrate the spread of tracks today. The diagrams also have arrows which show the general direction of the traffic flows to aid your interpretation of these plots. The arrows are *illustrative* of the general flow directions.

2 Period chosen: September 2012. This month was chosen because it was a representative sample of aircraft types and destinations, and was outside the 2012 Olympics period. During the Olympics, special airspace was applied to the London region for parts of July and August - those special flight-paths did not represent the typical paths normally flown.

Today's Farnborough departures - See Figure C6 on Page C33

2.6. ATC currently manages departing aircraft by manually directing each flight as there are no formal departure routes from Farnborough. When ATC manually directs a flight it is known as 'vectoring'. The controller that is responsible for the aircraft immediately after take-off plans a safe flight-path avoiding arrivals and any GA[3] in the area. This regularly includes 'unknown' aircraft (not in contact with a Farnborough controller) – these are represented only by blips on the radar screen with no confirmed information about their height or their intentions (Part A has more background information on 'known' and 'unknown' aircraft). For safe passage through the airspace, some departures are given longer flight-paths, and some shorter, depending on the specific situation at the time. Equally, some aircraft are climbed early, or late, for the same reason.

2.7. This variance/manual intervention due to other flights in the region means that departure flight-paths at altitudes below 7,000ft do not currently follow specific paths and tend to be spread over a wide area, as shown by Figure C6.

2.8. Departures from Farnborough usually join the air route network on passing about 7,000ft (sometimes earlier). However, the actions taken by our radar controllers at lower altitudes defines their flight-path even above 7,000ft until fully integrated into, and navigating along, the air route network.

2.9. Arrow 1 illustrates departures to the north, which can be seen along the northern edge of Figure C6. This traffic flow is not within the black outlined area. It is shown here because we propose to move this flow to within the black outlined area. This is explained in more detail in Section 4. About 45% of all our departures route this way.

2.10. Arrows numbered 2 illustrate departures to the south. About 45% of all our departures route this way.

2.11. Arrows numbered 3 illustrate departures to the southwest. About 10% of all our departures route this way.

2.12. Remember that these percentages **only** apply to departures. If you live or work in an area over-flown by departures, you may also be over-flown by arrivals. Please consider all the maps in this document to assess how your area of interest might be affected.

Points to note about Farnborough departures

2.13. Where the tracks end in Figure C6, the aircraft have climbed above 7,000ft. For example, for our departures to the south, most are above 7,000ft by the time they get south of Chichester.

3 General Aviation (GA) aircraft are usually private light aircraft, gliders, recreational aircraft etc. See Part A for more details.

2.14. Even though Part C is concerned with our air traffic from 4,000ft to 7,000ft, we are showing you the flight-paths below 4,000ft so you can see how the flows work. Aircraft flight-paths north of the black outlines, nearest to the airport, are most likely to be below 4,000ft. See Part B for details of this region.

2.15. Unknown aircraft on the radar (see paragraph 2.6) often cause controllers to turn our departures a long way left and/or right, and they may have to change the climb instructions as per paragraphs 2.6-2.7. Occasionally, they need to be delayed on the runway at the last moment, ready for take-off, waiting for a gap between other air traffic (known or unknown). This means the specific take-off time, flight-path and altitude are not often predictable, making the controller's (and the departing pilot's) work more difficult until they can climb into the air route network. Joining the network may take a long time depending on other air traffic, causing an unpredictable delay and an unpredictable extra distance to be flown.

Today's Farnborough arrivals - See Figure C7 on Page C34

2.16. ATC currently directs arriving aircraft towards the runway by vectoring (see paragraph 2.6). As the aircraft descend from about 7,000ft towards the runway, our radar controller takes command of the arrival and is planning a safe flight-path avoiding our departures, unknown radar blips or other aircraft known to be in the area. Some arrivals are given longer flight-paths, and some shorter, depending on the specific situation at the time. Equally, some aircraft are descended early, or late, for the same reason.

2.17. This variance/manual intervention means that arriving flight-paths below about 7,000ft do not currently follow specific paths and tend to be spread over a wide area, as shown by Figure C7.

2.18. Arrivals to Farnborough usually leave the air route network on passing about 7,000ft, sometimes lower, sometimes higher depending on the traffic situation.

2.19. Arrow 1 illustrates arrivals from the north, which can be seen along the northern edge of Figure C7. This traffic flow is not within the black outlined area, and would not change under this proposal. This is explained in more detail in Section 4. About 55% of all our arrivals route this way.

2.20. Arrows numbered 2 illustrates arrivals from the south. About 35% of all our arrivals route this way.

2.21. Arrows numbered 3 illustrates arrivals from the southwest. About 10% of all our arrivals route this way.

2.22. Remember that these percentages **only** apply to arrivals. If you live or work in an area over-flown by arrivals, you may also be over-flown by departures. Please consider the maps in this document to assess how your area of interest might be affected.

Points to note about Farnborough arrivals

2.23. The tracks in Figure C7 start when the aircraft have descended below 7,000ft. For example, for our arrivals from the southwest, most are below 7,000ft by the time they near Petersfield.

2.24. Even though Part C is concerned with our air traffic from 4,000ft to 7,000ft, we are showing you the flight-paths below 4,000ft so you can see how the flows work. Aircraft flight-paths north of the black outlines, nearest to the airport, are most likely to be below 4,000ft. See Part B for details of this region.

2.25. Unknown aircraft on the radar (see paragraph 2.6) often cause controllers to turn our arrivals a long way left and/or right, and they may have to change the descent instructions as per paragraphs 2.16-2.17. Occasionally, they have to be placed in a holding pattern in a safe area. This means the specific arrival time, flight-path and altitude are not often predictable, making the controller's (and the arriving pilot's) work more difficult until they land. This causes an unpredictable delay and an unpredictable extra distance to be flown.

Traffic to/from other airports, and General Aviation (GA) activity

2.26. Figure C3 shows that everywhere in the region is over-flown to some extent – there are no white areas on the map. Figures C5 to C7 only depict Farnborough traffic flows , and show that Farnborough air traffic is a relatively small part of that overall picture shown in Figure C3 - remember that the colour key for Figure C3 is bigger than that used in the other density plots because Farnborough is much less busy than Heathrow or Gatwick. Regardless of our proposal, the traffic to/from other airports will continue to be seen and heard over-flying these areas (in particular Heathrow, Gatwick and Southampton arrivals and departures) at similar altitudes to today. These aircraft are currently, and would continue to be, at higher altitudes than our aircraft within the black outlined areas.

2.27. This proposal is likely to have an effect on where some GA aircraft fly.

2.28. The change of impacts to people on the ground due to this is impossible to predict accurately. They are not required to speak with any ATS provider outside controlled airspace (CAS), and may not show up on radar.

2.29. What we do know is that there are popular areas of GA activity that we have tried to avoid as far as practicable, given our own requirements for consistent and predictable routes.

2.30. We know that changing flight-paths or airspace boundaries can be challenging to GA, and our intention is for as little disruption as possible by striking a fair balance.

2.31. See paragraphs 3.14-3.21 for additional information on the impact on gliders, and how we can mitigate it.

3. Objectives and justification for proposed changes from 4,000ft-7,000ft

3.1. This section describes our objectives for changing the routes to/from Farnborough airport; it describes what we are trying to achieve and the generic benefits/impacts that would result. We welcome your feedback on these objectives. The effects on specific aviation users are discussed in Part E. Specific local considerations are discussed below in section 4.

3.2. This consultation is to develop airspace solutions, assuming unchanged airport infrastructure. It is not associated with the work being undertaken by the Airports Commission. Any further proposals arising from any recommendations made by the Airports Commission would be subject to separate consultation at a later date.

3.3. The introduction of PBN, as recommended by the aviation industry's CAA-supported FAS, means the route system **must** undergo change (these terms are explained in Part A). This provides the opportunity to consider changes that will enable us to make best use of the runways and to improve the management of noise impact.

3.4. **Specific justifications:** We are seeking to optimise the route structure to bring benefits to the ATC operation. We intend to do this by balancing the operational benefits of introducing new routes with environmental impacts, considering GA activity areas as far as practicable, making airspace more efficient for as many users as possible. In particular we are proposing to introduce formal departure routes and to improve the management of arrivals by using the RNAV navigation standards. These would make the flight-paths more consistent and predictable whilst retaining sufficient flexibility for dealing with any air traffic scenario. The more consistent and predictable the routes, the more efficient they can be, and the already-high safety standards can be further enhanced. The airspace management would be more efficient for all users as well as the airport itself.

3.5. Maintaining Farnborough's competitive position in the UK and international market is important both for the airport and for the communities that benefit from having a commercially successful airport in the region.

Balancing consistent and predictable routes against the environmental impact and impact on GA activity

3.6. The proposed routes for Farnborough traffic would enable the position of the aircraft to be more precisely controlled. With careful design, this would allow the impact of the new routes to be balanced against changes to environmental impacts for flight-paths and also balanced with impacts on GA activity areas.

3.7. At low altitudes it is important to minimise the spread of flight-paths to reduce the noise impact as much as possible, and to ensure a consistent and predictable flow of departures and arrivals. At high altitudes in the air route network, it is important to fly the shortest possible route to reduce fuel consumption and CO_2 emissions. When connecting low altitude routes with the higher altitude air route network, flexibility in the intermediate altitudes between 4,000 and 7,000ft (the focus of this part of the consultation document) is key to operational efficiency. Whilst the system needs flexibility, the proposed change would still improve the consistency and predictability of flight-paths, because air traffic controllers would still need to regularly vector aircraft – it would happen less often than today.

3.8. We estimate that, due to the design proposed in this part of the consultation, ***130,000 fewer people***[4] would be over-flown by flight-paths at intermediate altitudes (4,000ft-7,000ft).

3.9. In addition to positioning the routes to reduce noise impact, we are also proposing changes that will keep arrivals higher for longer and climb departures higher earlier. The higher an aircraft is, the quieter and smaller it appears and so these changes would further reduce overall noise impact, however we are not able to quantify this benefit.

3.10. The proposal seeks to enable the airspace sharing arrangement with gliders, discussed later (starting at paragraph 3.17). When the airspace is shared with the gliders, we would move our southbound departures to avoid them. In this case, our departures would be less likely to be climbed higher earlier and so would stay at similar altitudes to today. This sharing would be infrequent as it would only happen when gliders sought to use the airspace.

Potential negative impacts

3.11. Avoiding over-flight of one area inevitably means flights over neighbouring ones instead. For example, avoiding over-flight of a town almost always means flying over the surrounding countryside, which may be valued for its relative tranquillity[5]. This applies equally to departure and arrival routes. Therefore whilst our proposal reduces the net number of people over-flown by these flight-paths (see paragraph 3.8) we recognise that changing the flight-paths will mean increased impact over some neighbouring areas (notwithstanding that aircraft would generally be higher –see paragraph 3.9)

3.12. Avoiding populated areas and GA activity areas also means some aircraft would have to fly longer paths than today. Part A Section 10 describes how longer routes cause aircraft to use more fuel and produce more CO_2.

4 Population data based on information supplied by CACI for 2012. This is a net figure based on a simple comparison of the populations within the areas covered by the current flight-paths vs the (smaller) areas covered by the proposed flight-paths. It 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.

5 Route positioning is limited by aircraft manoeuvrability. Aircraft fly at high speeds; this limits how tightly, and how often, aircraft can turn in order for the route to be considered flyable and safe (this is governed by international design standards); hence avoiding one sensitive area can often mean over-flying another.

Concentration versus dispersal

3.13. Aircraft following RNAV routes have more reliable and accurate track-keeping, and hence most aircraft follow the same paths within closer tolerances. Flights are concentrated along the routes, rather than being dispersed more widely across an area. Our proposed RNAV routes would therefore mean that net fewer people are over-flown, but those that are, would be over-flown more often.

Airspace sharing with gliders – infrequent use of an alternate southbound departure route

3.14. We also provide a service, on request, to all airspace users in the region outside controlled airspace (CAS)[6]. Changes to airspace inevitably affect those other users, and we want to minimise the disruption to them as much as we can whilst fulfilling our objectives to provide a predictable airspace environment which can be managed safely and efficiently.

3.15. The higher the altitude, in general the fewer GA flights. Many GA activities take place at these intermediate altitudes (4,000ft-7,000ft) such as parachuting and flying training[7], but these are fewer than occur at low altitudes (below 4,000ft).

3.16. Gliding is a GA activity that is an exception. Gliders need to climb to these intermediate altitudes, using geographical features like ranges of hills and valleys, to be able to glide to their ultimate destination. We know that the airspace we propose could disrupt some gliding activities because it could reduce access to these useful geographical features at the altitude to which gliders need to climb. That is one of the reasons that the proposed consultation areas are the shapes shown in this document – we have refined the airspace blocks to be as small as possible and in places away from gliding areas wherever we can.

3.17. We also have an innovative solution to reduce the potential disruption to the places gliders fly. It is called a **Flexible Use of Airspace (FUA)**.

3.18. Activating the FUA means that we would 'give' the gliding organisation some pieces of the newly proposed airspace when they need it; this means moving our southbound departures out of their way onto an alternate (longer) proposed route. When they have finished they would return it to us, and we would go back to using the normal (more direct) proposed routes.

3.19. The gliding organisations cannot predict exactly how often they would need to request activation of the FUA. Gliding is heavily dependent on the weather, and tends to happen more on summer weekends during daylight. Based local operational expertise, the sharing is expected to happen between **30 and 80 days per year**, but this is a broad estimate.

6 See Part A for more details on CAS and on ATC services
7 There are many GA activities that regularly occur at intermediate altitudes, these are just examples. GA activities such as hang gliding and helicopter flying occur more often below 4,000ft than above.

3.20. The consequence of this airspace sharing is that most days (85-90% of the year), our departures to the south would route the standard way as per Figure C8 on Page C35, and some days (10-15% of the year) they would route the alternate (longer) way as per Figure C9 on Page C36. This is likely to be infrequent, as per paragraph 3.19.

3.21. Setting this up would involve detailed negotiation between us and the gliding community to ensure it could be done safely and reliably. This negotiation has been started, and will progress throughout the consultation and beyond.

3.22. Paragraph 3.12 and Part A Section 10 describes how the longer routes avoiding populated areas and GA activity areas that we are proposing would cause aircraft to use more fuel and produce more CO_2.

3.23. In the same way, avoiding gliders during FUA activation would cause our departures to use even more fuel than stated in Part A on those activation days as it would increase the length of our southbound departure flight-paths by about 4.5 nautical miles and would restrict the opportunity for quicker climb (albeit infrequently). We estimate that this would cost our aircraft from 8.5kg-25kg fuel, emitting 27kg-80kg more CO_2 per flight[8] when the FUA is active. This would be *additional* to the proposal's change in fuel/CO_2 described in Part A.

3.24. Only departures to the south and southeast would be affected by FUA activation, which would be about 35% of all our departures during the activation period. Arrivals would not be affected, and nor would our departures to other destinations.

3.25. Due to the unknown frequency of potential FUA activation, population analysis has not been performed for this airspace/route scenario.

Overall benefit

3.26. Our assessment of impacts is based on our interpretation of the Government's priorities described in Part A, which focusses on minimising the impact of aviation noise on densely populated areas, balanced with the need for a predictable and efficient flow of air traffic (operationally and with respect to fuel/CO_2). Whilst the proposed design would have both positive and negative impacts, we believe that by reducing the net number of people over-flown at intermediate altitudes and by avoiding disruption of GA areas as far as practicable (including a large design change to accommodate potential FUA to benefit the gliding community), our design achieves the best balance. We therefore believe that the change is justified. In the questions below we ask about the principles behind our design decisions, and in Section 4 we are seeking local views in order to help determine whether our design can be improved further.

8 The lesser amount for small executive jets, the greater amount for larger corporate jets. Based on a typical fuel cost of £650/tonne or 65p/kg.

Questions C1-C3

The following three questions are intended to gather your views regarding our ***justification*** for the proposed changes, and the ***balances*** we strike between route efficiency and environmental impacts.

Please remember that these three questions are ***not*** asking about specific locations, only the ***principles*** behind why and how we designed the proposed routes.

Answering these questions does not prevent you from providing information on local sensitivities in answer to the questions in Section 4; for example you may support our objective to balance the placement of predictable over-flights at these intermediate altitudes against the needs of GA and the people beneath, but have strong views on areas that should be avoided. Equally you may have information that we have not considered that leads you to oppose the objective of consistent and predictable flight-paths, regardless of local issues. Please use the questions below to express your views on the general principles.

Question C4 (later) will ask about the impact on specific locations.

Question C1 – Routes and airspace structures

This question is about ***justification for change***.

In Section 3 above, we say that the more ***predictable*** aircraft flight-paths are, the more ***efficient*** their safe management can be.

This proposal is seeking to introduce new departure and arrival routes, and airspace structures to surround them, which would change some flight-paths from 4,000ft-7,000ft.

This would improve the consistency of aircraft flight-paths on those routes, using modern navigational capabilities. Consistent flight-paths would be predictable and more efficient to manage safely. It would retain the required operational flexibility at the same time.

The use of CAS structures would help separate Farnborough aircraft from recreational and military flights that also operate in the area. This means that everything inside the structures would be known and predictable, which would also be more efficient to manage safely. GA users outside CAS would fly more predictable paths due to the presence of the CAS structures themselves, and could make requests to cross them, again using predictable paths.

To what extent do you agree with our justification:

Introducing new routes and airspace would make aircraft flight-paths more predictable. Making them more predictable makes them more efficient to manage safely.

1 Strongly agree
2 Somewhat agree
3 No preference
4 Somewhat disagree
5 Strongly disagree

You are welcome to provide a statement to support your answer.

Question C2 – Balance between route efficiency and environmental impacts

This question is about *balance*. In Section 3 above we say that we have designed routes at low altitudes to avoid populated areas, and that linking low altitude routes with the high altitude air route network needs flexibility, consistency and predictability.

The consequence is that some routes are longer than today's typical flight-paths. This means that some aircraft need to use more fuel, leading to more CO_2 emissions. It's not possible to reduce the local noise impact at low altitudes ***and*** make all our aircraft fly shorter routes at the same time, so we prioritised reducing low-altitude local noise impact at the expense of more fuel.

We then balanced the (diminished) environmental impacts at intermediate altitudes with the need to fly as efficient a route as possible.

To what extent do you agree with our balance:

At low altitudes, avoiding over-flying populated areas where possible is the highest priority. At these intermediate altitudes (4,000ft-7,000ft), some environmental impact is justified because the effect is much less than at low altitudes.

1 Strongly agree

2 Somewhat agree

3 No preference

4 Somewhat disagree

5 Strongly disagree

You are welcome to provide a statement to support your answer.

Question C3 – Balance between route efficiency and affecting GA activities

This question is also about ***balance***. In Section 3 above we say that we have designed routes whilst considering areas of popular GA activity as much as possible.

The consequence is that some routes are longer than today's typical flight-paths. This means that some aircraft need to use more fuel, leading to more CO_2 emissions. It's not possible to avoid popular GA areas *and* make all our aircraft fly shorter routes at the same time, so we prioritised avoiding GA areas at the expense of more fuel.

We also propose sharing airspace with the gliding community using FUA, which would further increase the length of some of our departure routes (but only infrequently).

We then balanced all these impacts on GA at intermediate altitudes with the need to fly as efficient a route as possible, as often as possible.

To what extent do you agree with our balance:

At low altitudes, reducing the impact on GA activities is important wherever possible. At these intermediate altitudes (4,000ft-7,000ft), some impact on GA activities is justified. FUA airspace sharing with gliders would reduce that impact.

1 Strongly agree

2 Somewhat agree

3 No preference

4 Somewhat disagree

5 Strongly disagree

You are welcome to provide a statement to support your answer.

4. Local considerations for route positioning

4.1. Figures C5-C7 show current air traffic flows, and Figures C8-C10 show the proposed air traffic flows. You can also view the maps interactively at:

www.Consultation.TAGFarnboroughAirport.com

and use the postcode search function. The website will also allow you to zoom in on maps, and to easily switch between the current day traffic picture and the consultation swathes for the new routes.

How to use the maps and data to assess potential effects

4.2. We have provided information to help answer the questions 'Would the change mean more or fewer over-flights? And if so, how many aircraft and what is the potential change in impact?' This information is in the form of maps and data that indicates potential noise and visual impacts across the consultation swathe. These swathes cover all options for the positioning of the new routes described in this document (they do not cover existing flight-paths that would not change). The consultation swathes themselves are shown in Figures C8-C10, including data indicating the predicted numbers of flights affected. These Figures may be directly compared to the maps in Figures C3 and C5-C7 which show today's air traffic flows.

4.3. The information we have provided describes:

a. The potential number of aircraft that would fly on the route. A summary is provided on the data pages preceding those maps

b. The lowest, and the most likely, altitudes these aircraft would be at. This is shown by the shading on the maps themselves and is discussed in more detail in the paragraphs below; and

c. A measurement of the maximum noise impact aircraft over-flying at that height would generate at ground level (referred to as L_{max}). This is also dependent on the aircraft types expected. A summary is provided on the data page preceding these maps.

Swathes

4.4. The swathe maps have shaded areas to show where flight-paths would normally be as a consequence of this proposal. The areas enclosed by the dashed black lines denote the widest extent of the likely traffic spread, and the solid red lines show where traffic would normally be concentrated. We have not yet finalised the exact position of the routes we are proposing, but they would need to be within the area enclosed by the solid red lines.

Arrows

4.5. The swathe maps have arrows which indicate the general direction of the traffic flows, provided to help you interpret the maps. These arrows are illustrative and do not represent the precise position of any formal airspace route.

Altitude data

4.6. The altitude information presented on the maps shows a worst case (lowest) altitude and an indication of typical (most likely) altitude for aircraft during normal operations. The worst case represents the lowest altitude we would normally expect an aircraft to be on the flight-path in question. For example, the start of the 'minimum 6,000ft' altitude band on a map for a departure route is the area by which we would normally expect all aircraft to have reached 6,000ft. This would include the worst case of a slow climbing aircraft. Slow climbers are generally the larger/older aircraft types – most aircraft significantly outperform these slow climbers and would therefore usually be higher[9]. Most Farnborough aircraft tend to be amongst the highest performing types.

4.7. The typical altitude is shown to indicate that most aircraft would usually be above the worst case; however, predicting typical altitudes for aircraft for a future airspace design is not an exact science. We have therefore erred on the side of caution with these typical values, and even they do not represent the true range of altitudes that most aircraft achieve. It is worth noting that, in general, we expect the proposed changes to mean that, for a given location, aircraft will be at least the same, but most probably at higher, altitudes than today.

4.8. Whilst this variation in altitudes would happen in reality, it is difficult to represent in a consultation document. We therefore suggest that, as a default, stakeholders should consider the potential impact of aircraft at the minimum altitudes shown on Figures C8, C9 and C10.

Tranquillity

4.9. Another factor that may determine the significance of a potential impact is tranquillity. CAA guidance for airspace change does not provide a method for assessing tranquillity. Any assessment will therefore be subjective and dependent on the specific location in question. The Government guidance (see Appendix A) specifically mentions AONBs and National Parks and so we have highlighted them in Figure C4 and in the worked examples later in this section. You may wish to consider the potential effect on tranquillity when providing feedback.

9 When FUA is activated and our alternate departure route to the south is in use, they would climb about the same as today, rather than higher.

Assumptions

4.10. In order to ensure you do not underestimate the number of over-flights over a particular location, and to ensure we get feedback across the range of options within the swathes presented in this consultation, we ask you to make the following assumptions if your area of interest falls within the shaded areas bounded by the red lines on the maps:

a. Assume the flight-path may be positioned directly above you at the altitudes shown (so the maximum number of over-flights would apply to this area, as described in the data tables); and

b. Assume that all aircraft would consistently fly along the flight-path in question rather than being vectored elsewhere in the vicinity by ATC.

4.11. These assumptions, combined with the worst-case assumptions regarding minimum altitude described above, mean that the potential impact may be overestimated in this document. This is because the consultation swathes presented are wider than the routes which would be positioned within them, so not all the areas would be directly over-flown by the route, and because vectoring off route would happen some of the time (albeit less than today).

4.12. We believe that this is a prudent and favourable approach over one which risks you underestimating the potential effects as it is better for us to analyse and filter the salient points from a wide consultation response, than to risk stakeholders not responding because they assume the impact is lower than it might in fact be. For this reason, please think about what feedback you would supply us *if* you were directly over-flown by one, some or all of the routes and provide your feedback by answering the questions we ask.

General characteristics of proposed changes

4.13. The following paragraphs present the consultation swathes and describe the key factors that determine where they sit.

4.14. The traffic data shown on the pages preceding Figures C3 show a forecast of the average daily number of flights.

Farnborough's proposed departure routes to the north and southwest
See Figure C8 on Page C35

4.15. Figure C8 shows the consultation swathe for departure routes to the north. Figure C6 shows today's equivalent pattern. You may prefer to view the website where you can switch between these maps on screen.

4.16. Figure C8 illustrates that when compared to today's wide spread of flight paths, the area over-flown by our proposal would be relatively small (enclosed by the dashed lines), and the flights would most likely be concentrated somewhere within an even smaller region (between the solid red lines). Also, it illustrates where the departures would most likely climb past 7,000ft (grey shaded region).

4.17. Arrow 1 on Figure C6 shows where departures to the north currently route (about 45% of all departures), and Arrow 3 shows where they route to the southwest (about 10% of all departures).

4.18. Comparing Figure C6 with Figure C8 shows how our proposal would change this. All departures to the north and to the southwest would route to the west first, before turning north or south respectively once east of Winchester. The 'new' boomerang-shaped region to the west of Figure C8 would be over-flown more often at intermediate altitudes, but the 'old' region (Arrow 1 to the north of Figure C6) would be over-flown less often or not at all by our departures (see below for information about arrivals).

4.19. Remember that only the pink and blue shaded areas could be up to 7,000ft – the large grey area would be 7,000ft and above, and is currently part of a major air route network running north-south between France and the west side of London.

4.20. In Part A (Section 8) we describe that 10% of our departures currently leave the country eastbound via a southeastly initial departure. To improve overall system efficiency [10] our proposal includes switching the traffic from this initial routeing onto the northerly departure route. They would only be directed eastward once above 7,000ft. This means that this eastbound 10% would be added to the northbound flow below 7,000ft.

Farnborough's proposed departure routes to the south and southeast
See Figures C8 on Page C35 and Figure C9 on Page C36

4.21. Figure C8 shows the consultation swathe for the proposed departure routes to the south and southeast in normal operations, and Figure C9 when FUA is activated (See paragraph 3.17 to 3.21 regarding the potential for infrequent FUA airspace sharing arrangements with gliders). Figure C6 shows today's traffic. You may prefer to view the website where you can switch between these maps on screen.

4.22. Arrows marked 2 on Figure C6 shows that departures to the south currently route this way (about 45% of all departures), and Arrow 3 shows where they currently route to the southwest (about 10% of all departures).

4.23. Remember that only the yellow, pink and blue shaded areas could be up to 7,000ft – the large grey area would be 7,000ft and above, and is part of a major air route network over the south coast between eastern France and the west.

4.24. In general, the departure routes to the south would follow a similar flight-path to those followed today, but would be more concentrated over a smaller area. Some southerly departures would head slightly further to the southwest before turning south. They would also most likely be higher than today's flights at an equivalent place along the flight-path.

[10] This particular change is to enable system efficiency in the airspace above that being consulted upon here. It is a request from 'NATS En-Route' ATC (the next 'link' in the ATC chain after Farnborough)

4.25. Comparing Figure C6 with Figure C9, when FUA is activated (infrequently) shows our proposed route would follow the longer pink flight-path which does not allow for a quicker climb due to adjacent air routes.

4.26. Paragraph 4.20 describes that 10% of our departures currently leave the country eastbound via a southerly initial departure but that we propose these flights would instead initially head north. This means that 10% fewer departures would route via our proposed routes to the south and southeast compared to today.

Farnborough's proposed arrival routes – See Figure C10 on Page C37

4.27. Figure C10 shows the consultation swathe for the arrival routes to both runways. Figure C7 shows today's equivalent pattern. You may prefer to view the website where you can switch between these maps on screen.

4.28. Arrow 1 on Figure C7 shows that all arrivals from the north currently route this way (about 55% of all arrivals). Arrows marked 2 show the wide arrival flow from the south and southeast (about 35% of all arrivals), and Arrow 3 shows where they arrive from the southwest (about 10% of all arrivals).

4.29. Comparing Figure C7 with Figure C10, we propose that there would be no change to arrivals from the north. Arrivals from the southwest would join the arrivals from the south and southeast.

4.30. Remember that only the yellow, pink and blue shaded areas could be up to 7,000ft – the large grey area would be 7,000ft and above, and is currently part of a major air route network running north-south between France and the west side of London.

4.31. Figure C10 illustrates that the areas we expect to be over-flown by this proposal are broadly similar to today's spread of flight paths (the dashed lines enclose a similar area), however the proposal would mean the flights would most likely be concentrated somewhere within a smaller region (between the solid red lines). Also, it illustrates where the arrivals would most likely stay at or above 7,000ft (grey shaded region).

4.32. This means that the region near Portsmouth in Figure C10 would be over-flown more often, albeit most likely at or above 7,000ft, but the region near Petersfield (Arrow 3 in Figure C7) would be over-flown less often or not at all by our arrivals.

4.33. Figure C3 shows where all commercial aircraft currently fly (please note the strong colouring in the vicinity of Portsmouth), and Figure C5 shows where Farnborough aircraft currently fly.

Current and forecast air traffic information for Figures C8-C10

4.34. Below, Tables C1-C6 show the potential number of flights that could pass directly overhead if that is where a route gets positioned.

4.35. Areas beneath the final routes would expect more over-flights than today due to the more consistent and accurate flight-paths. Areas away from the routes would expect fewer over-flights.

4.36. The hourly numbers given in Tables C1-C6 (Pages C27-C28) are *averages*[11]. Like any airport, there are busy periods where flights per hour are greater than the average, likewise there are quiet periods where there are few flights, or none at all. At Farnborough, these peaks and troughs are unpredictable, though weekends and public holidays tend to be less busy than weekdays. This would not change due to the proposal.

Noise impact for Figures C8-C10

4.37. Below, Tables C7-C8 show the potential noise impact of a single flight directly overhead at a given height. This measurement is known as L_{max}.

What is the impact now, and what would it be in the future? Worked examples

4.38. The following paragraphs explain how to work out the changes in impact for real places, as an example. Follow these examples, use the maps to find where you live or work, and run through the same method for your area of interest.

4.39. We have worked three examples below, using the towns of Petersfield, Midhurst and Ropley. To follow the examples we suggest you have the maps nearby, or have the consultation website open with the map pages on display.

4.40. We describe what impacts Petersfield, Midhurst and Ropley are exposed to now, what they would be exposed to in the future if this proposal was not implemented, and what they would be exposed to in the future if this proposal was implemented.

4.41. To describe the impact today, we used radar data and aircraft numbers from 2012. In 2019, if the proposal was not implemented, aircraft would continue to follow the same flight-paths as today. We have provided forecast numbers of flights for both the most likely and the highest cases. Part A describes the proportions of all Farnborough aircraft that depart to, or arrive from, a given direction.

4.42. In these examples, we compare today's movement numbers with the most likely forecast movement numbers for 2019.

4.43. Please remember the assumptions in paragraphs 4.10-4.12.

4.44. The relevant Figures (C3-C10) are on Pages C30-C37. The relevant Tables (C1-C9) are on pages C27-C29.

11 These averages were calculated based on Farnborough being open 253 weekdays for 15 hours, and 110 weekend/ Bank Holiday days for 12 hours, with two days closed (Dec 25th and 26th). The weekend limit set by the Planning Deed will be observed (maximum 17.8% of all annual flights are allowed at weekends).

4.45. We use:	In order to:
Figures C3-C7	See where the place is, in relation to current flight-paths
Figures C8-C10	See where the place is, in relation to proposed flight-paths
Tables C1-C6	Find out how many flights affect the place
Tables C7-C9	Understand the noise impacts involved for that place.

Petersfield

4.46. From Figure C3, Petersfield is currently over-flown by commercial air traffic to and from many airports, including established routes to/from Heathrow and Gatwick. This density plot shows Petersfield covered by red, yellow and green colours. There is one red coloured route which passes over the north side of Petersfield. This means that more than 24 flights per day over-fly on that route (at altitudes up to 20,000ft). The green area (on the south side of Petersfield) represents up to 18 flights per day. From Figure C4, Petersfield is within the South Downs National Park.

4.47. Figure C5 (Farnborough air traffic only, up to 20,000ft) shows that Petersfield is currently overflown by Farnborough air traffic. This density plot shows Petersfield covered mainly by the grey colour (note the density plots show one month of data). This means that, on average, Petersfield is directly over-flown less than once per day by Farnborough flights. The light blue swathes either side indicate that 1-3 other Farnborough flights per day pass nearby, but not directly overhead.

4.48. Figure C6 and C7 show the Farnborough departures and arrivals respectively below 7,000ft. These show that over Petersfield there are fewer than 1 aircraft per day on average below 7,000ft,, and these are close to 7,000ft since they are close to where the tracks disappear to the south of Petersfield (which is due to the data cutting off at 7,000ft). Hence it can be concluded that the trajectories shown in Figure C3 are generally at or above 7,000ft.

Petersfield today, and if the proposal was not implemented

4.49. Figure C5 and C6 shows Petersfield is partly over-flown by Farnborough departures and arrivals to/from the southwest. Table C3 and C6 show that, in 2012, about 1,150 aircraft arrived from, and departed to, the southwest (arrows marked 3 on figure C6 & C7). In 2019 the most likely number to fly that route would be 1,600 (i.e. ~4 per day).

4.50. This many aircraft currently fly through the vicinity of Petersfield:

1,150 departures per annum

1,150 arrivals per annum

4.51. If the proposal was not implemented (*no change* to tracks), in 2019 this many aircraft would fly through that same vicinity:

1,600 departures per annum

1,600 arrivals per annum

Petersfield under this proposal

4.52. Figure C8 shows Petersfield would not usually be over-flown by any Farnborough departures or arrivals at all, because it would not lie within or near a dashed corridor. However from Figure C9 it can be seen that when gliding activity causes the FUA airspace sharing area to be active (forecast less than 80 days per year), all departures to the south would route to the west of Petersfield.

From Table C2 & C3, in 2019 the greatest likely number to fly that route would be if the FUA airspace sharing occurred 80 days per year, the maximum forecast.

(5,600 + 1,600) x (max 80 days out of 365) departures = 1,578.

For noise impacts, see Table C7

No arrivals would be likely to fly in that area, regardless of FUA airspace sharing.

Midhurst

4.53. From Figure C3, Midhurst is currently over-flown by commercial air traffic to and from many airports, including established routes to/from Heathrow and Gatwick. This density plot shows a red band (departures) passing just to the west of Midhurst. This means that, on average Midhurst is overflown by more than 24 flights per day (at altitudes below 20,000ft). From Figure C4, Midhurst is within the South Downs National Park.

4.54. Figure C5 (Farnborough air traffic only, up to 20,000ft) shows that Midhurst is currently overflown by Farnborough air traffic. This density plot shows Midhurst covered mainly by the blue colour[12], with a swathe of green passing to the west. This means that, on average over a month, Midhurst is directly over-flown by up to 3 Farnborough flights, up to 20,000ft. The adjacent colours mean that other Farnborough flights (up to 5) pass nearby, but not directly overhead.

4.55. Figure C6 and C7 show the Farnborough departures and arrivals respectively up to 7,000ft. These show that Midhurst is covered partly by grey, partly by blue, so there are up to 3 Farnborough aircraft per day up to 7,000ft.

12 Remember that the colour key for Figure C3 is different from other Figures because Figure C3 includes traffic for ***all*** airports

Midhurst today, and if the proposal was not implemented

4.56. Figure C5 & C6 shows Midhurst is partly over-flown by Farnborough departures to, and arrivals from, the south. Table C3 & C6 show that, in 2012, about 5,175 aircraft arrived/departed to the south (arrows numbered 2 on Figures C6 and C7). In 2019 the most likely number to fly that route would be 5,600 (i.e. ~15 per day).

4.57. This many aircraft currently fly in the vicinity of Midhurst:

5,175 departures per annum

5,175 arrivals per annum

4.58. If the proposal was not implemented (*no change* to tracks), in 2019 this many aircraft would fly within that same vicinity:

5,600 departures per annum

5,600 arrivals per annum

Midhurst under this proposal

4.59. Figure C8 shows a dashed corridor to the west of Midhurst, through which Farnborough departures would fly climbing through about 5,000ft passing by the town. Figure C10 shows a wide dashed box through which Farnborough arrivals would descend, which includes Midhurst, at about 5,000ft. From Figure C9 it can be seen that, when gliding activity causes the FUA airspace sharing area to be active (forecast 30 - 80 days per year), departures to the south would not fly over Midhurst. From Table C2 & C3, in 2019 the greatest likely number to fly in the vicinity would be if the FUA airspace sharing occurred 30 days per year, the minimum forecast.

5,600 x (365 – 30 days FUA)/365 = 5,140 departures per annum - For noise impacts, see Table C7

5,600 arrivals per annum - For noise impacts, see Table C8

Ropley

4.60. From Figure C3, Ropley is currently over-flown by commercial air traffic to and from many airports, including to/from Heathrow and Gatwick. This density plot shows Ropley covered by a mix of light blue and grey. This means that, on average Ropley is over-flown by up to 12 flights per day (by aircraft at altitudes below 20,000ft). From Figure C4, Ropley is not actually within a National Park or AONB, but it is near the boundary of the South Downs.

4.61. Figure C5 (Farnborough air traffic only, up to 20,000ft) shows that Ropley is occasionally grazed by Farnborough air traffic.

4.62. Figure C6 and C7 show the Farnborough departures and arrivals respectively below 7,000ft. These show that no Farnborough aircraft over-fly Ropley below 7,000ft.

Ropley today, and if the proposal was not implemented

4.63. Figure C6 & C7 show Ropley is not over-flown by Farnborough departures or arrivals below 7,000ft.

4.64. If the proposal was not implemented, in 2019 Ropley would still not be over-flown by Farnborough aircraft. Aircraft to/from other airports would continue to over-fly Ropley.

Ropley under this proposal

4.65. Figure C8 shows that if the proposal is implemented, the vicinity of Ropley would regularly be over-flown by Farnborough departures at a typical altitude of about 7,000ft. From Figure C9 it can be seen that, when gliding activity causes the FUA airspace sharing area to be active (forecast 30 - 80 days per year), departures to the north & southwest would still route in the vicinity of Ropley. From Figure C10, Farnborough arrivals would be unlikely to over-fly Ropley.
From Table C2 & C3, in 2019 the most likely number to fly in the vicinity of Ropley would be:

5,600 +1,600 = 7,200 Farnborough departures per annum (~20 per day).

For noise impacts, see Table C7

No arrivals would fly in that area, regardless of FUA airspace sharing.

Noise impacts

4.66. Comparing the noise impacts for departures (Table C7) and arrivals (Table C8) against Table C9 (which gives examples of everyday noises) allows you to understand the approximate scale of the noise impact. Farnborough aircraft are generally moving quickly, so each noise impact would build then disappear as each aircraft got closer then moved away.

End of worked examples

4.67. Completing this exercise for yourself will allow you to form your own opinion on the change in impact this proposal could have on where you live or work.

4.68. Remember that, if this proposal is ***not*** implemented, the forecast 2019 traffic numbers would ***still*** apply to today's flight-paths.

Departing Aircraft Numbers[13]: Figures C6, C8 and C9

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	5,175	7,425	12,375	8,800	13,750
Average Per Hr Weekday	1.12	1.61	2.68	1.91	2.98
Average Per Hr Weekend	0.70	1.00	1.67	1.19	1.85

Table C1: Departures to the north (ref Figure C6 arrow No.1)

Under this proposal, future departures to the north would route west first, moving the route from the immediate northwest of Farnborough further towards the west before heading north. Departures to the east would initially route north instead of south. Departures to the southwest would route this way initially (adding from Table C3).

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	5,175	4,725	7,875	5,600	8,750
Average Per Hr Weekday	1.12	1.02	1.71	1.21	1.90
Average Per Hr Weekend	0.70	0.64	1.06	0.76	1.18

Table C2: Departures to the south (ref Figure C6 arrow No.2)

Under this proposal, future departures to the south would route in a similar manner to today (Figure C8). Departures to the east would initially route north instead of south.

If the (infrequent) FUA sharing arrangement was activated, these numbers would instead use the alternate route illustrated in Figure C9.

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	1,150	1,350	2,250	1,600	2,500
Average Per Hr Weekday	0.25	0.29	0.49	0.35	0.54
Average Per Hr Weekend	0.16	0.18	0.30	0.22	0.34

Table C3: Departures to the southwest (ref Figure C6 arrow No.3)

Under this proposal, future departures to the southwest would route west first (adding to Table C1).

13 As per Part A, the proportion of departures to the north would change due to requests from NATS En-Route, the next 'link' in the ATC chain. This has been included in these calculations.

Arriving Aircraft Numbers[14]: Figures C7 and C10

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	5,175	7,425	12,375	8,800	13,750
Average Per Hr Weekday	1.12	1.61	2.68	1.91	2.98
Average Per Hr Weekend	0.70	1.00	1.67	1.19	1.85

Table C4: Arrivals from the north (ref Figure C7 arrow No.1)

Under this proposal, future arrivals from the north would route in a similar manner to today.

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	5,175	4,725	7,875	5,600	8,750
Average Per Hr Weekday	1.12	1.02	1.71	1.21	1.90
Average Per Hr Weekend	0.70	0.64	1.06	0.76	1.18

Table C5: Arrivals from the south (ref Figure C7 arrow No.2)

Under this proposal, future arrivals from the south would route in a similar manner to today, and would be joined by the arrivals from the southwest (adding from Table C6).

If the FUA sharing arrangement was activated, it would make no difference to the numbers or to where they flew – Figure C10 would continue to apply.

Flights	2012 Typical	2015 Most Likely	2015 High Forecast	2019 Most Likely	2019 High Forecast
Annual	1,150	1,350	2,250	1,600	2,500
Average Per Hr Weekday	0.25	0.29	0.49	0.35	0.54
Average Per Hr Weekend	0.16	0.18	0.30	0.22	0.34

Table C6: Arrivals from the southwest (ref Figure C7 arrow No.3)

Under this proposal, future arrivals from the southwest would route at a higher altitude heading eastwards, turning left to join the arrivals from the south (adding to Table C5).

14 As per Part A, the proportion of departures to the north would change due to requests from NATS En-Route, the next 'link' in the ATC chain. This has been included in these calculations.

Departure Noise Information

Height above ground	Peak noise impact of most common aircraft types Executive Jets (75%)	Peak noise impact of noisiest aircraft types A320/ Boeing 737 (10%)
4,000ft-5,000ft	61-64 dBA	63-66 dBA
5,000ft-6,000ft	57-61 dBA	60-63 dBA
6,000ft-7,000ft	56-57 dBA	59-60 dBA
Above 7,000ft	Up to 56 dBA	Up to 59 dBA

Table C7: Departures - Typical noise level (Lmax dBA) at various heights for the most common aircraft types, and the noisiest aircraft types, using Farnborough.

The highest L_{max} dBA would be for the aircraft at the lowest altitude in each band.

Arrival Noise Information

Height above ground (ft)	Peak noise impact of most common aircraft types Executive Jets (75%)	Peak noise impact of noisiest aircraft types A320/ Boeing 737 (10%)
4,000ft-5,000ft	Up to 57 dBA	59-61 dBA
5,000ft-6,000ft	55 dBA or below	57-59 dBA
6,000ft-7,000ft	55 dBA or below	55-57 dBA
Above 7,000ft	55 dBA or below	55 dBA or below

Table C8: Arrivals - Typical noise level (Lmax dBA) at various heights for the most common aircraft types, and the noisiest aircraft types, using Farnborough.

The highest L_{max} dBA would be for the aircraft at the lowest altitude in each band.

Table of Equivalent Sounds

Example Sound	Noise level (dBA)
Chainsaw, 1m distance	110
Disco, 1m from speaker	100
Diesel truck pass-by, 10m away	90
Kerbside of busy road, 5m away	80
Vacuum cleaner, 1m distance	70
Conversational speech, 1m away	60
Quiet office	50
Room in quiet suburban area	40

Table C9: Table of noise levels (Lmax dBA) for equivalent sounds[15]

15 Based substantially on www.sengpielaudio.com/TableOfSoundPressureLevels.htm

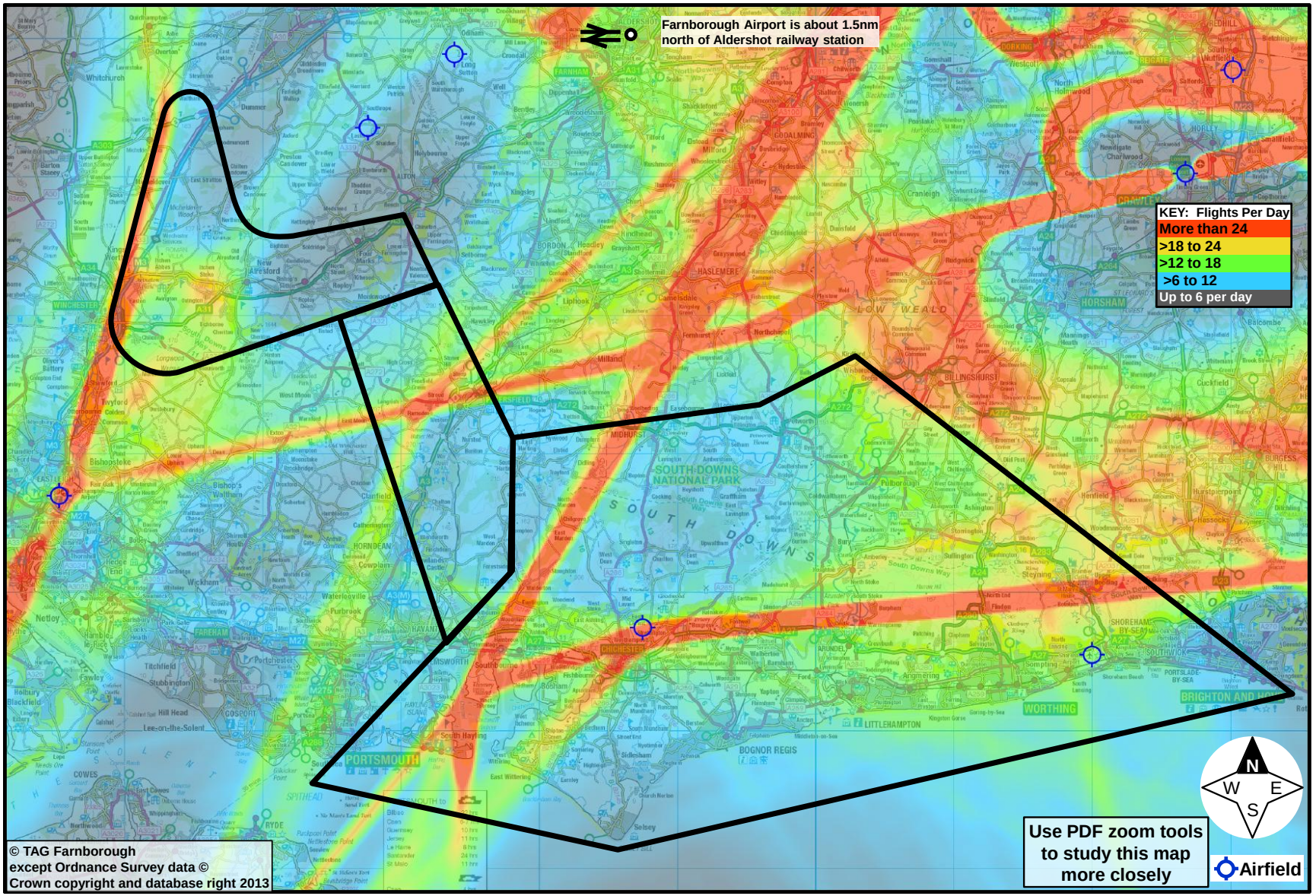


Figure C3: All commercial flights (up to 20,000ft) density plot

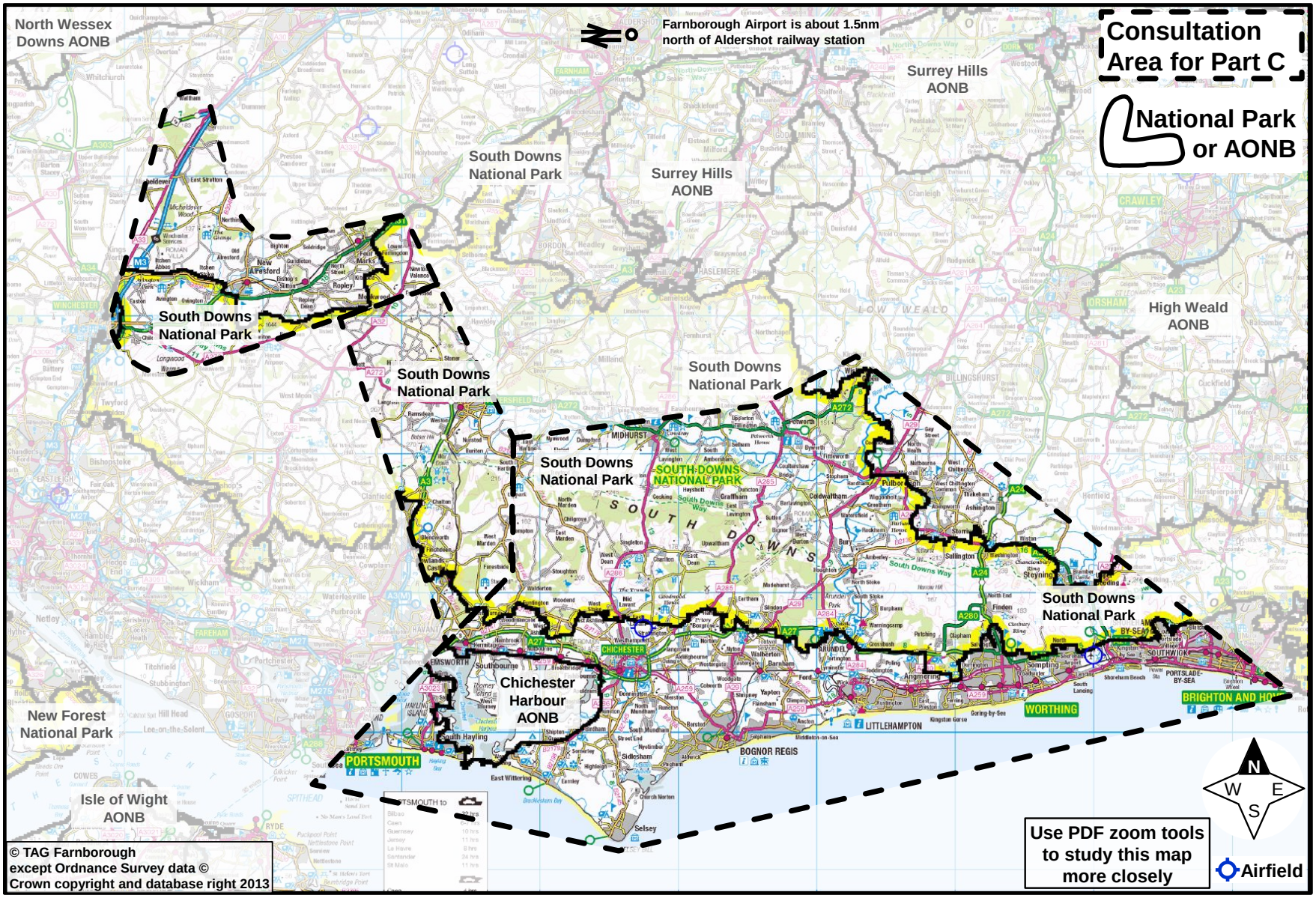


Figure C4: National Parks and AONBs

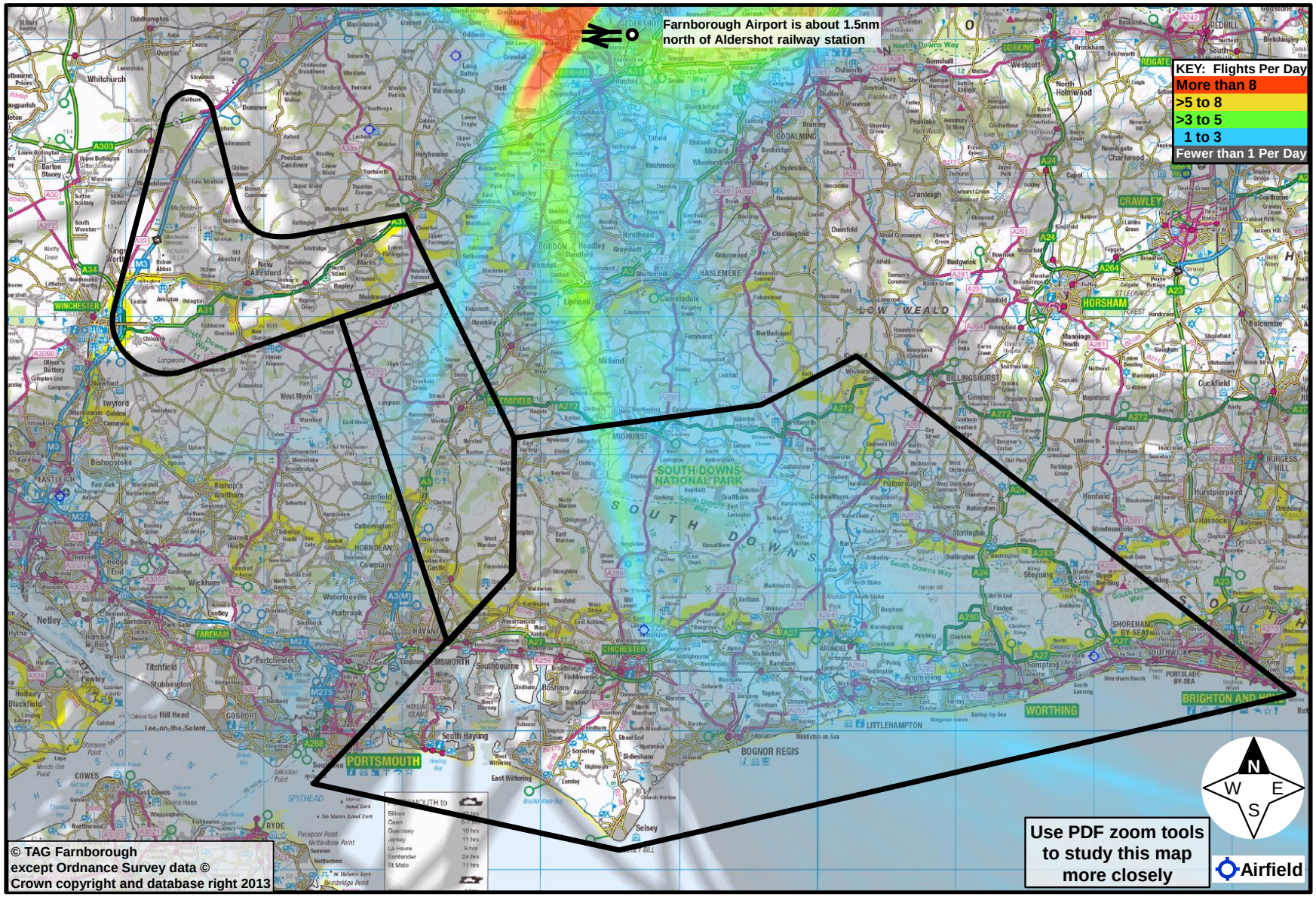


Figure C5: Farnborough departures and arrivals (up to 20,000ft) density plot

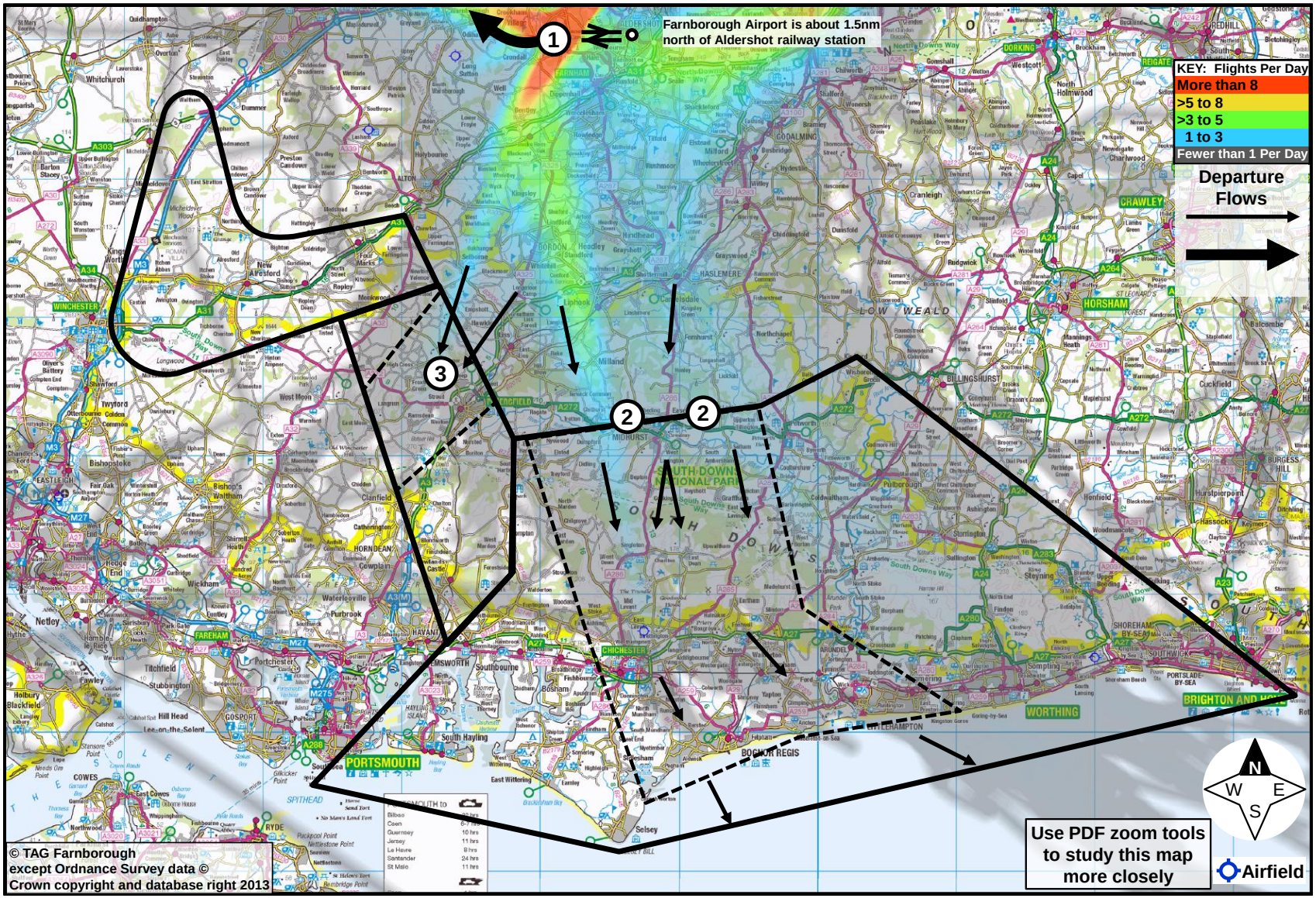


Figure C6: Arrows/dotted lines show Farnborough departure flows to the south (Radar data shows all Farnborough air traffic up to 7,000ft)

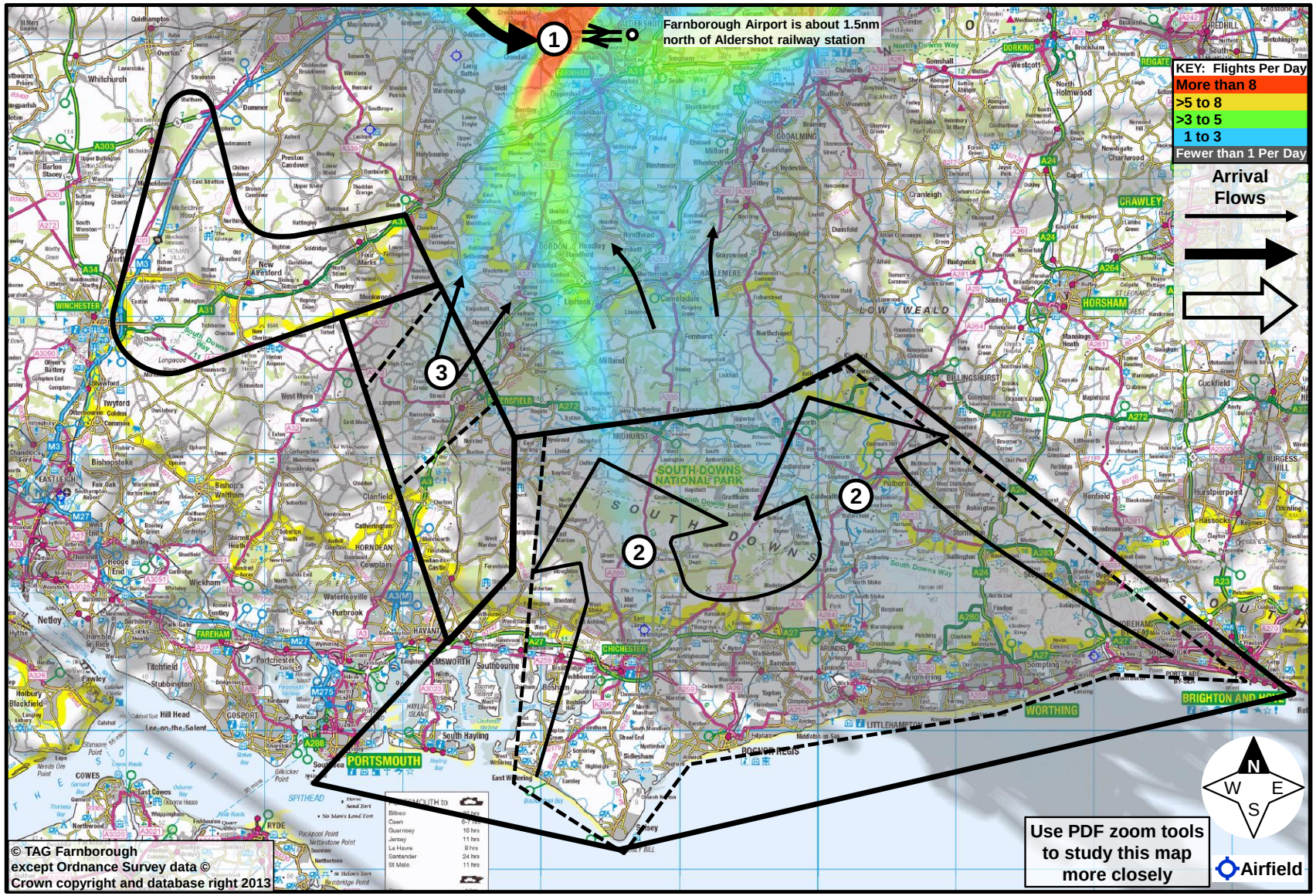


Figure C7: Arrows/dotted lines show Farnborough arrival flows from the south (Radar data shows all Farnborough air traffic up to 7,000ft)

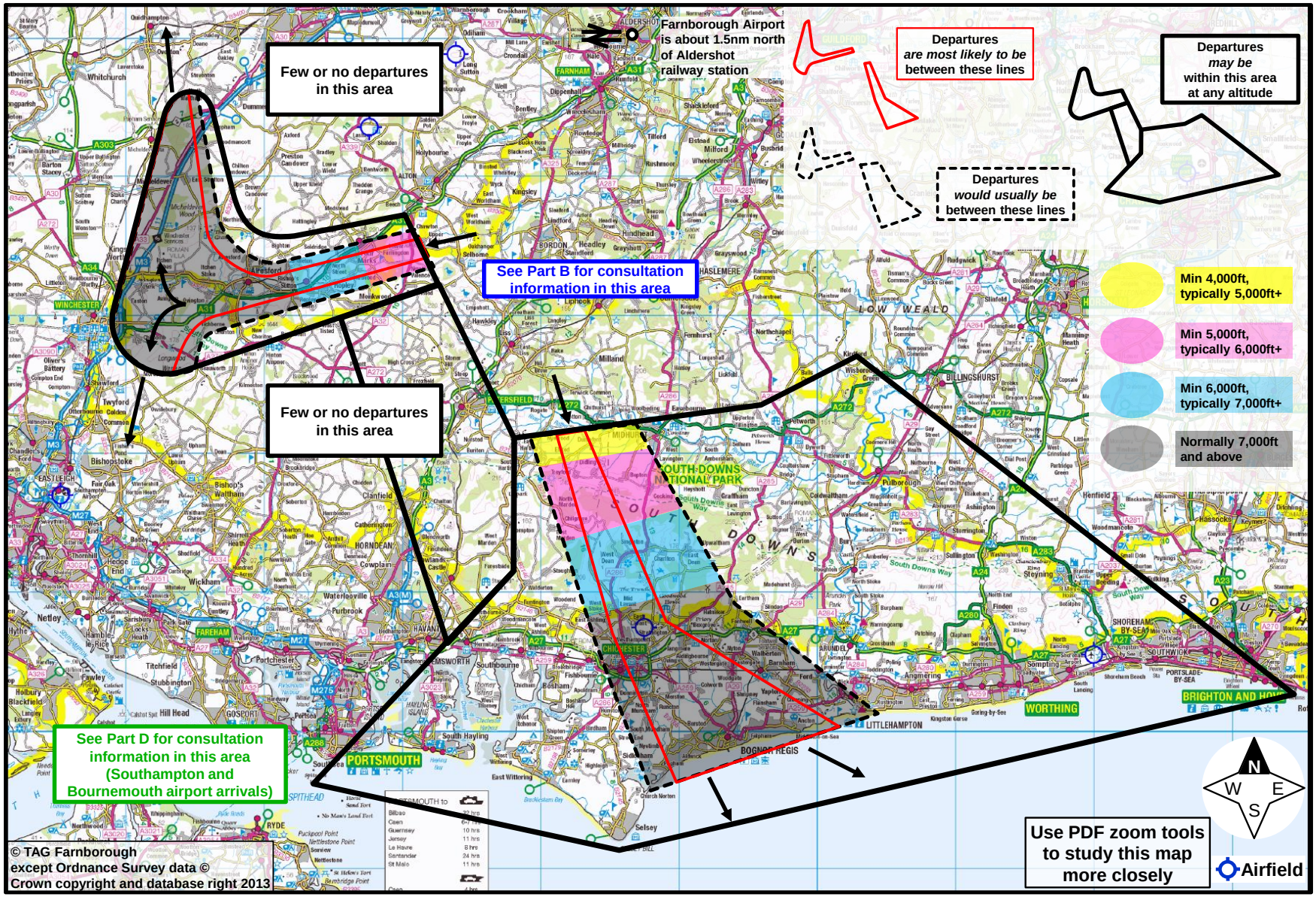


Figure C8: Proposed Farnborough departures (4,000ft-7,000ft) when FUA airspace sharing is not active (most of the time)

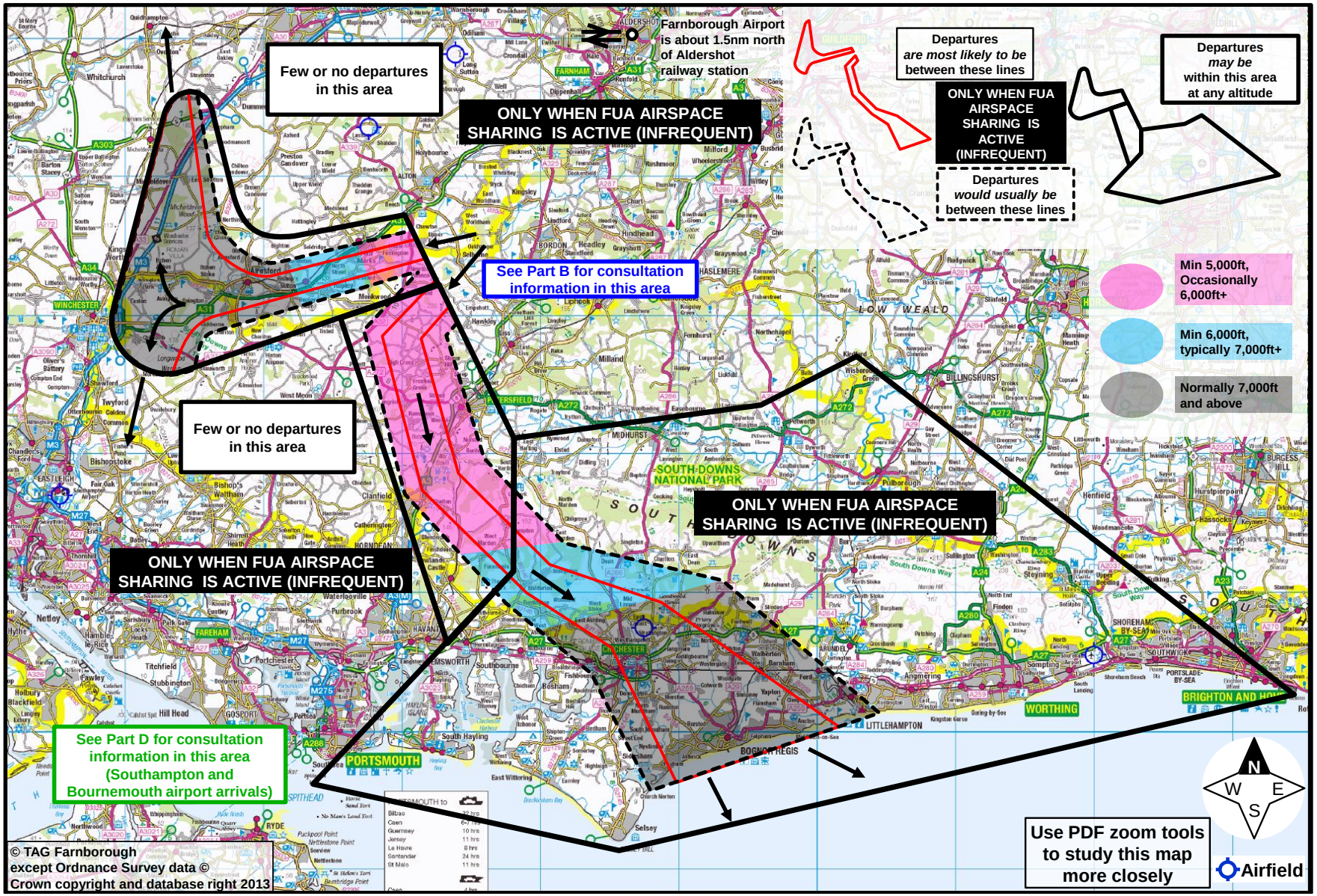


Figure C9: Proposed Farnborough departures (4,000ft-7,000ft) when FUA airspace sharing is active (infrequent)

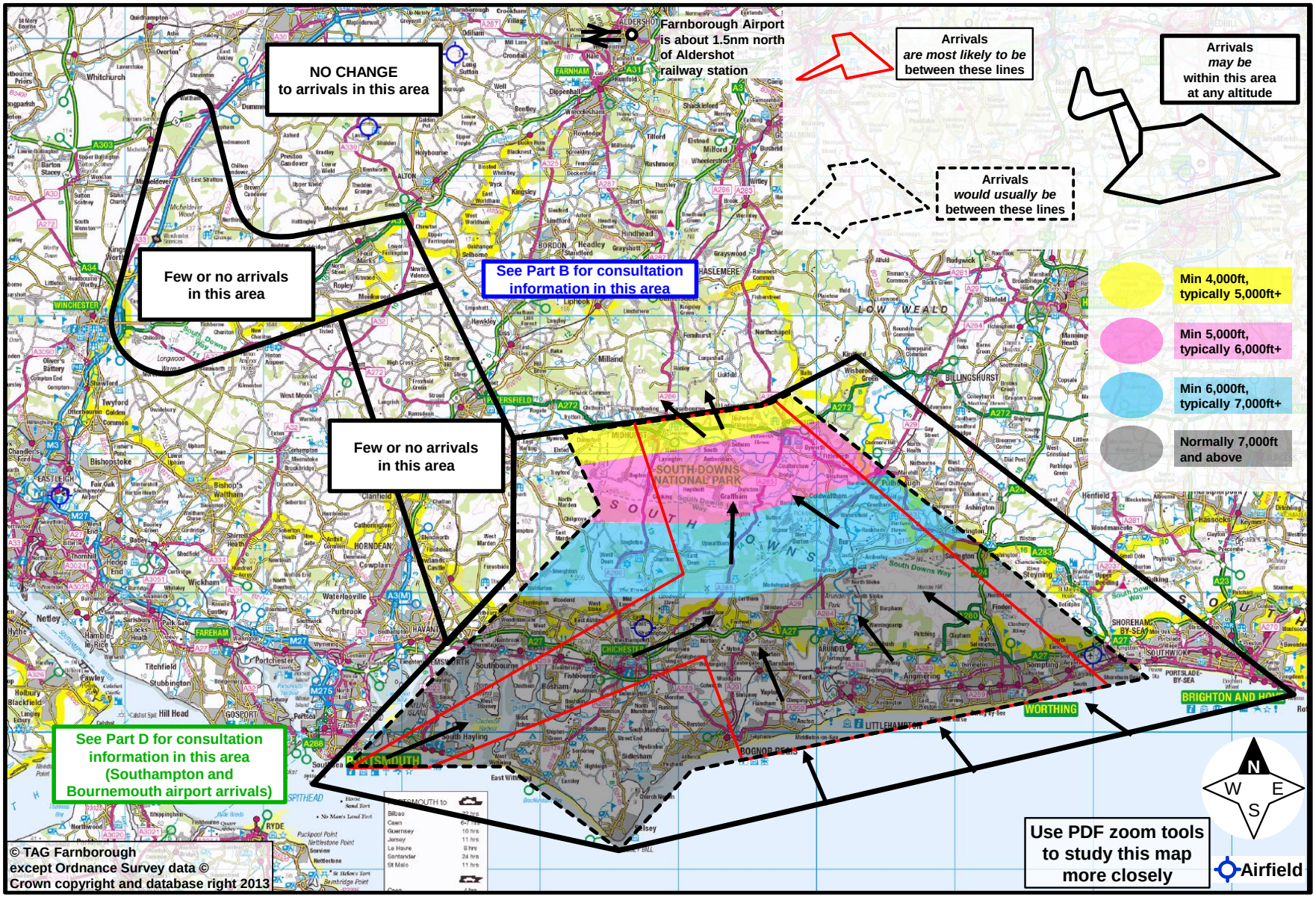


Figure C10: Proposed Farnborough arrivals from the South (4,000ft-7,000ft) regardless of airspace sharing

Question C4 – Specific Locations

This question is about *places* within the consultation swathes.

In Section 4 we asked you to consider your area(s) of interest using the maps, and compare the impact now with the impact under this proposal.

We want you to tell us about places within the black consultation region that you think require special consideration in the ongoing design process.

Bear in mind that aircraft at intermediate altitudes (4,000ft-7,000ft) appear smaller and quieter than those at low altitudes (below 4,000ft). Also bear in mind the effect of the airspace sharing arrangement with gliders, FUA, that would infrequently move our southbound departure flight-path.

Ideally, you would supply us with a postcode of the location. Otherwise, please use town or village names, the names of National Parks/AONBs, or other easily identifiable location. This means we can find the right place more easily.

Tell us broadly what type of place this is by choosing the closest type from the online menu. Do you think these places would benefit from the proposed change, or not, and to what extent? Describe the characteristics of these places, stating whether they should be considered special due to concerns about noise impact, visual impact or other reason.

You can do this for as many locations as you wish. We have provided a template for you below. Choose the closest or most important option from those suggested, or add your own if none are suitable.

Structuring your response like this will make it easier for us to analyse your feedback, which in turn makes it more effective on your behalf.

Location

Postcode, or name of easily identifiable place.

What type of place is this? *I consider this a…*

Populated residential area / Busy commercial area (town centre, retail park) / Industrial area (including military use) / Recreational area / Tranquil area / Sensitive area (e.g. hospital) / Village / Nature area / Tourist attraction / Transport link (railway, motorway, airport) / Other (brief description)

What would the change in impact be, on this place*?* *If the change occurred, this place would…*

Benefit significantly from the change / Benefit slightly / Probably not notice the change / Be slightly negatively impacted / Be very negatively impacted by the change

Why would the impact change, on this place? *If I was at this place…*

I would hear less aircraft noise / I would see fewer aircraft / It wouldn't make much difference to me / I would hear more aircraft noise / I would see more aircraft / Other (brief description)

Choose the ***most relevant***, or ***most important***, item from the suggestions, or add your own if none are suitable.

Please repeat this process until you have finished telling us about specific locations that are important to you.

5. Changes below 4,000ft, and changes above 7,000ft

5.1. For information relating to changes below 4,000ft in the vicinity of Farnborough, see Part B of this consultation document.

5.2. Changes above 7,000ft are designed for flight efficiency because they are far less likely to be noticeable from the ground. Changes due to this proposal above 7,000ft are mostly over the sea wherever possible, or are within modified areas of the current air route network where aircraft are already common.

General Question

If there is something that you think we should know that hasn't already been covered by the questions in this document (or by other questions in other parts of this consultation), please provide a statement.

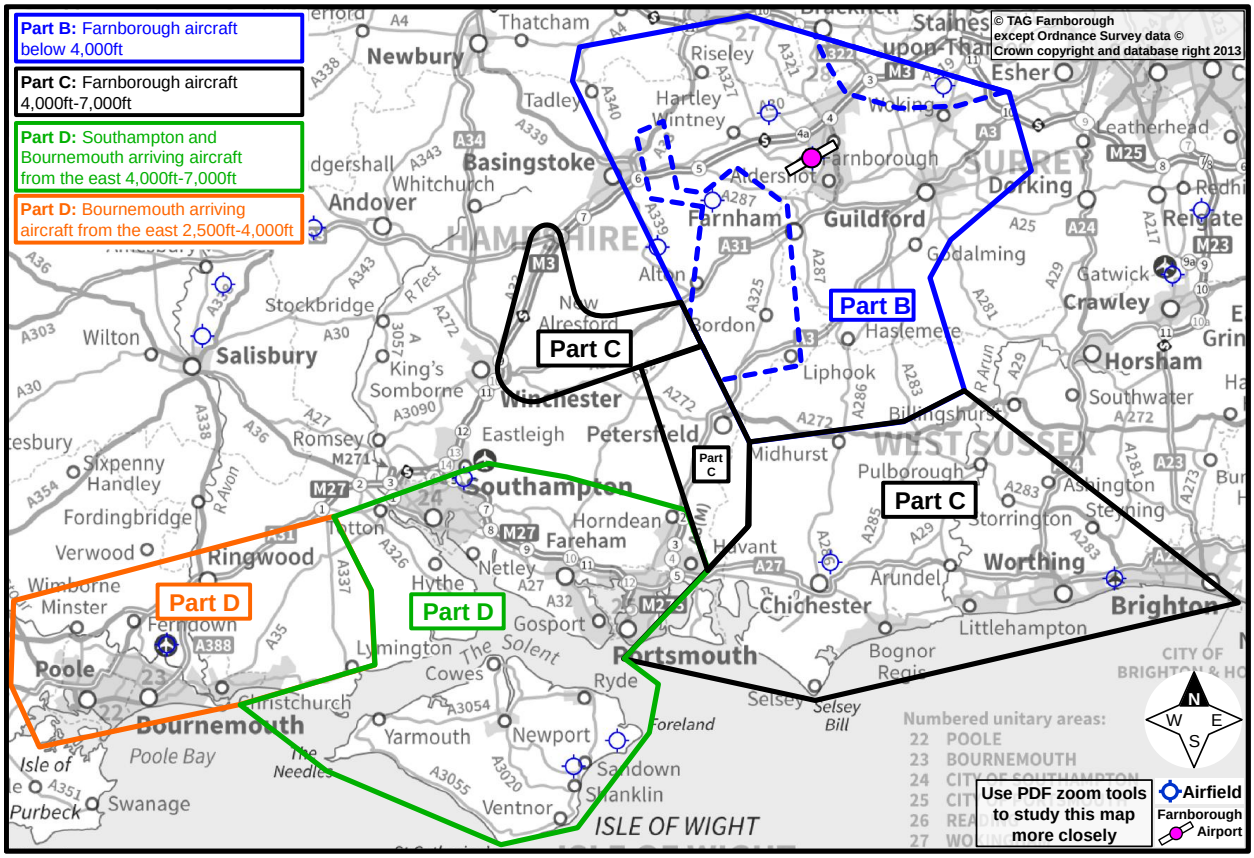
This page is intentionally blank

Farnborough Airport

Airspace Consultation

Part D: Proposed changes between 2,500ft and 7,000ft in the vicinity of Southampton and Bournemouth

(Affecting Parts of Hampshire, the Isle of Wight and Dorset)



Contents

List of Figures

List of Tables

This page intentionally left blank

1. Introduction to Part D

1.1. This part of the consultation material is slightly different from Parts B and C. It describes the proposed changes to the flight paths for Southampton and Bournemouth airport arrivals from the east. The regions which may be affected are shown enclosed by the solid green (4,000ft-7,000ft) and orange (2,500ft-3,999ft) outlined areas in Figure D1 below. All altitudes are above mean sea level[1].

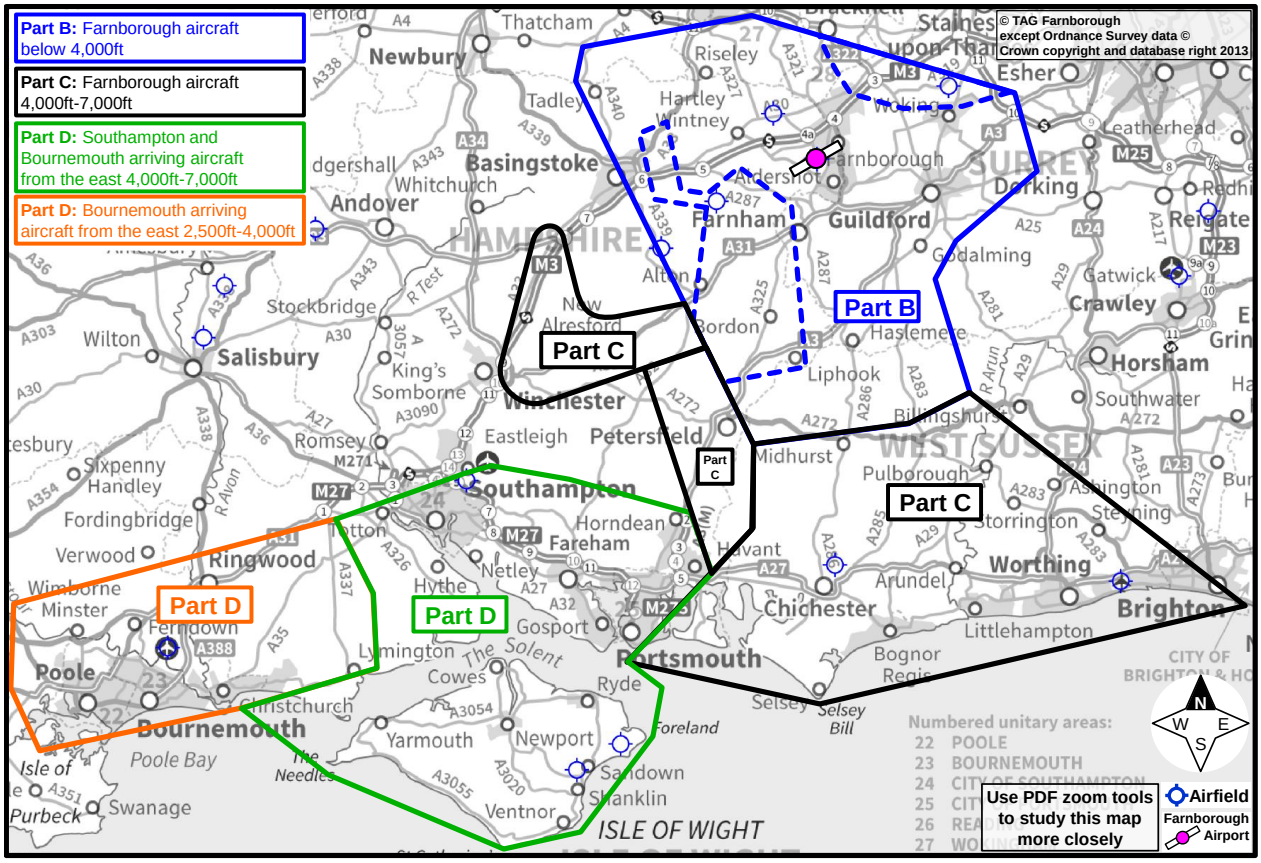


Figure D1: Consultation areas overview

1.2. Part D assumes that:

a. You have read and understood the first half of Part A (this sets the context for the proposed changes);

b. You have identified that the geographic areas (shown outlined in green and orange in Figure D1) above are of interest to you, and

c. You understand that this consultation only covers the areas identified in Figure D1 where changes to air traffic flows are likely to occur as a result of this proposal. In this case, the only changes would be to one arrival route from the east.

1 Altitudes of flights and airspace are given in feet above mean sea level (AMSL). Southampton Airport is at 44ft AMSL. The terrain within the areas shown in Figure D1 varies between sea level to about 900ft in elevation. To calculate the height above ground level (AGL) where you are, subtract your elevation from the altitudes in this document.
For example, if you live on a 300ft hill (AMSL), and aircraft fly over you at an altitude of 5,400ft, that aircraft is 5,400 – 300 = 5,100ft AGL (above you).

1.3. As discussed in Part A, changes to airspace and routes in one place can make a difference to traffic flows elsewhere, sometimes quite a distance from the original change. The changes to Southampton and Bournemouth arrivals are necessary as part of this TAG Farnborough Airport proposal, because they share an arrival route down to around 7,000ft. Moving this route for Farnborough arrivals therefore also means moving it for these two airports. This route is primarily at higher altitudes over the sea where it will not have a local environmental impact, however, moving this route will affect the way arrivals from the east approach Southampton and Bournemouth airports at altitudes below 7,000ft, over the green and orange outlined areas shown in in Figure D1.

1.4. This part of the consultation document provides information to help understand the impact of the changes to Southampton and Bournemouth arrival flight paths within the green and orange outlined areas shown in Figure D1 (previous page) and Figure D2 (on Page D8).

1.5. The main focus of this document is on the impacts of moving this arrival route, which are covered in detail in sections 1-4 of this document. You may consider this information to determine the local impact on your area of interest.

1.6. Other air traffic flows, such as those serving Heathrow and Gatwick, also use the same airspace at higher altitudes throughout the region. Within the green and orange outlined areas of this proposal, we are not considering changes to other flows.

1.7. We need to gather feedback from you as a stakeholder, to enable us to understand how the change may impact you. Later in this part, we have included questions which are highlighted in a box like this. The easiest way to respond to the consultation is to answer these questions via the website:

www.Consultation.TAGFarnboroughAirport.com

1.8. Care has been taken to make this consultation accessible to anyone who may wish to respond. The design and operation of airspace is, by its nature, a complex and technical issue. We aim to avoid technical jargon, but in order to help readers fully understand the rationale behind the changes being proposed we have, where appropriate and necessary, gone into some technical details and used relevant terminology. Any technical terms used are explained briefly, and summarised as a glossary in Appendix B.

1.9. In this part, we describe:

a. Today's airspace usage - a description of today’s flight-paths including maps of where aircraft are generally seen;

b. The objectives and justification for the proposed changes – describing the route we are seeking to implement and its potential benefits and impacts; and

c. Local considerations for route positioning; describing potential local impacts. We ask for your feedback on any location that may require special consideration in the ongoing design process, and why you think we should consider it special. This will help us assess and balance the impacts of the design.

How do I work out the change in impact within the green and orange outlined areas?

1.10. Later in this document, there are worked examples of how to assess the change of impact on a place. Use it for where you live or work, in order to decide how the change might affect you. These worked examples start in section 4 on Page D19.

1.11. Sections 2 and 3 provide background information to give an understanding of our objectives for this proposal.

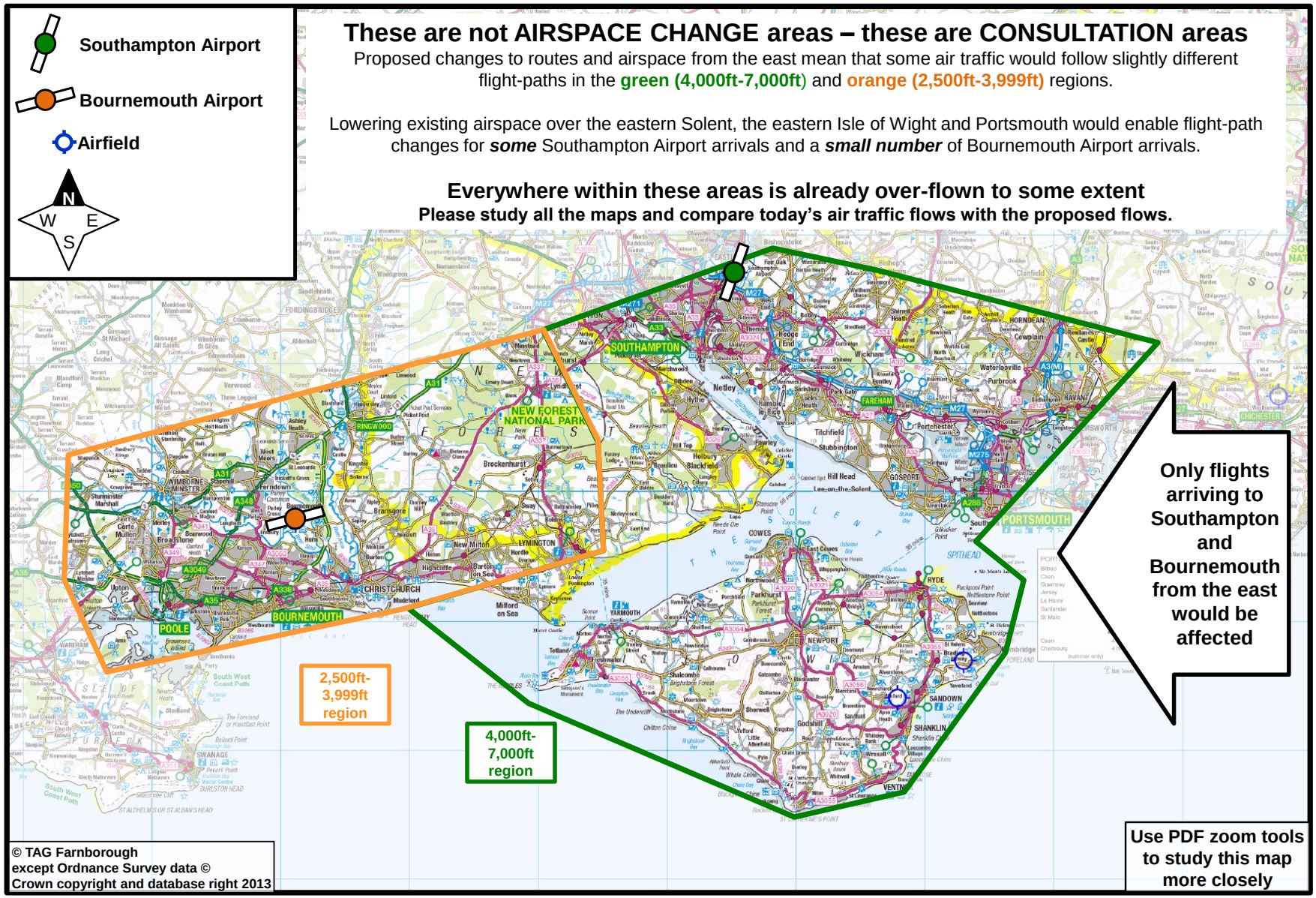


Figure D2: Consultation areas for Southampton and Bournemouth arrivals from the East (4,000-7,000ft and 2,500-3,999ft)

2. Today's airspace usage

2.1. The airspace near the south coast, which includes that used by Farnborough, Southampton and Bournemouth, is busy and complex. The area is also over-flown by aircraft originating from many different airports, as shown in Figure D3 (Page D30), which is a 'density plot' (see explanation below). This map shows all commercial air traffic in the region up to 20,000ft. Most notably there are several arrival and departure routes to and from Heathrow, Gatwick, Southampton and Bournemouth airports crossing the region. Figure D3 also contains outlines of National Parks and Areas of Outstanding Natural Beauty so you can see how often these places are over-flown by commercial aircraft today.

Aircraft flight-path density plots

2.2. In order to illustrate where commercial aircraft currently fly, we have provided maps overlaid with aircraft flight-paths (Figures D3-D7). These are known as density plots, which are produced using radar data, and show how many aircraft over-flew a particular place. These maps start from Page D30.

2.3. The density plots show all flights for one month[2], and hence give a good representation of where flights are most concentrated. A colour key explains the average number of flights per day over a particular place. Note that, because Southampton and Bournemouth have far fewer flights than Heathrow or Gatwick, the colour keys are different between density plots that show ***all*** airports and those that ***only*** show flights relating to these two airports.

2.4. We have filtered the radar data so we can show you different views:

a. Figure D3 shows all flights to/from all airports up to 20,000ft;

b. Figure D4 shows only flights arriving at Southampton and Bournemouth up to 20,000ft;

c. Figures D5-D7 show only flights arriving at Southampton and Bournemouth up to 7,000ft.

2.5. The density plots are provided to illustrate the spread of tracks today. The diagrams also have arrows which show the general direction of the traffic flows to aid your interpretation of these plots. The arrows are *illustrative* of the general flow directions.

2 Period chosen: September 2012. This month was chosen because it was a representative sample of aircraft types and destinations, and was outside the 2012 Olympics period. During the Olympics, special airspace was applied to the London region for parts of July and August - those special flight-paths did not represent the typical paths normally flown. This had consequential effects on Southampton and Bournemouth flight-paths, making them atypical.

Runway directions

2.6. Southampton and Bournemouth Airports each have one long stretch of concrete and asphalt which aircraft use to take off and land. However, because it can be used in either direction, each length of concrete is officially classed as being **two** runways (Southampton has Runway 02 and Runway 20, and Bournemouth has Runway 08 and 26) [3].

2.7. Airspace near the airport is used by departing aircraft as they climb after take-off, 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; for safety reasons the runway used is generally the one that has aircraft taking off and landing into the wind. This in turn influences the traffic patterns seen in the surrounding airspace.

2.8. If the wind is from the west or calm, Bournemouth aircraft take off and land using the westerly facing runway (Runway 26) and if the wind is from the east they take off and land using the easterly facing runway (Runway 08). Southampton is aligned more towards the northeast-southwest axis but the same principle applies.

2.9. The prevailing wind is generally from the west/southwest, this means that for both Southampton and Bournemouth the runway aligned in the westerly/south-westerly direction (the higher number) is used about 70% of the time.

2.10. Arriving aircraft initially come from the general direction of their departure airport via the air route network, but when they get close to the airport (and have descended sufficiently) they leave the air route and are directed towards the appropriate airport and the final approach for whichever runway is in use.

2.11. Initially these arriving aircraft for both airports are controlled from the national 'en-route' ATC centre, but all are transferred to the local airport controllers at Southampton. After this handover, Southampton arrivals are directed to final approach at whichever runway is in use at Southampton. Bournemouth arrivals are descended further by Southampton ATC before being handed over again to Bournemouth ATC. Bournemouth ATC then direct their aircraft to whichever of their runways is in use.

2.12. See Part A for further details on runway direction, usage, and designation.

Overview of Southampton and Bournemouth arrivals
See Figure D4 on Page D31

2.13. Figure D4 shows all Southampton and Bournemouth arrivals up to 20,000ft – departing aircraft are not shown. The vast majority of arrivals converge from the north and the south towards Southampton, with a smaller number arriving from the east. Only the arrivals from the east are relevant to this consultation.

3 The runway numbers '02', '20' '08' and '26' refer to the magnetic heading an aircraft would display on its compass, if it was aligned with the runway centreline. Southampton's runways are aligned approximately 020° and 200°, abbreviated to 02 and 20.

a. For Southampton, **8.5%** of their arrivals come from the east.

b. For Bournemouth, **15%** of their arrivals come from the east.

Today's Southampton arrivals from the east – see Figure D5 on Page D32 (No change to flights below 4,000ft)

2.14. Southampton ATC currently manages arriving aircraft by manually directing each flight along reasonably consistent flight-paths towards the runway. When ATC manually directs a flight it is known as 'vectoring'. As the aircraft descend from about 7,000ft towards the runway, the radar controller takes command of the arrival and directs it along a safe and efficient flight-path taking account of the other aircraft in the vicinity. Some arrivals are given longer flight-paths, and some shorter, depending on the specific situation at the time. Equally, some aircraft are descended early, or late, for the same reason.

2.15. Because Southampton has controlled airspace (or 'CAS' – see Part A for an overview of CAS) that surround the airport at low altitudes, the arriving flight-paths are generally consistent and predictable, though there is some dispersal along those paths.

2.16. Southampton's flight-paths from the east, between 7,000ft and 4,000ft, currently follow two well-defined paths within the dashed outlined area in Figure D5.

2.17. Arrow 1 shows where arrivals from the east are handed over to Southampton ATC by the national 'en-route' ATC centre (the previous 'link' in the ATC chain).

2.18. Arrow 2 shows where Southampton ATC decides which runway to land them on.

2.19. If Runway 20 is in use (70% of the time, broad Arrow 2) the aircraft will continue heading northwest towards Arrow 3. When it reaches Arrow 3, it will be turned north and into the Runway 20 landing pattern, aiming at Arrow 20 to the north.

2.20. 6% of all Southampton arrivals head for Runway 20 via Arrow 3 (i.e. 8.5% arrive from the east, and 70% of these head to Runway 20).

2.21. If Runway 02 is in use (30% of the time, slim Arrow 2) the aircraft will be turned southwest towards Arrow 4. When it reaches Arrow 4, it will be turned south and into the Runway 02 landing pattern, aiming at Arrow 02 to the south, near Beaulieu.

2.22. 2.5% of Southampton arrivals head for Runway 02 via Arrow 4 (i.e. 8.5% arrive from the east, and 30% of these head to Runway 02).

Points to note about these Southampton arrivals from the east

2.23. The tracks in Figure D5 start when the aircraft have descended below 7,000ft. Most are below 7,000ft by the time they near Havant.

2.24. Even though Figure D5 and this particular section of Part D are concerned with air traffic from 4,000ft to 7,000ft, we are showing you the flight-paths below 4,000ft so you can see how the flows work. Aircraft flight-paths outside the black dashed outline to the north, south or west are likely to be below 4,000ft, and to the west would be above 7,000ft.

2.25. Southampton arrivals from all other directions would not change. Figures D4 and D5 show these traffic flows also. No Southampton departure routes would be affected by this proposal, and so they are only shown in Figure D3 as part of the overall traffic flows.

Today's Bournemouth arrivals from the east in the vicinity of Southampton
See Figure D6 on Page D33 (No change to flights below 4,000ft)

2.26. Because Southampton and Bournemouth both have CAS that adjoins, the Bournemouth flight-paths are generally consistent and predictable, though there is some dispersal along these flight-paths.

2.27. Bournemouth's flight-paths from the east, between 7,000ft and 4,000ft, currently follow two well-defined paths within the dashed outlined area in Figure D6 (and one occasional path described below).

2.28. Arrow 1 shows where arrivals from the east are handed over from the national 'en-route' ATC centre (the previous 'link' in the ATC chain) to local ATC at Southampton (se paragraph 2.10). About 15% of all Bournemouth arrivals route this way.

2.29. Arrow 2 shows where Southampton ATC decides which runway to land them on – this is agreed with Bournemouth ATC well in advance.

2.30. If Runway 26 is in use (70% of the time, broad Arrow 2) the aircraft will be turned southwest towards Arrow 3. When it reaches Arrow 3, it will continue in a near straight line onto a long final approach to Runway 26, joining the landing pattern, aiming at Arrow 26 near Brockenhurst.

2.31. 10.5% of Bournemouth arrivals head for Runway 26 via Arrow 3 (i.e. 15% arrive from the east, of which 70% head for Runway 26).

2.32. If Runway 08 is in use (30% of the time, slim Arrow 2) the aircraft will continue northwest towards Arrow 4. When it reaches Arrow 4, it will be turned southwest and into the Runway 08 landing pattern, aiming at Arrow 08 to the west, near Lyndhurst.

2.33. 4.5% of Bournemouth arrivals head for Runway 08 via Arrow 4 (i.e. 15% arrive from the east, of which 30% head for Runway 08).

2.34. Occasionally to achieve the correct spacing between aircraft, pilots are given alternative, less direct flight-paths; this happens relatively infrequently but contributes to the spread of flight paths shown in these Figures.

Points to note about Bournemouth arrivals from the east in the Southampton vicinity

2.35. The tracks in Figure D6 start when the aircraft have descended below 7,000ft. Most are below 7,000ft by the time they near Havant.

2.36. Even though Figure D6 and this particular section of Part D are concerned with air traffic from 4,000ft to 7,000ft, we are showing you the flight-paths below 4,000ft so you can see how the flows work. Aircraft flight-paths to the west of the black dashed outline are likely to be below 4,000ft, and to the east above 7,000ft.

2.37. Bournemouth arrivals from all other directions would not change. Figure D6 shows these traffic flows also. No Bournemouth departure routes would be affected by this proposal, and so they are only shown in Figure D3 as part of the overall traffic flows.

Today's Bournemouth arrivals from the east in the vicinity of Bournemouth
See Figure D7 on Page D34 (No change to flights below 2,500ft)

2.38. Bournemouth manages their arriving aircraft by vectoring them in a similar way to paragraph 2.14.

2.39. Because Bournemouth has CAS that surrounds the airport, the Bournemouth flight-paths are generally consistent and predictable, though there is some dispersal along these flight-paths.

2.40. Bournemouth's flight-paths from the east, between 3,999ft and 2,500ft, currently follow two paths within the dashed outlined area in Figure D7 (the Runway 26 path is well defined, however because fewer aircraft arrive on Runway 08 its path is less clear – Figure D7 shows the corridor in which they typically arrive).

2.41. Arrow 08 and Arrow 26 show approximately where arrivals from the east are handed over to Bournemouth ATC by Southampton ATC (the previous 'link' in the ATC chain). Combining Arrows 08 and 26, about 15% of all Bournemouth arrivals route this way.

2.42. If Runway 26 is in use (70% of the time) the aircraft will arrive from Arrow 26 near Hythe and continue in a straight line towards Arrow 2. It will continue in a near straight line onto a long final approach to Runway 26, joining the landing pattern to the west of Arrow 2, aiming straight for the runway.

2.43. 10.5% of Bournemouth arrivals head for Runway 26 via Arrow 2 (i.e. 15% arrive from the east, of which 70% head for Runway 26).

2.44. If Runway 08 is in use (30% of the time) the aircraft will arrive from Arrow 08 between Marchwood and Totton, heading west towards Arrow 3 then Ringwood and Wimborne Minster, joining the landing pattern at Arrow 4 near Lytchett Matravers. When it reaches Arrow 4, it will be turned onto final approach for Runway 08, aiming straight for the runway to the east.

2.45. 4.5% of Bournemouth arrivals head for Runway 08 via Arrow 4 (i.e. 15% arrive from the east, of which 30% head for Runway 08).

Points to note about Bournemouth arrivals in this area between 2,500ft-3,999ft

2.46. The tracks in Figure D7 start when the aircraft have descended below 4,000ft. Most are below 4,000ft soon after they enter the New Forest National Park, which is currently over-flown regularly.

2.47. Even though Figure D7 and this particular section of Part D are concerned with air traffic from 3,999ft to 2,500ft, we are showing you the flight-paths above and below so you can see how the flows work. Aircraft flight-paths to the east of the black dashed outline are likely to be at or above 4,000ft, and when the aircraft are turned towards final approach for either runway they are likely to descend below 2,500ft.

2.48. Bournemouth arrivals from all other directions would not change. Figure D7 shows these traffic flows also. No Bournemouth departure routes would be affected by this proposal, and so they are only shown in Figure D3 as part of the overall traffic flows.

Traffic to/from other airports, and General Aviation (GA)[4] activity

2.49. Figure D3 shows that everywhere in the region is over-flown to some extent, and that Southampton and Bournemouth air traffic is a part of that overall picture. Figures D4 to D7 only depict Southampton and Bournemouth arrival traffic flows. Remember that the colour key for Figure D3 is different to that used in the other density plots because Southampton and Bournemouth are much less busy than Heathrow or Gatwick. Regardless of our proposal, the traffic to/from other airports will continue to be seen over-flying these areas (in particular Heathrow and Gatwick arrivals and departures) at similar altitudes to today, as would Southampton and Bournemouth traffic, other than the affected arrivals from the east.

2.50. This proposal may have an effect on where some GA aircraft fly. The change of impacts to people on the ground due to this is impossible to predict accurately. They are not required to speak with any ATS provider outside CAS, and may not show up on radar.

2.51. We know that changing flight-paths or airspace boundaries can be challenging to GA, and our intention is for as little disruption as possible by striking a fair balance (see Part E for details of aviation impacts).

4 General Aviation (GA) aircraft are usually private light aircraft, gliders, recreational aircraft etc. See Part A for more details.

3. Objectives and justification for proposed changes from 2,500ft-7,000ft

3.1. This section describes our objectives for changing the arrival route from the east to Southampton and Bournemouth Airports; it describes what we are trying to achieve and the generic benefits/impacts that would result. We welcome your feedback on these objectives. The effects on specific aviation users are discussed in Part E. Specific local considerations are discussed below in section 4.

3.2. This consultation is to develop airspace and flight-path solutions, assuming unchanged airport infrastructure. It is not associated with the work being undertaken by the Airports Commission. Any further proposals arising from any recommendations made by the Airports Commission would be subject to separate consultation at a later date.

3.3. The introduction of PBN, as recommended by the aviation industry's CAA-supported FAS, means the wider route system **must** undergo change (these terms are explained in Part A). This provides the opportunity to consider changes that will enable us to make best use of runways and to improve the management of noise impact wherever possible.

3.4. **Specific justifications:** We are seeking to optimise the route structure to bring benefits to the overall ATC system, in particular for the wider route network allowing improved Farnborough air traffic flows. Relocating the flows described in this part would enable that improvement (see Parts B and C), but would also improve the overall management of airspace in the entire region for the benefit of as many users as possible. We intend to do this by balancing the operational benefits of relocating the flight-paths with environmental impacts, considering GA activity areas as far as practicable. In particular we are proposing to change the manually vectored flight-paths that lead from the end of this relocated arrival route to the runways of both airports. This would improve the overall management of arrivals and keep the flight-paths consistent and predictable whilst retaining flexibility. Keeping the legacy arrangements was considered but would not enable the proposed wider airspace changes. The proposed airspace management would be more efficient for all users as well as these two airports.

Balancing the relocated flight-paths against the environmental impact and impact on GA activity

3.5. The proposed relocation of this arrival route from over the land to over the sea would enable the wider benefits of this proposed airspace change, as described in Parts B and C.

3.6. In addition, we estimate that, due to the relocation of this arrival route from over the land to over the sea, ***464,000 fewer people***[5] would be over-flown by flight-paths between 7,000ft-4,000ft (the green area), and ***11,000 fewer people*** would be over-flown by flight-paths between 3,999ft-2,500ft (the orange area). This totals ***475,000***.

3.7. Most of the affected flight-paths would fly over areas on the ground where aircraft already fly at similar altitudes, and often in similar directions. This is less likely to be noticeable to an observer on the ground than a new flight-path where aircraft were previously uncommon.

Potential negative impacts

3.8. Avoiding over-flight of one area inevitably means flights over neighbouring ones instead. For example, avoiding over-flight of a town almost always means flying over surrounding countryside, which may be valued for its relative tranquillity[6]. This has been minimised by planning replacement flight-paths to be over the sea or over areas of reduced population as far as practicable. Whilst our proposal reduces the net number of people over-flown by these flight-paths (see paragraph 3.6 above), we recognise that changing the flight paths will mean new or increased impact over some areas.

3.9. Relocating the route means some aircraft would have to fly longer paths than today. Part A Section 10 describes how longer routes cause aircraft to use more fuel and produce more CO_2.

3.10. Southampton and Bournemouth also provide services on request to all airspace users in the region outside CAS. Changes to airspace inevitably affect those other users, and we want to minimise the disruption to them as much as we can whilst fulfilling our objectives to provide a predictable airspace environment which can be managed safely and efficiently.

3.11. The majority of GA flying takes place below 4,000ft. There is GA activity from 4,000ft to 10,000ft and higher, but their frequency tends to decrease with altitude. In general there are relatively few GA flights above 10,000ft. It is unlikely that services to GA below 6,500ft would be significantly affected by this part of the proposal. Services to GA from 6,500ft and above would be affected in the vicinity of the eastern Isle of Wight. See Part E for more details.

5 Population data based on information supplied by CACI for 2012. This is a net figure based on a simple comparison of the populations within the areas covered by the current flight-paths vs the (smaller) areas covered by the proposed flight-paths. It 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.

6 Route positioning is limited by aircraft manoeuvrability. Aircraft fly at high speeds; this limits how tightly, and how often, aircraft can turn in order for the route to be considered flyable and safe (this is governed by international design standards); hence avoiding one sensitive area can often mean over-flying another.

Overall benefit

3.12. Our assessment of impacts is based on our interpretation of the Government's priorities described in Part A, which focusses on minimising the impact of aviation noise on densely populated areas, balanced with the need for a predictable and efficient flow of air traffic (operationally and with respect to fuel/CO_2). Whilst the proposed change would have both positive and negative impacts, we believe that by reducing the net number of people over-flown and by avoiding disruption of GA areas as far as practicable, our design achieves the best balance. We therefore believe that the change is justified. In the questions below we ask about the principles behind our design decisions, and in Section 4 we are seeking local views in order to help determine whether our design can be improved further.

Questions D1-D3

The following three questions are intended to gather your views regarding our ***justification*** for the proposed changes, and the ***balances*** we strike between route efficiency and environmental impacts. Please remember that these three questions are ***not*** asking about specific locations, only the ***principles*** behind why and how we designed the proposed routes.

Answering these questions does not prevent you from providing information on local sensitivities in answer to the questions in section 4; for example you may support our objective to improve airspace management in the region by enabling airspace and route changes to the east, but have strong views on areas that should be avoided. Equally you may have information that we have not considered that leads you to oppose the wider objective of improving overall airspace management, regardless of local issues. Please use the questions below to express your views on the general principles.

Question D4 (later) will ask about the impact on specific locations.

Question D1 – Relocating one arrival route – Effect on flight-paths

This question is about ***justification for change***.

In Section 3 above, we say that relocating this arrival route from the east would ***not only*** enable the wider airspace and route changes (described in Parts B and C), but would ***also*** improve the ***overall*** airspace management in the entire region for the benefit of as many airspace users as possible.

To what extent do you agree with our justification:

Relocating the Bournemouth and Southampton arrival route, and the associated landing patterns, would enable changes to other routes and airspace – these changes are linked. Enabling these changes would improve the overall airspace management in the south.

1 Strongly agree

2 Somewhat agree

3 No preference

4 Somewhat disagree

5 Strongly disagree

You are welcome to provide a statement to support your answer.

Question D2 – Balance between local noise impact and CO_2 emissions – Low altitude flight-paths

This question is about ***balance***. In section 3 above we say that the proposed flight-paths at low altitudes would reduce the net number of people over-flown by these flight-paths. This would help noise management, in line with Government guidance that we are required to consider, as discussed in Part A.

The consequence of following this guidance is that some flight-paths are longer than today's typical flight-paths. This means that some aircraft need to use more fuel, leading to more CO_2 emissions. Other flight-paths are shorter, but they are not used as often.

It's not possible to reduce the local noise impact at low altitudes *and* make all aircraft fly shorter routes at the same time, so we prioritised reducing the overall low-altitude local noise impact at the expense of more fuel for some flights.

To what extent do you agree with our balance:

Making some aircraft fly longer routes is justified, if it reduces the over-flight of populated areas at low altitudes (below 4,000ft).

1 Strongly agree

2 Somewhat agree

3 No preference

4 Somewhat disagree

5 Strongly disagree

You are welcome to provide a statement to support your answer.

Question D3 – Balance between route efficiency & environmental impacts

This question is also about ***balance***. In section 3 above we say that the relocated flight-paths would reduce the net number of people over-flown by these flight-paths, and that linking low altitude routes with the high altitude air route network needs flexibility, consistency and predictability.

The consequence is that some routes are longer than today's typical flight-paths. This means that some aircraft need to use more fuel, leading to more CO_2 emissions. It's not possible to reduce the local noise impact at low altitudes and make all our aircraft fly shorter routes at the same time, so we prioritised reducing low-altitude local noise impact at the expense of more fuel.

We then balanced the (diminished) environmental impacts at intermediate altitudes (4,000ft-7,000ft) with the need to fly as efficient a route as possible.

To what extent do you agree with our balance:

At low altitudes, avoiding over-flying populated areas where possible is the highest priority. At these intermediate altitudes (4,000ft-7,000ft), some environmental impact is justified because the effect is much less than at low altitudes.

1 Strongly agree

2 Somewhat agree

3 No preference

4 Somewhat disagree

5 Strongly disagree

You are welcome to provide a statement to support your answer.

4. Local considerations for route positioning

4.1. Figures D3-D7 show current air traffic flows, and Figures D8-D9 show the proposed air traffic flows. You can also view the maps interactively at

www.Consultation.TAGFarnboroughAirport.com

and use the postcode search function. The website will also allow you to zoom in on maps, and to easily switch between the current day traffic picture and the consultation swathes for the new routes.

How to use the maps and data to assess potential effects

4.2. We have provided information to help answer the questions 'Would the change mean more or fewer over-flights? And if so, how many aircraft and what is the potential change in impact?' This information is in the form of maps and data that indicates potential noise and visual impacts across the consultation swathe. These swathes cover the most likely positioning of the relocated flight-paths described in this document (they do not cover existing flight-paths that would not change). The consultation swathes themselves are shown in Figures D8-D9, including data indicating the predicted numbers of flights affected. These Figures may be directly compared to the maps in Figures D3-D7 which show today's air traffic flows.

4.3. The information we have provided describes:

a. The potential number of aircraft that would use that flight-path. A summary is provided on the data pages preceding those maps

b. The lowest, and the most likely, altitudes these aircraft would be at. This is shown by the shading on the maps themselves and is discussed in more detail in the paragraphs below; and

c. A measurement of the maximum noise impact aircraft over-flying at that height would generate at ground level (referred to as L_{max}). This is also dependent on the aircraft types expected. A summary is provided on the data page preceding these maps.

Swathes

4.4. The swathe maps have shaded areas to show where flight-paths would normally be as a consequence of this proposal. The areas enclosed by the dashed black lines denote the widest extent of the likely traffic spread, and the solid black lines show where traffic would normally be concentrated.

Arrows

4.5. The swathe maps have arrows which indicate the general direction of the traffic flows, provided to help you interpret the maps. These arrows are illustrative.

Altitude data

4.6. The altitude information presented on the maps shows a minimum altitude representing the lowest altitude we would normally expect an aircraft to be on that part of the flight-path. For example, the part of the 'minimum 5,000ft' altitude band nearest the runway on these maps is the area by which we would normally expect the lowest aircraft to be at 5,000ft, but further away in that shaded area they would typically be higher than 5,000ft.

4.7. Predicting typical altitudes for aircraft for a future airspace design is not an exact science. We have therefore erred on the side of caution with these typical values, and even they do not represent the true range of altitudes that aircraft may achieve.

4.8. Whilst this variation in altitudes would happen in reality, it is difficult to represent in a consultation document. We therefore suggest that, as a default, stakeholders should consider the potential impact of aircraft at the minimum altitudes shown on Figures D8 and D9.

Tranquillity

4.9. Another factor that may determine the significance of a potential impact is tranquillity. CAA guidance for airspace change does not provide a method for assessing tranquillity. Any assessment will therefore be subjective and dependent on the specific location in question. The Government guidance (see Appendix A) specifically mentions AONBs and National Parks and so we have highlighted them in Figure D3 and the worked examples later in this section. You may wish to consider the potential effect on tranquillity when providing feedback.

Assumptions

4.10. In order to ensure you do not underestimate the number of over-flights over a particular location, and to ensure we get feedback across the range of options within the swathes presented in this consultation, we ask you to make the following assumptions if your area of interest falls within the shaded areas bounded by the black lines on the maps:

a. Assume the flight-path may be positioned directly above you at the altitudes shown (so the maximum number of over-flights would apply to this area, as described in the data tables); and

b. Assume that all aircraft would consistently fly along the flight-path in question rather than being vectored elsewhere in the vicinity by ATC.

4.11. These assumptions, combined with the assumptions regarding minimum altitude described above, mean that the potential impact may be overestimated in this document. This is because the consultation swathes presented would have a degree of dispersal within the swathes due to manual vectoring, so not all the areas would be directly over-flown all the time by the route.

4.12. We believe that this is a prudent and favourable approach over one which risks you underestimating the potential effects. This is because it is better for us to analyse and filter the salient points from a wide consultation response, than to risk stakeholders not responding because they assume the impact is lower than it might in fact be. For this reason, please think about what feedback you would supply us *if* you were directly over-flown by one, some or all of the routes and provide your feedback by answering the questions we ask.

General characteristics of proposed changes

4.13. The following paragraphs present the consultation swathes and describe the key factors that determine where they sit.

4.14. The traffic data shown on the pages preceding Figure D3 show a forecast of the average daily number of flights.

Southampton's proposed arrival flight-paths from the east
See Figure D8 on Page D35

4.15. Figure D8 shows the consultation swathes for the landing patterns to both runways. Figure D5 shows today's equivalent patterns. You may prefer to view the website where you can switch between these maps on screen.

4.16. Comparing Figure D5 with Figure D8 shows how our proposal would change the Southampton arrivals - the entire arrival route would move south, approaching from over the sea (Arrow 1). From there, the flow would start to split into the landing patterns for the relevant runway.

4.17. In Figure D8, Arrow 1 shows where the Southampton controller *may* decide to route some of the arriving aircraft if Runway 02 is in use. One option is for them to follow the slim arrow towards the point labelled 7 then over the southern Isle of Wight to Arrow 8. This would mostly be at higher altitudes above 7,000ft. From Arrow 8 they would turn straight to final approach for Runway 02 over Beaulieu as per today. This would happen about 35% of the time Runway 02 is in use, which itself is only 30% of the time.

Less than 1% of all Southampton arrivals would be affected by this route change (i.e. 8.5% arrive from the east, of which 30% head for Runway 02, of which 35% would fly over the southern Isle of Wight).

4.18. Most Runway 02 arrivals (65%) would route from Arrow 1 to Arrow 2 then Arrows 5 and 6. This would take them mainly over water along the Solent, avoiding populated areas as far as practicable.

1.7% of all Southampton arrivals would be affected by this route change (i.e. 8.5% arrive from the east, of which 30% head for Runway 02, of which 65% would fly along the Solent).

4.19. For arrivals to Runway 20 (in use 70% of the time), the controller also has a choice to make, depending on the air traffic situation at the time.

4.20. About half the time, Runway 20 arrivals would route along the Solent via Arrows 1 then 2 and then 5, at which point they would turn north towards Arrow 4, joining the remaining (unchanged) landing pattern at Arrow 20.

4.21. The other half of the time, Runway 20 arrivals would cut the corner over southern Portsmouth and Gosport via Arrows 1-2-3-4, again joining the unchanged landing pattern beyond Arrow 4.

About 3% of all Southampton arrivals would follow the flight-path via the Solent (Arrow 5) and likewise 3% would follow the more direct route via Arrow 3 (i.e. 8.5% arrive from the east, of which 70% head for Runway 20, of which 50% would be directed along each path depending on the situation).

4.22. Table D1 on Page D27 shows the total affected Southampton flights. See Tables D2-D5 for how these proportions relate to the total numbers of flights involved.

4.23. Remember that only the yellow, pink and blue shaded areas could be up to 7,000ft – the grey areas would be 7,000ft and above.

4.24. The Needles, Beaulieu, Hythe, Fawley, Hamble, Hedge End, Botley and Lower Upham are already overflown regularly by arriving flight-paths from the south (see Figures D3 and D4). These flows are not changing due to this proposal.

Bournemouth's proposed arrival flight-paths from the east
See Figure D9 on Page D36

4.25. Figure D9 shows the consultation swathes for the landing pattern to both runways. Figures D6 (4,000ft-7,000ft) and D7 (2,500ft-3,999ft) show today's equivalent patterns. You may prefer to view the website where you can switch between these maps on screen.

4.26. Current arrival flight-paths are discussed from paragraph 2.28 on Page D12 and from paragraph 2.41 on Page D13.

4.27. Comparing Figure D6 with Figure D9 the entire arrival route, containing about 15% of Bournemouth arrivals, would move south, starting over the sea but overflying part of the Isle of Wight (Figure D9 Arrow 1). From the Needles (Arrow 2), the flow would split into the landing patterns for the relevant runway. This means that the grey and blue shaded areas in Figure D9 would get the same number of aircraft overhead regardless of the runway in use at Bournemouth, typically 6,000ft (blue) to 7,000ft or above (grey). (From Table D6, 2015 forecast indicates that on average about 2.5 flights per day would use this route.)

4.28. If Runway 08 was in use (30% of the time), arrivals would route from Arrow 2 to Arrow 4 then join the (unchanged) final approach at Arrow 08 over Canford Heath.

(From Table D7, the 2015 forecast indicates that on average fewer than 1 flight per day would route this way.)

4.29. If Runway 26 was in use (70% of the time), arrivals would route from Arrow 2 to Arrow 3 via Milford on Sea and Lymington, then join the (unchanged) final approach at Arrow 26 over Thorney Hill.

(From Table D8, the 2015 forecast indicates that on average fewer than 2 flights per day would route this way.)

4.30. Arrows 1-5-6-26 show a potential alternate route to Runway 26. This follows the Solent and makes landfall south of Calshot, towards Blackfield and Beaulieu. This flight-path may be infrequently used by a small number of arrivals to Runway 26. These places are, and would continue to be, over-flown by other flight-paths.

4.31. Remember that the grey and blue areas would be over-flown more often, but at higher altitudes (at least 6,000ft in the blue shaded area, typically 7,000ft or above in the grey shaded area). The yellow and pink shaded areas would be at least 4,000ft-5,000ft respectively. Aircraft are only likely to descend below 4,000ft in the green areas, before reaching final approach in the red areas, probably between 3,000ft and 2,500ft.

4.32. The Milford-Lymington area and the Bournemouth-Poole area are both already overflown regularly by arriving flight-paths from the south (from Figures D3 and D4). These flows are not changing due to this proposal. Please consider whether the small number of aircraft affected by this proposal would be noticeable amongst these existing traffic flows.

4.33. The Isle of Wight is already regularly overflown below 20,000ft by at least three major airways (see the red, yellow and blue bands in Figure D3, aligned northeast to southwest and vice versa). The change proposed in this part of the consultation would slightly increase the over-flight of parts of the island, at or above 6,000ft but generally above 7,000ft, with two flows running east to west - and one of those flows would probably be used infrequently. Please consider whether the small number of aircraft affected by this proposal would be noticeable amongst these existing traffic flows.

Current and forecast air traffic information for Figures D8-D9

4.34. Daily numbers given in the data tables are *averages*[7]. Like any airport, there are busy periods where flights per day are greater than the average, likewise there are quiet periods. These peaks and troughs are based on too many factors to be predictable, but the summer season is usually busier than winter. This would not change due to the proposal.

4.35. Southampton's air traffic movements are forecast to remain the same in 2015 as they were in 2012, and to increase by 10.8% by 2019.

7 These averages were calculated based on both airports being open 364 days per year (excluding December 25th).

4.36. Bournemouth Airport were not able to supply forecast figures for 2015 and 2019. However, for the purposes of this consultation, it was agreed that the following forecast could be used to provide calculations so that current and future potential impacts could be compared:

a. 2015's movements could be considered to remain the same as 2012's

b. 2019's movements could be considered as 10% greater than 2015's

What is the impact now, and what would it be in the future? Worked examples

4.37. The following paragraphs explain how to work out the changes in impact for real places, as an example. Follow these examples, use the maps to find where you live or work, and run through the same method for your area of interest.

4.38. We have worked three examples below, using the towns of Havant and Gosport. To follow the examples we suggest you have the maps nearby, or have the consultation website open with the map pages on display.

4.39. We describe what impacts these places are exposed to now, what they would be exposed to in the future if this proposal was not implemented, and what they would be exposed to in the future if this proposal was implemented.

4.40. To describe the impact today, we used radar data and aircraft numbers from 2012. In 2019, if the proposal was not implemented, aircraft would continue to follow the same flight-paths as today.

4.41. In these examples, we compare today's movement numbers with the most likely forecast movement numbers for 2019.

4.42. Please remember the assumptions in paragraphs 4.10-4.12.

4.43. The relevant Figures (D3-D9) are on Pages D30-D36. The relevant Tables (D1-D11) are on Pages D27-D29.

4.44.

We use:	In order to:
Figures D3-D7	See where the place is, in relation to current flight-paths
Figures D8-D9	See where the place is, in relation to proposed flight-paths
Tables D1-D8	Find out how many flights affect the place
Tables D9-D11	Understand the noise impacts involved for that place.

Havant

4.45. From Figure D3, Havant is currently over-flown by commercial air traffic to and from many airports, including to/from Heathrow and Gatwick. This density plot shows Havant covered by blue/green (up to 18 flights per day) with a confluence of (red) routes passing a short distance to the southeast. This means that, on average Havant is over-flown by up to 18 flights per day by aircraft at altitudes below 20,000ft, with a major route in the vicinity. From Figure D3, Havant is not within a National Park or AONB, but it is near the boundaries of both the South Downs and Chichester Harbour. The key for Figure D3 is different to the keys of the other density plots, because it includes the busier Heathrow and Gatwick flows.

4.46. Figure D4 (Southampton and Bournemouth air traffic only, up to 20,000ft) shows that Havant is currently overflown by up to 1 Southampton/Bournemouth flight per day (grey area), with a route (blue/green band) representing up to 5 flights per day passing east to west slightly north of the town.

4.47. Figures D5 and D6 show the patterns flown by arrivals to Southampton and Bournemouth respectively, up to 7,000ft. These show that the arrival route to Southampton and Bournemouth from the east passes just to the north of Havant, but the average number of flights is up to 3 per day (blue colour)..

Havant today, and if the proposal was not implemented

4.48. Figures D5 and D6 show the vicinity of Havant is currently over-flown by all Southampton and Bournemouth arrivals from the east.

4.49. Adding Table D1 (all relevant Southampton arrivals) to Table D6 (all relevant Bournemouth arrivals) shows that about 1,783 + 922 = 2,705 follow this route – about 7 per day.

4.50. If the proposal was not implemented, in 2019 Havant would still be over-flown by Southampton and Bournemouth arrivals from the east.

4.51. In the 2019 column, adding Table D1 to Table D6 shows that about 1,975 + 1,014 = 2,989 would follow this route in that year – about 8 per day.

4.52. Aircraft to/from other airports would also continue to over-fly Havant.

Havant under this proposal

4.53. Figure D8 and D9 show that, if the proposal is implemented, these Southampton and Bournemouth arrivals from the east would be positioned to the south (over the sea) and hence would not over-fly Havant.

Gosport

4.54. From Figure D3, Gosport is currently over-flown by commercial air traffic to and from many airports, including to/from Heathrow and Gatwick. This density plot shows the Gosport vicinity covered by blue/green (up to 18 flights per day) with one distinct route coloured green/yellow (up to 24 flights per day) passing over Portsmouth Harbour towards Alverstoke. These flights are higher altitude and not related to Southampton and Bournemouth flights, since they do not show up in Figures D4, D5 and D6. This means that Gosport is over-flown by more than 24 flights per day (by aircraft at altitudes up to 20,000ft). Figure D3 also shows Gosport is not within a National Park or AONB.

4.55. Figure D4 (Southampton and Bournemouth arrivals only, up to 20,000ft) shows that Gosport is not currently over-flown by these flights.

4.56. Figures D5 and D6 show the patterns utilised by arrivals to Southampton and Bournemouth respectively, up to 7,000ft. They show that Gosport is not currently over-flown by these flights.

Gosport today, and if the proposal was not implemented

4.57. Figures D5 and D6 show that Gosport is not currently over-flown by Southampton and Bournemouth arrivals from the east.

4.58. If the proposal was not implemented, in 2019 Gosport would still probably not be over-flown by Southampton and Bournemouth arrivals from the east. Aircraft to/from other airports would however continue to over-fly Gosport.

Gosport under this proposal

4.59. Figure D8 shows that, if the proposal is implemented, the Southampton arrival routes from the east would be positioned more to the south (Arrow 2) and hence would join the new pattern from a starting place more likely to over-fly Gosport.

4.60. From Arrow 2, Southampton arrivals could route to Arrow 5 via the Solent. If Runway 20 was in use, arrivals would split around Arrow 2 and some would route to Arrow 3 via Gosport. Those that head towards Arrow 5 are less likely to over-fly Gosport directly, so the most likely impact would come from Arrow 3 (Table D5).

4.61. From the 2019 column in Table D5, the most likely number to fly in the vicinity of Gosport is 691, on average fewer than 2 flights per day. These would be in the blue shaded area, between 7,000ft and 6,000ft.

4.62. From Figure D9, Bournemouth arrivals would be unlikely to over-fly Gosport under this proposal.

Noise impacts

4.63. Comparing the noise impacts for arrivals (Table D9) against Table D11 (which gives examples of everyday noises) allows you to understand the approximate scale of the noise impact.

End of worked examples

4.64. Completing this exercise for yourself will allow you to form your own opinion on the change in impact this proposal could have on where you live or work.

4.65. Remember that, if this proposal is ***not*** implemented, the forecast 2019 traffic numbers would ***still*** apply to today's flight-paths.

Southampton Arrivals Aircraft Numbers
See Figures D5 (Page D32) and D8 (Page D35)

Flights	2012 Typical	2015 Most Likely	2019 Most Likely
Annual	1,783	1,783	1,975
Average Per Day	4.9	4.9	5.4

Table D1: Total arrivals from the east to Southampton Airport (All traffic in Figure D8)

Flights	2012 Typical	2015 Most Likely	2019 Most Likely
Annual	187	187	207
Average Per Day	0.51	0.51	0.57

Table D2: Arrivals from the east to Southampton Runway 02 via the Isle of Wight (Figure D8 Arrows 1-7-8-02)

Flights	2012 Typical	2015 Most Likely	2019 Most Likely
Annual	348	348	385
Average Per Day	0.96	0.96	1.06

Table D3: Arrivals from the east to Southampton Runway 02 via the Solent (Figure D8 Arrows 1-2-5-6-02)

Flights	2012 Typical	2015 Most Likely	2019 Most Likely
Annual	624	624	691
Average Per Day	1.71	1.71	1.90

Table D4: Arrivals from the east to Southampton Runway 20 via the Solent (Figure D8 Arrows 1-2-5-4-20)

Flights	2012 Typical	2015 Most Likely	2019 Most Likely
Annual	624	624	691
Average Per Day	1.71	1.71	1.90

Table D5: Arrivals from the east to Southampton Runway 20 via Gosport (Figure D8 Arrows 1-2-3-4-20)

Bournemouth Arrivals Aircraft Numbers
See Figures D6 (Page D33), D7 (Page D34) and D9 (Page D36)

Flights	2012 Typical	2015 Most Likely	2019 Most Likely
Annual	922	922	1,014
Average Per Day	2.5	2.5	2.8

Table D6: Total arrivals from the east to Bournemouth Airport (All traffic in Figure D9)

Flights	2012 Typical	2015 Most Likely	2019 Most Likely
Annual	277	277	304
Average Per Day	0.76	0.76	0.84

Table D7: Arrivals from the east to Bournemouth Runway 08 (Figure D9 Arrows 1-2-4-08)

Flights	2012 Typical	2015 Most Likely	2019 Most Likely
Annual	645	645	710
Average Per Day	1.77	1.77	1.95

Table D8: Arrivals from the east to Bournemouth Runway 26 (Figure D8 Arrows 1-2-3-26)

The potential arrival route 1-5-6-26 would probably be infrequently used, so no data is presented for that route.

Arrival Noise Information - Southampton

Height above ground (ft)	Peak noise impact of most common[8] aircraft type Medium Turboprop e.g. Bombardier DH8 (77%)
4,000ft-5,000ft	62-64 dBA
5,000ft-6,000ft	61-62 dBA
6,000ft-7,000ft	59-61 dBA
Above 7,000ft	59 dBA or below

Table D9: Arrivals - Typical noise level (Lmax dBA) at various heights for the most common[8] aircraft type

Arrival Noise Information - Bournemouth

Height above ground (ft)	Peak noise impact of most common aircraft type Medium twin jet e.g. Airbus A320/ Boeing 737 (50%)	Peak noise impact of noisiest aircraft type Boeing 747 (1%)
2,000ft-3,000ft	64-69 dBA	71-77 dBA
3,000ft-4,000ft	61-64 dBA	67-71 dBA
4,000ft-5,000ft	59-61 dBA	64-67 dBA
5,000ft-6,000ft	57-59 dBA	61-64 dBA
6,000ft-7,000ft	56-57 dBA	59-61 dBA
Above 7,000ft	56 dBA or below	59 dBA or below

Table D10: Arrivals - Typical noise level (Lmax dBA) at various heights for the most common and noisiest aircraft types

The highest L_{max} dBA would be for the aircraft at the lowest altitude in each band.

Table of Equivalent Sounds

Example Sound	Noise level (dBA)
Chainsaw, 1m distance	110
Disco, 1m from speaker	100
Diesel truck pass-by, 10m away	90
Kerbside of busy road, 5m away	80
Vacuum cleaner, 1m distance	70
Conversational speech, 1m away	60
Quiet office	50
Room in quiet suburban area	40

Table D11: Table of noise levels (L_{max} dBA) for equivalent sounds[9]

8 This is also the noisiest type to operate at Southampton. The jet aircraft that operate here are slightly quieter
9 Based substantially on www.sengpielaudio.com/TableOfSoundPressureLevels.htm

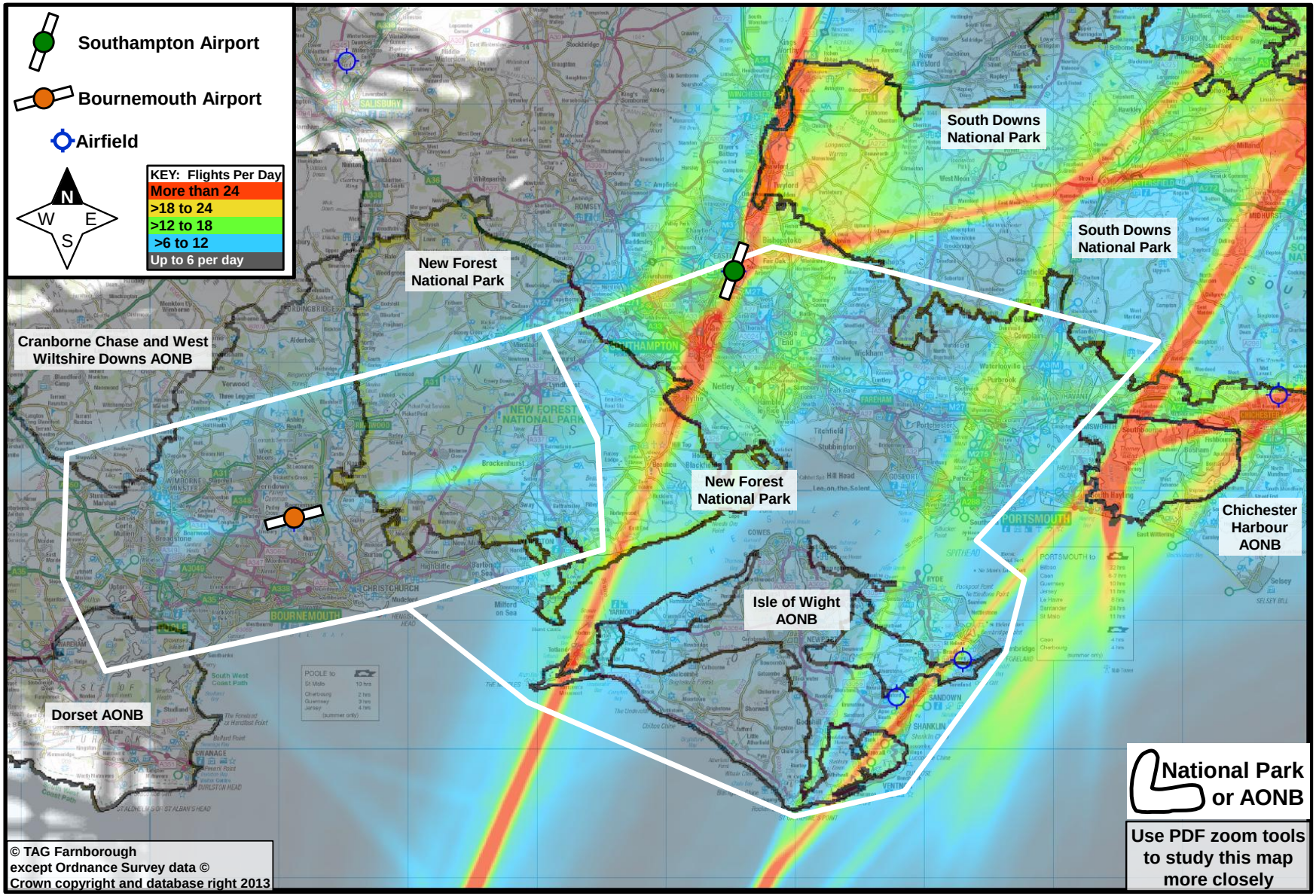


Figure D3: All commercial flights (up to 20,000ft) density plot with National Parks and AONBs

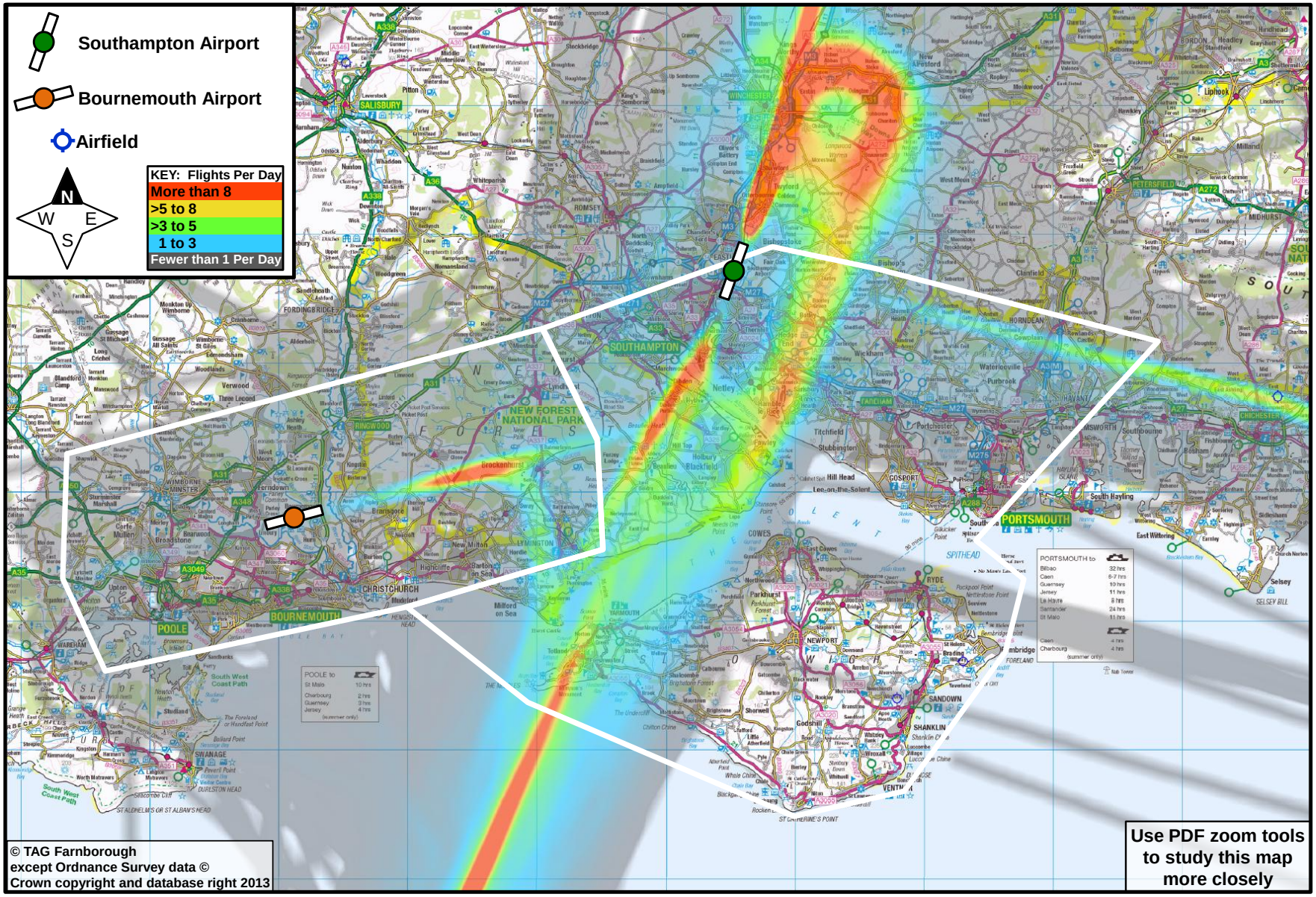


Figure D4: Southampton and Bournemouth arrivals (up to 20,000ft) density plot

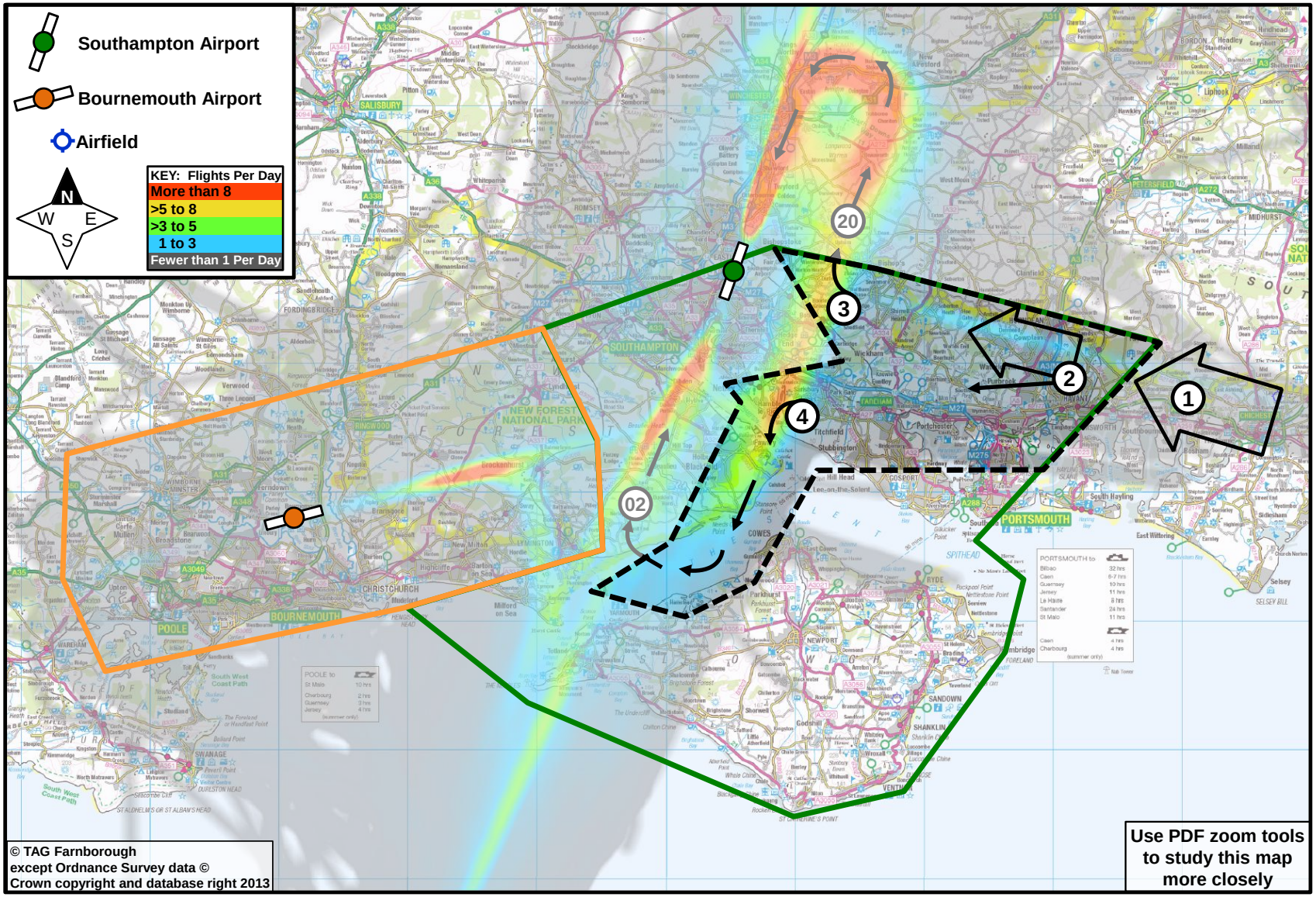


Figure D5: Arrows/dotted lines show typical SOUTHAMPTON arrival flows from the east to both runways, 4,000ft-7,000ft (Radar data shows all Southampton and Bournemouth air traffic up to 7,000ft)

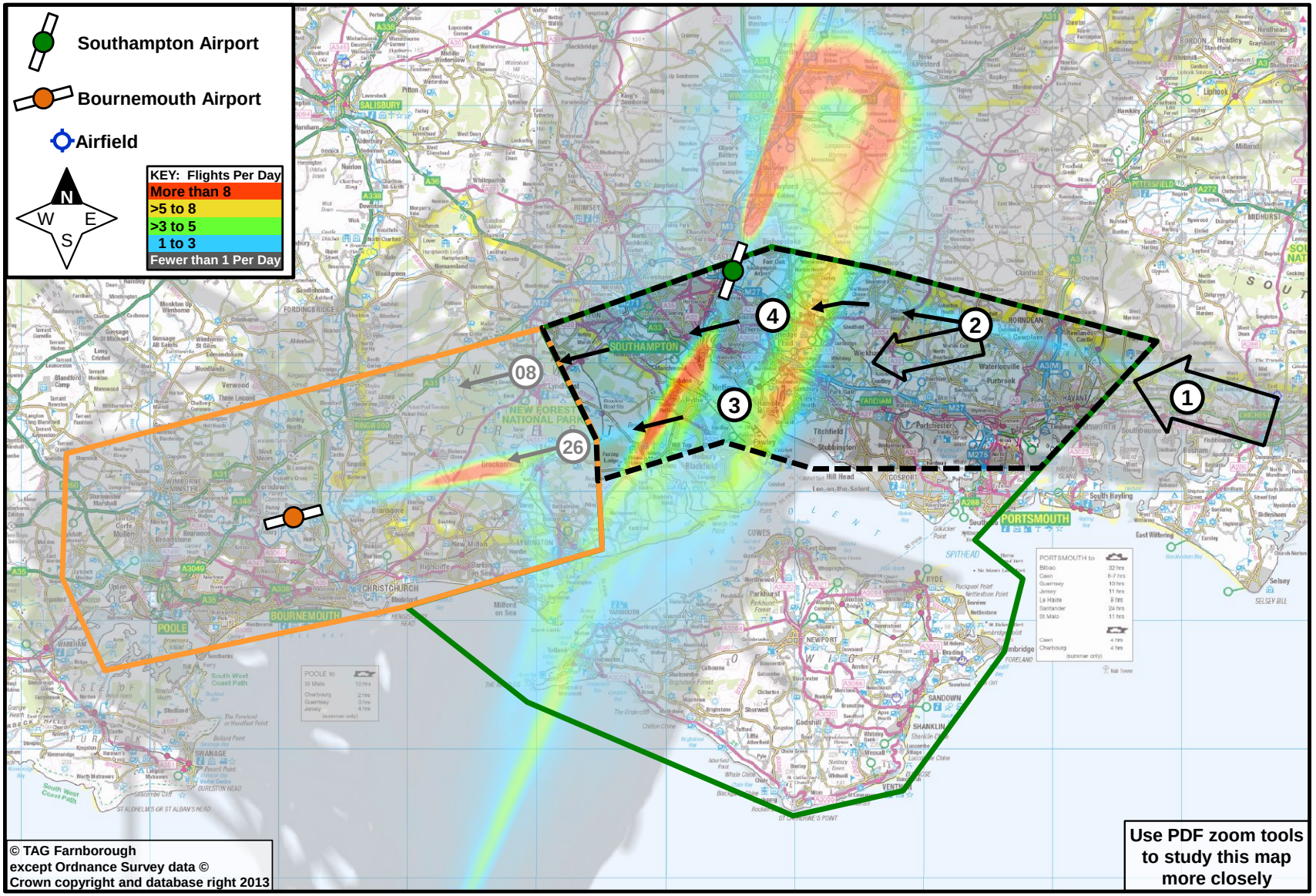


Figure D6: Arrows/dotted lines show typical BOURNEMOUTH arrival flows from the east to both runways, 4,000ft-7,000ft (Radar data shows all Southampton and Bournemouth air traffic up to 7,000ft)

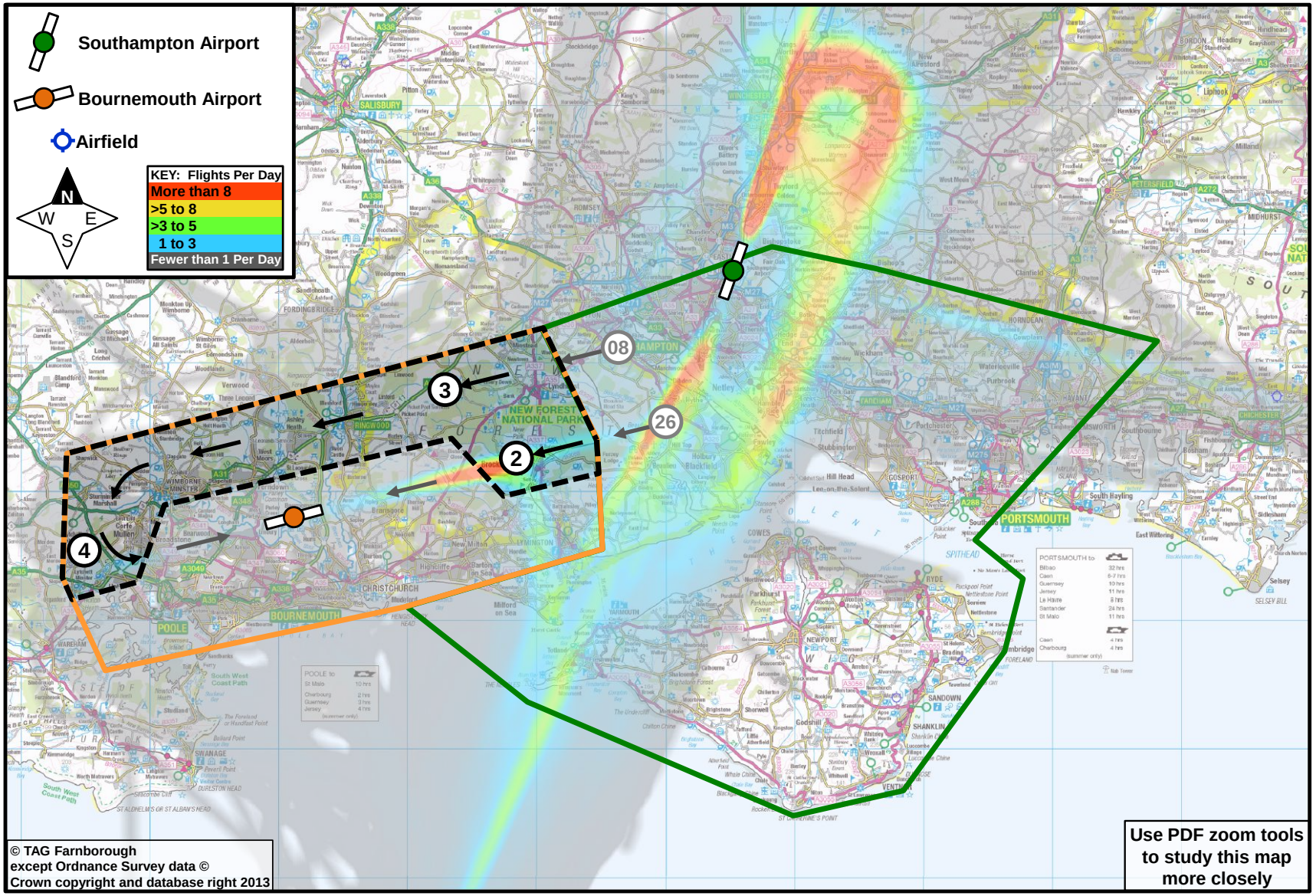


Figure D7: Arrows/dotted lines show typical BOURNEMOUTH arrival flows from the east to both runways, below 4,000ft (Radar data shows all Southampton and Bournemouth air traffic up to 7,000ft)

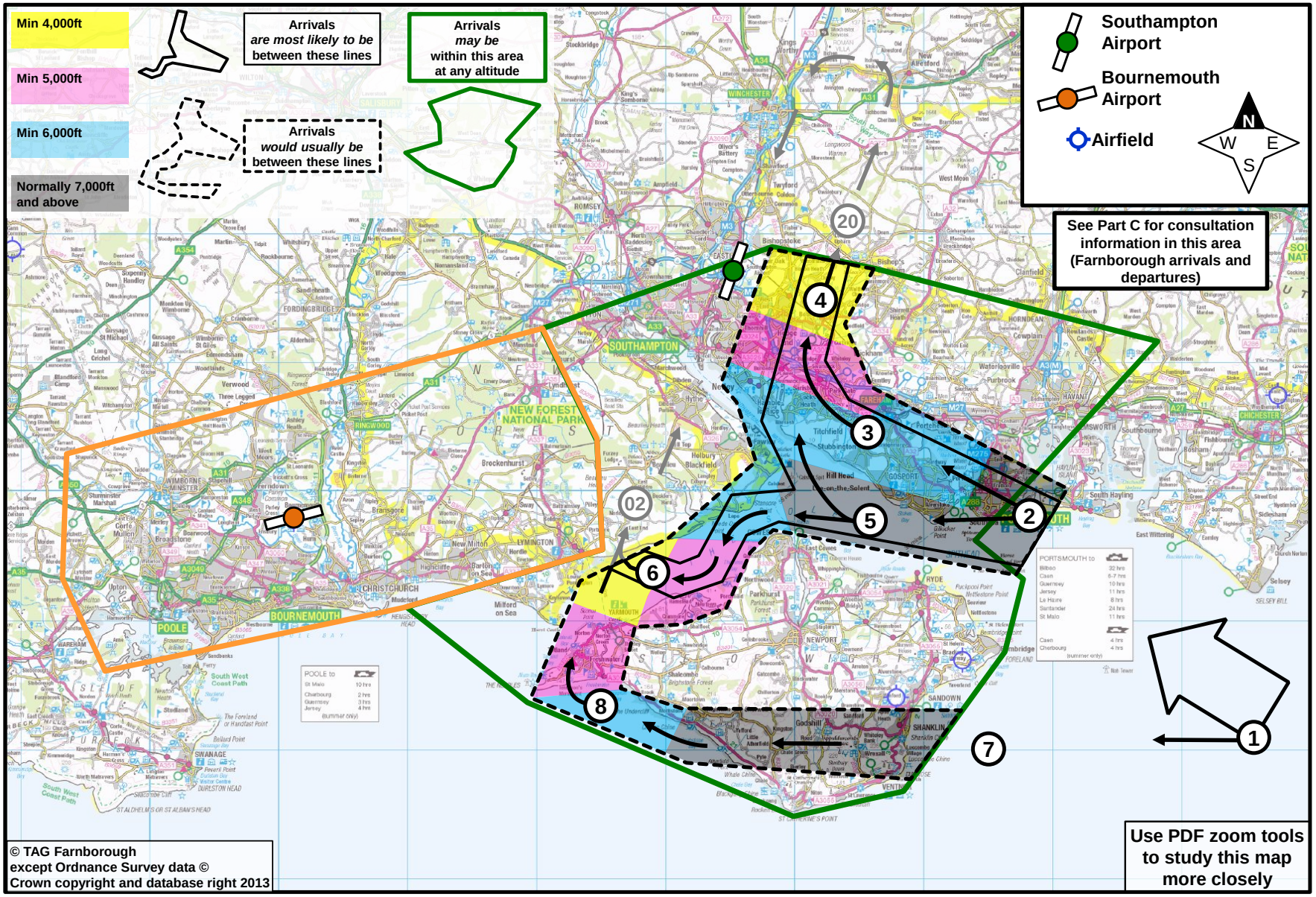


Figure D8: Proposed SOUTHAMPTON arrival flows from the east to both runways, 4,000ft-7,000ft

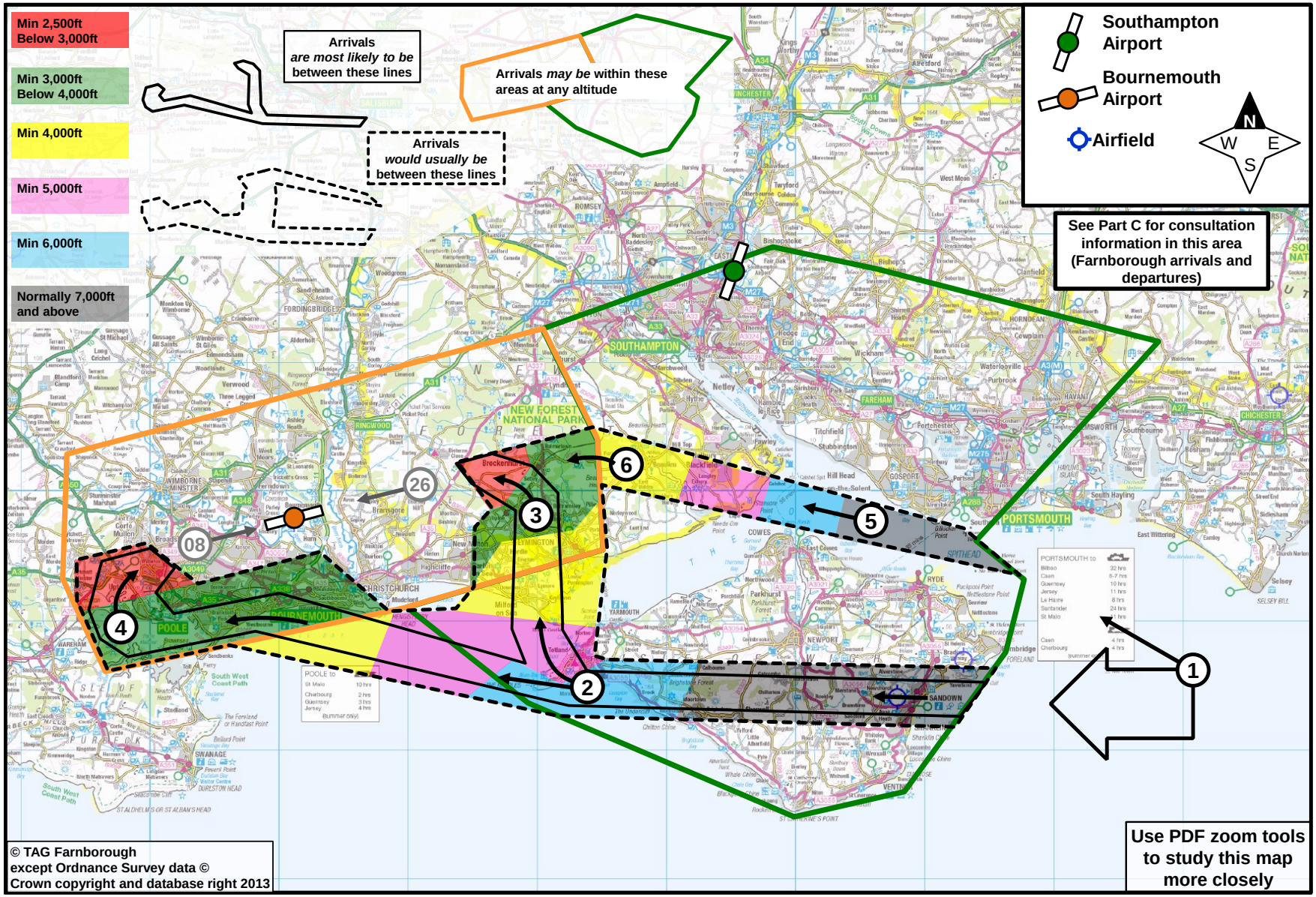


Figure D9: Proposed BOURNEMOUTH arrival flows from the east to both runways, 7,000ft to 2,500ft

Question D4 – Specific Locations

This question is about ***places*** within the consultation swathes.

In Section 4 we asked you to consider your area(s) of interest using the maps, and compare the impact now with the impact under this proposal.

We want you to tell us about places within the green and orange outlined consultation regions that you think require special consideration in the ongoing design process.

Bear in mind that aircraft at intermediate altitudes (4,000ft-7,000ft) appear smaller and quieter than those at low altitudes (below 4,000ft). Also bear in mind the relatively small number of aircraft affected in these areas.

Ideally, you would supply us with a postcode of the location. Otherwise, please use town or village names, the names of National Parks/AONBs, or other easily identifiable location. This means we can find the right place more easily.

Tell us broadly what type of place this is by choosing the closest type from the online menu. Do you think these places would benefit from the proposed change, or not, and to what extent? Describe the characteristics of these places, stating whether they should be considered special due to concerns about noise impact, visual impact or other reason.

You can do this for as many locations as you wish. We have provided a template for you below. Choose the closest or most important option from those suggested, or add your own if none are suitable.

Structuring your response like this will make it easier for us to analyse your feedback, which in turn makes it more effective on your behalf.

Location

Postcode, or name of easily identifiable place.

What type of place is this? *I consider this a…*

Populated residential area / Busy commercial area (town centre, retail park) / Industrial area (including military use) / Recreational area / Tranquil area / Sensitive area (e.g. hospital) / Village / Nature area / Tourist attraction / Transport link (railway, motorway, airport) / Other (brief description)

What would the change in impact be, on this place*?* *If the change occurred, this place would…*

Benefit significantly from the change / Benefit slightly / Probably not notice the change / Be slightly negatively impacted / Be very negatively impacted by the change

Why would the impact change, on this place? *If I was at this place…*

I would hear less aircraft noise / I would see fewer aircraft / It wouldn't make much difference to me / I would hear more aircraft noise / I would see more aircraft / Other (brief description)

Choose the ***most relevant***, or ***most important***, item from the suggestions, or add your own if none are suitable.

Please repeat this process until you have finished telling us about specific locations that are important to you.

5. Changes to the east of these areas

5.1. For information relating to changes in the vicinity of Farnborough, see Part B of this consultation document.

5.2. For information relating to changes between Farnborough and the south coast to the east of Portsmouth, see Part C of this consultation document.

5.3. Changes above 7,000ft are designed for flight efficiency because they are far less likely to be noticeable from the ground. Changes due to this proposal above 7,000ft are mostly over the sea wherever possible, or are within modified areas of the current air route network where aircraft are already common.

General Question

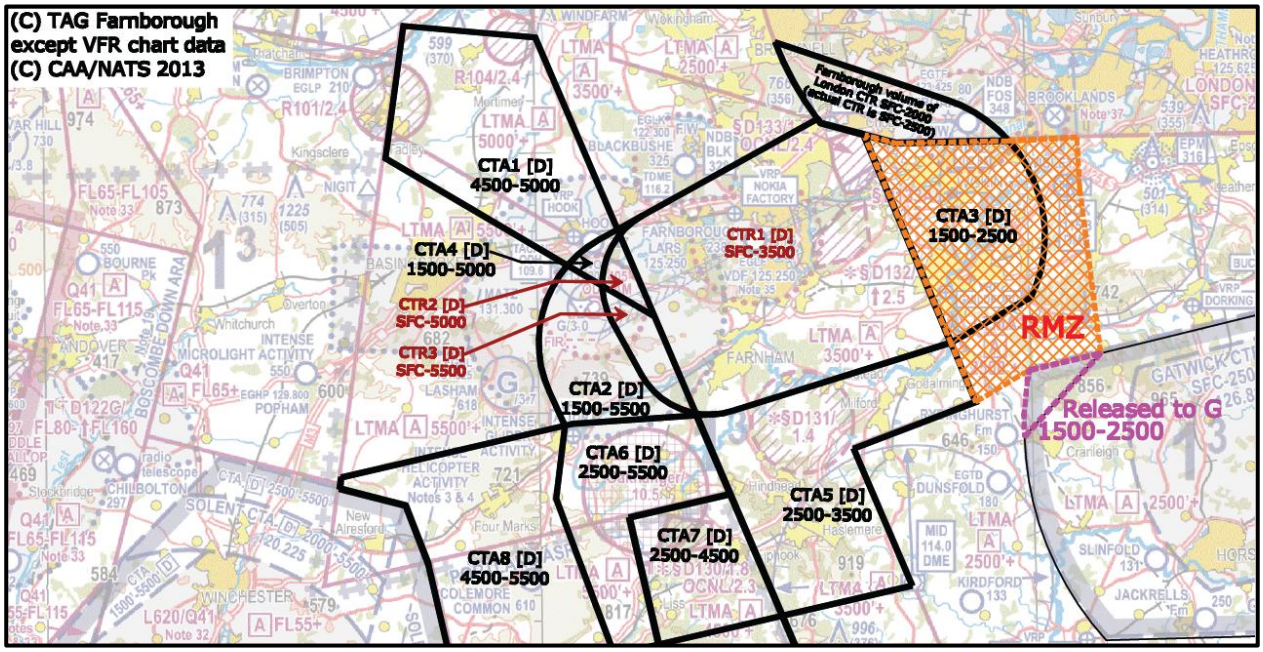
If there is something that you think we should know that hasn't already been covered by the questions in this document (or by other questions in other parts of this consultation), please provide a statement.

Farnborough Airport

Airspace Consultation

Part E: Aviation Technical Information

(This document uses technical language associated with the aviation industry)



Contents

List of Figures

List of Tables

1. Introduction to Part E

1.1. This is Part E of the consultation material, which describes the proposed airspace changes for an aviation technical audience. It assumes that:

a. You have read and understood Part A; and

b. You have identified yourself or your organisation as one that has an aviation interest. Aviation may be your sole interest in this consultation, or it may be in addition to any local environmental interests discussed in Parts B, C or D. This part is especially of interest to commercial and GA flight operations, and to local aerodrome operators.

1.2. We will ask questions highlighted in a box like this.

1.3. Considerable care has been taken to make this consultation accessible to anyone who may wish to respond. The design and operation of airspace is, by its nature, a complex and technical issue. Part E is written for aviation experts and hence uses aviation-specific terminology which may not be familiar to laymen.

2. Justification for the establishment of IFR routes and CAS for Farnborough

2.1. As discussed in Part A, we gained planning permission to operate up to 50,000 movements per annum. In 2012 there were 23,000 movements at Farnborough, this is predicted to rise to between 32,000 and 50,000 in 2019.

2.2. The first thing we did was to assess the impacts of this growth on other airspace users, the existing CAS structures, and the wider route network.

2.3. Options that retain uncontrolled (Class G) airspace around Farnborough were considered at length – these are briefly explained below, including the 'do nothing' option. We considered what needed to be done in order to handle the forecast increase in traffic.

Concept one – Do nothing

2.4. We concluded that 'do nothing' is not a sustainable option. The existing airspace infrastructure is not currently robust enough to operate at the predicted 2019 number of TAG Farnborough movements, Specifically:

a. Traffic mix within the Farnborough operation and region is such that integration with other activities within Class G does not offer an efficient and sustainable operation;

b. Significant volumes of Class G operations occur in the immediate vicinity of Farnborough, without currently being afforded any structured method of integrating these with the IFR traffic;

c. Arriving Farnborough aircraft *staying within* London Terminal Control (LTC) CAS-enclosed flight levels to hold would be delayed in the PEPIS hold at or above FL70 whilst other Farnborough traffic is handled, and/or GA traffic is coordinated by LARS, and/or unknown traffic passes by. This would cause knock-on delays to LTC – even at today's activity levels, more than one airborne-holding Farnborough flight at PEPIS causes significant workload issues at LTC. If Farnborough gets busier *without* changing airspace arrangements, the likelihood of airborne holding at PEPIS would increase, delaying our aircraft, and the increased complexity at LTC would potentially delay other flights to other airports.

d. Arriving Farnborough aircraft *below* network (LTC) levels, i.e. those that are between PEPIS and the runway outside CAS, would be more likely to need delaying vectors, manual holding or orbiting. This would increase the likelihood of interaction with other GA users in areas where these larger, faster aircraft might not usually be encountered, with consequential issues of reaction, integration and safety. When these larger, faster aircraft operate outside CAS in the vicinity of GA they need to maintain the best visual awareness. This is done by operating at slower speeds than optimum, with reduced manoeuvrability due to flap/gear configuration. The cockpit visibility for aircraft are not primarily designed for the 'see and avoid' principle is also not comparable to that for a typical GA aircraft. These combined issues make it much more difficult for pilots of these aircraft, increasing their workload considerably.

Other GA users need to understand these limitations when operating in close proximity to Farnborough.

e. Departing Farnborough aircraft are currently regularly delayed on the ground, often on the runway engines running awaiting take-off clearance, whilst other Farnborough departures/arrivals are handled, and/or GA traffic is coordinated by LARS, and/or unknown traffic passes by. LTC cannot always accept multiple departures in quick succession, which occurs today from time to time. This scenario would get more likely when Farnborough gets busier as predicted - the likelihood of ground-holding would increase, delaying our aircraft, and the increased complexity at LTC could delay other flights.

f. In order to ensure separation from Farnborough's aircraft (which are generally fast moving executive jets, sometimes Boeing 737 or Airbus A320 sized), GA flights are managed and coordinated tactically. This can only occur ***if*** the pilot is communicating with Farnborough Radar ***and*** is willing to cooperate with temporary restrictions – these can, and do, occur anywhere in the vicinity of Farnborough, depending on the precise tactical situation at that moment. Unknown radar targets are to be avoided, as per standard ATSOCAS operations. These unknown targets, and pilots that are unable to cooperate with Farnborough Radar (e.g. due to their qualifications/equipage or the fact that our request would cause an unacceptable disruption to their intended task), are accommodated by ***penalising*** the Farnborough aircraft (delaying action, extended track miles, restricted climb/descent, orbits). This additional work is usually ***invisible*** to the unknown aircraft and other users unable to cooperate. It causes high workload for the controller and the executive jet pilot, due to multiple vectors in quick succession. The majority of pilots in contact with LARS do accept temporary restrictions whilst the Farnborough traffic clears their area. These temporary restrictions are usually of short duration, and result in some disruption to the GA pilot's desired flight.

Concept two – Other non-CAS structures and zones

2.5. 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 CAS. In such an environment with predicted Farnborough traffic levels, a TMZ/RMZ combination would:

a. Enable Farnborough to know about all aircraft within the area concerned, but crucially would ***not*** enable controllers to effectively predict (or control) traffic interactions – Class G flight rules still apply

b. Inevitably require agreements to be made with local flying organisations that would allow certain flights (or categories of flights) to be exempt from the requirements. This reduces the controllers' confidence that they are fully aware of all flights likely to affect them, and that the primary radar targets observed would actually be complying with the mitigated requirements

c. Increase controller and pilot workload without providing a meaningful benefit

d. The current deconfliction minima would still apply. Controllers would benefit from knowing all the traffic operating in the region, but minima would still need to be achieved, and there would be no method for ensuring this beyond making requests of GA that could be refused; and

e. Initially *seem* more attractive and less restrictive when compared with CAS, however GA traffic could actually be offered more safe efficient integration and potentially more flexibility if CAS was present, and IFR flight paths could be guaranteed against a predictable GA traffic flow. VFR traffic operating in Class D CAS need be only passed traffic information against IFR traffic (and vice versa). Consequential restrictions would be diminished.

Concept three – CAS

2.6. We determined that our requirements would be most suitably met by the establishment of a CAS environment, with a small element of RMZ. This would provide the following benefits:

a. Arrivals to Farnborough would follow RNAV STARs (or if necessary be radar-sequenced) along a small number of predictable flight paths, reducing complexity and workload for the controllers and pilots. This would continue further up the ATC chain to LTC Swanwick, which would also benefit from workload improvements. In the event that airborne holding is required for any reason, this would occur inside CAS in a far more convenient location for both LTC and Farnborough, removing the risk of GA interactions, affecting fewer flights to/from other airports and reducing the overall complexity of their airspace also.

b. Departures from Farnborough would be far less likely to be significantly delayed on the ground. The systemisation and predictability of the proposed SID flight paths would allow each controller in the chain to know precisely where each departure would fly, how high it would be at each point along track, and what it would do next. This in turn would reduce the workload and complexity for Farnborough and LTC controllers, and would make the proposed intermediate link via Solent Radar (for about 65% of our departures) as simple as possible. It would also benefit RAF Odiham controllers and their interactions with our departures.

c. Pilots would be able to plan a predictable path which would reduce the likelihood of Farnborough-initiated temporary restrictions or disruption. CAS and CTRs would be available for (S)VFR transit as far as practicable by Farnborough Radar, subject to workload, VMC and associated consequences of SERA (see later). This would reduce the complexity of clearances (and reduce the chance of misinterpretation) and would allow the jet traffic the opportunity to use their climb performance to reduce interaction with other users.

d. Safety by design would normally suggest a larger CTR, but the retention of LARS West and the establishment of an RMZ to the east mitigates the infringement risk of the proposed smaller CTR. This would retain as much freedom as possible for GA aircraft whilst providing assurance to the controllers that the CTR would be unlikely to be inadvertently penetrated. We believe this is a good balance of GA freedom versus extensive establishment of CAS.

2.7. The designs described in Section 7 of this document developed from many options and took into account the needs of as many airspace users as possible.

2.8. The proposed classification of CAS below FL65 is Class D for the CTR and CTAs. Other classifications below FL65 would be either more restrictive for GA traffic (Class A, B, C), or would not support a predictable operation (Class E).

2.9. We are also proposing step-lowered Class A bases for airways Y8, L980, N514, N863, N859 and L151 over the coast around the Solent/Selsey Bill/Bognor Regis areas, in order to improve arrival and departure flows for Farnborough and arrival flows to Southampton/ Bournemouth. These would become additions to the adjacent Class A Worthing CTAs under the control of LTC.

2.10. The vast majority of GA in the UK operates over the mainland, however current Class G airspace over the Isle of Wight can be popular with GA up to the current base of FL105. Areas over the sea are less popular with GA.

2.11. We believe that, on balance, the majority of stakeholders have had their requirements met by the proposed designs. Where requirements have not been able to be met directly, several compromises have been incorporated into the design, mitigating the potential negative impacts on current GA activity as far as practicable.

3. Why choose Standard Instrument Departures (SIDs)?

3.1. Performance Based Navigation (PBN) SIDs to the RNAV1 standard are our preferred option. These require establishment of CAS, which matches our requirement to enclose and protect all routes to and from Farnborough.

3.2. This would improve the automation, systemisation and predictability of all departures. The CAS required for RNAV1 SIDs is the least possible.

3.3. Standard Departure Routes (SDRs), Omnidirectional Departures (Omnis), 'conventional navigation' SIDs and PBN SIDs were explored.

3.4. SDRs and Omnis were discounted as they are not suitable for flight-plan connection to the en-route network where the whole of the flight would be contained within CAS.

3.5. RNAV5 SIDs were discounted because their lower navigation standards would require enormous CAS corridors either side of the centreline in order to contain them. We always committed to reduce the impact on other airspace users by minimising the CAS 'take', and this would not be a reasonable way forward.

3.6. Conventional SIDs cannot be seriously considered because the CAA's policy is to replace existing conventional SIDs with PBN SIDs as opportunities arise over time. This means that new conventional SIDs would not be approved.

3.7. Higher categories of PBN such as RNP1 were considered. The advantages these would provide for Farnborough over and above the RNAV1 standard are small, and are outweighed by the more-common aircraft fleet equipage to RNAV1 standard. However, over time there is potential to refine the SIDs to a higher standard as the fleet equipage improves, and we reserve the right to explore that possibility.

3.8. Aircraft unable to comply with the RNAV1 standard would expect radar vectors, to follow the same track as the RNAV1 routes.

3.9. The most important issues for Farnborough departures are:

a. Noise impact in the vicinity of the airport;

b. The initial altitude to which aircraft may climb; and

c. The overall route, considering GA activity areas.

3.10. From a noise perspective, consideration was mainly given to the areas immediately surrounding Farnborough's climbouts, especially from Runway 24.

3.11. The initial altitudes to which departures climb are similar to, or higher than, today. The prediction is that ***actual*** departure climb profiles will be significantly higher and achieved earlier than today, once the departure is airborne and its 'fit' in the evolving tactical environment is identified (e.g. against Heathrow or Gatwick departures, or other Farnborough traffic). Farnborough would like to take advantage of the high performance aircraft utilising the airport.

3.12. Ideally, the routes would be direct to the airway network connectivity points but this would curtail and significantly disrupt GA activities, affect local communities and LTC operations. We believe we have struck a balance between these competing requirements, but such compromises inevitably means some changes to the ideal; in this case some of our proposed routes are longer in track length.

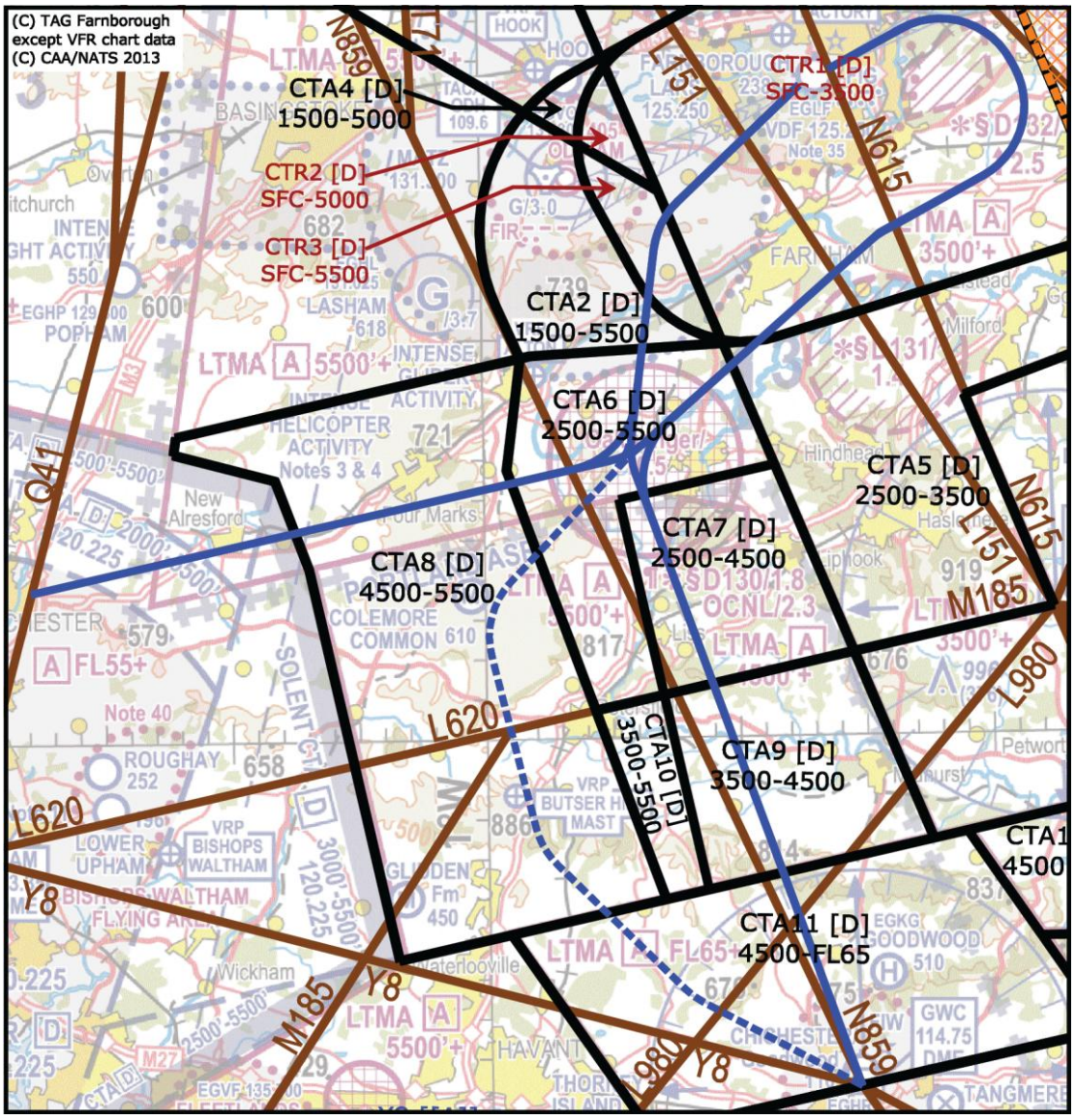


Figure E1: Schematic of proposed RNAV1 SIDs

Blue solid lines indicate the nominal centreline for the SIDs.

Blue dashed line is the alternate southbound SID should FUA be active to allow gliding in CTAs 9 & 10.

Airway centrelines in brown. Proposed CAS in black.

SIDs from Runway 06, in use 20% of the time – initial phase

3.13. The town of Farnborough surrounds the departure end and climbout for Runway 06 – there are no flight-paths that could reduce the over-flight of populated areas straight after takeoff.

3.14. The most logical conclusion for Runway 06 departures is to maintain the current legacy flight-paths for the initial phase:

a. Those that are over-flown immediately after takeoff would continue to be over-flown

b. No new areas that are not currently over-flown would be over-flown as a result; and

c. The current dispersal of traffic in a relatively wide U-shape would be concentrated into a tighter, more consistent U-shape, reducing the CAS requirement east of Farnborough and significantly reducing the likelihood of departures over-flying Woking and Guildford.

3.15. Today's northbound traffic from Runway 06 is directed towards CPT VOR when it has reached a position south abeam the airport.

3.16. Today's southbound traffic is directed towards GWC VOR when it has reached a position southeast of the airport, after completing the U-shape described in paragraph 3.14.c above.

SIDs from Runway 24, in use 80% of the time – initial phase

3.17. Under the climb-out of Runway 24 lies an unpopulated army vehicle training ground near the airport boundary extending to the southwest. To the west is the village of Church Crookham straight ahead, and the town of Fleet to the northwest. Today, these two populated areas are the most likely to be over-flown by departures straight after takeoff.

3.18. Today, departures are sometimes given a left-turn clearance to fly over the army land avoiding Church Crookham and Fleet, but sometimes must be given straight ahead or right-turn departures to avoid unknown traffic to the south or west.

3.19. It is possible using RNAV1 SIDs to formalise the avoidance of these populated areas the majority of the time by directing all Runway 24 departures to make a left turn straight after takeoff.

3.20. This would concentrate the flight-path at low altitudes over the large but unpopulated army training land, reducing the likelihood of over-flight of the populated village and town to the west and northwest.

3.21. Exceptionally, if RAF Odiham have a significant traffic numbers in their Runway 27 ILS pattern, these SIDs would need to be tactically modified so the first leg would be to climb straight ahead (as happens today), but these occurrence would be far less likely. Right turns after takeoff from Runway 24 would be extremely unlikely.

SIDs from both Runways – second phase, FUA not in use

3.22. The proposed SIDs would take the following path:

a. The departures would turn towards Oakhanger, avoiding Aldershot and Farnham (Runway 06) and Church Crookham, Fleet and Odiham (Runway 24).

b. On reaching Oakhanger, the departure would either continue climbing westwards towards Winchester joining airway Q41 and the main route network towards the southwest, north, and northeast, or they would turn climbing south towards GWC and the coast for the route network to the south.

SIDs from both Runways – second phase, FUA in use (30-80 days per year)

3.23. If the FUA was in use, only southbound GWC SIDs would be affected.

3.24. The proposed CTA9 and CTA10 would both be assumed to be occupied by gliders. The alternate (dashed blue) SID would leave Oakhanger to the southwest to Colemore Common into CTA8, turn south towards Butser Hill Mast then turn back towards GWC.

3.25. Subject to negotiation with the relevant association, this would be used between 30-80 days per year.

Non-RNAV compliancy

3.26. Aircraft unable to comply with RNAV1 standards (for whatever reason) would expect radar vectors for departure. Aircraft unable to meet the RNAV1 standard are relatively uncommon at Farnborough (circa 90% of the fleet is already capable). The remaining 10% non-certified will shrink over time as the fleet is updated.

4. Standard Arrival Routes (STARs) and the arrival pattern to final approach

4.1. PBN STARs to the RNAV1 standard are our preferred option. These require establishment of CAS, which matches our requirement to enclose and protect all routes to and from Farnborough. STARs to the RNAV5 standard are also proposed, to cater for Farnborough arrivals equipped only to that standard (approximately 10% of the fleet), and for Southampton and Bournemouth arrivals from the east. Radar vectoring would still regularly occur during the intermediate arrival phase in order to provide tactical benefits to all users.

4.2. This would improve the automation, systemisation and predictability of arrivals to all three airports, especially Farnborough. The CAS required for RNAV1 STARs is the least possible. The CAS required for RNAV5 STARs is much greater, which is why the RNAV5 STARs are proposed to end in a different location and much higher level, further away from the runways.

4.3. Higher categories of PBN such as RNP1 were considered. Farnborough's primary route to final approach would remain radar vectors to ILS. In the future we may consider RNP1 arrival transitions, potentially to SBAS or GBAS in lieu of ILS. The advantages these would provide for Farnborough over and above the RNAV1 standard are currently small, and are outweighed by the more-common aircraft fleet equipage to RNAV1 standard. However, over time there is potential to refine the arrival routes to this higher standard as the fleet equipage improves, and we reserve the right to explore that possibility.

4.4. The most important issues for Farnborough arrivals are:

a. Noise impact in the vicinity of the airport

b. The descent profile; and

c. The overall route, considering GA activity areas.

4.5. From a noise perspective, consideration was mainly given to the areas immediately surrounding Farnborough.

4.6. The prediction is that descent profiles will be higher for longer than today, once the arrival's 'fit' in the evolving tactical environment is identified (e.g. against Heathrow or Gatwick departures, or other Farnborough traffic).

4.7. Some of the routes are of similar track length, and others are longer than today in order to avoid curtailing popular GA activity areas, in particular between the west of the airport and CPT VOR. This is a compromise balance that we believe we have achieved, between the two competing requirements.

4.8. We believe the balance we have struck here is the right one.

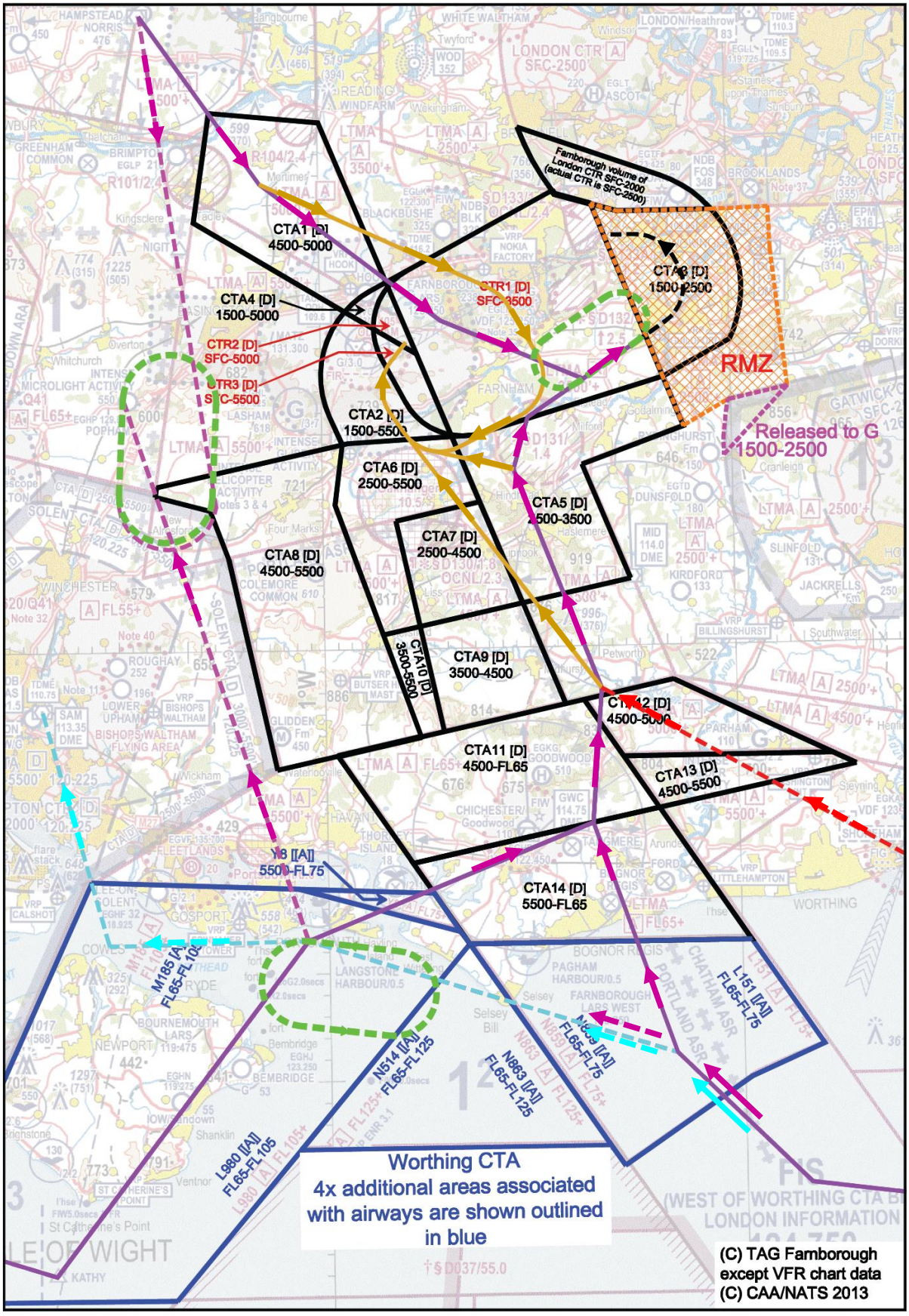


Figure E2: Proposed arrival routes schematic – see text overleaf for info on line colours

Arrivals from the North of Farnborough – Runway 24

4.9. RNAV1-capable arrivals from the north would flight plan CPT-new RNAV1 STAR, and follow the new STAR (purple solid line) to downwind left for Runway 24. Expect to terminate the STAR and take radar vectors along the black dashed line to final approach. The green dashed contingency hold at the end of the downwind leg would only be used in contingency circumstances.

4.10. RNAV5 arrivals from the north would flight plan CPT PEPIS as today, which would be converted into an RNAV5 STAR (purple dashed line towards the green dashed line PEPIS contingency hold). However, they should expect to take radar vectors along the RNAV1 STAR's track (solid purple line) to downwind left, then along the black dashed line to final approach.

4.11. These arrival procedures are very similar to the current all-vectored tracks.

Arrivals from the North of Farnborough – Runway 06

4.12. RNAV1-capable arrivals from the north would flight plan CPT-new RNAV1 STAR, and follow the new STAR (purple solid line) through CTA1. From there, expect to follow radar vectors along the brown line through the Farnborough overhead to downwind right for Runway 06, continuing to take vectors to final. The green dashed contingency hold at the opposite end of the downwind leg would only be used in contingency circumstances.

4.13. RNAV5 arrivals from the north would flight plan CPT PEPIS as today, which would be converted into an RNAV5 STAR (purple dashed line towards the green dashed line PEPIS contingency hold). However, they should expect to be vectored along the STAR track (solid purple line) then be vectored along the brown line through the Farnborough overhead as per paragraph 4.12 above.

4.14. These arrival procedures are similar to the current all-vectored tracks, though currently some arrivals join left base from CPT, which would be very unlikely under the proposal. The Farnborough-overhead turn is required in order to mitigate against excessive restrictions on GA operations in Class G west of RAF Odiham. The precise position of these legs is not as predictable as for Runway 24 due to the more tactical environment for Runway 06 arrivals. However, the general position for the arrival path would be much more predictable than today.

Arrivals from the Southeast of Farnborough – Runway 24

4.15. RNAV1-capable arrivals from the southeast would flight plan via a new RNAV1 STAR that crosses the south coast at Bognor Regis (solid purple line). However, it may be tactically advantageous to LTC to shortcut the STAR via the red dashed line over Shoreham, which is why CTA12 and CTA13 are that size and shape (see Figure E2). From this point, aircraft should expect to follow the STAR north then east, downwind left for Runway 24. Expect to terminate the STAR and take radar vectors along the black dashed line to

final approach. The green dashed contingency hold at the end of the downwind leg would only be used in contingency circumstances.

4.16. RNAV5 arrivals from the southeast would flight plan via a new RNAV5 STAR (purple dashed line, west towards the green dashed line contingency hold over the sea, then north to PEPIS green dashed line contingency hold). However, they should expect to be vectored along the RNAV1 STAR track (solid purple line) to downwind left, then along the black dashed line to final approach.

4.17. These tracks are similar to the current all-vectored tracks.

Arrivals from the Southeast of Farnborough – Runway 06

4.18. RNAV1-capable arrivals from the southeast would flight plan via a new RNAV1 STAR that crosses the south coast at Bognor Regis (solid purple line). However, it may be tactically advantageous to LTC to shortcut the STAR via the red dashed line over Shoreham, which is why CTA12 and CTA13 are that size and shape. From this point, aircraft should expect to take radar vectors along the brown line direct to right base. Sometimes it would be advantageous to the controller to keep the aircraft on the new RNAV1 STAR and then vector it left towards downwind right and right base from a point further north, as illustrated by the second brown line starting in CTA5. The green dashed contingency hold at the end of the opposite downwind leg would only be used in contingency circumstances.

4.19. RNAV5 arrivals from the southeast would flight plan via a new RNAV5 STAR (purple dashed line, west towards the green dashed line contingency hold over the sea, then north to PEPIS green dashed line contingency hold). However, they should expect to be vectored along the same tracks described in paragraph 4.18 above.

4.20. These tracks are similar to the current all-vectored tracks.

Arrivals from the Southwest of Farnborough – Runway 24

4.21. RNAV1-capable arrivals from the southwest would flight plan via a new RNAV1 STAR (solid purple line) that crosses the Isle of Wight towards a new contingency hold over the sea (dashed green line). From this point, aircraft should expect to follow the STAR east past GWC, then north, finally turning downwind left for Runway 24. Expect to terminate the STAR and take radar vectors along the black dashed line to final approach. The second green dashed contingency hold at the end of the downwind leg would only be used in contingency circumstances.

4.22. RNAV5 arrivals from the southwest would flight plan via a new RNAV5 STAR (same track as the RNAV1 STAR purple solid line) over the Isle of Wight towards a new contingency hold over the sea (dashed green line), then north (purple dashed line) towards the PEPIS green dashed line contingency hold. However, they should expect to be vectored along the RNAV1 STAR track (solid purple line) to downwind left as described above in paragraph 4.21, then along the black dashed line to final approach.

4.23. The current all-vectored tracks do not cut across to the east side of the proposed CAS before heading north, as these proposed STARs would. This is because the proposed SIDs would predominantly use the west side of the CAS, forming a one-way north-south system.

Arrivals from the Southwest of Farnborough – Runway 06

4.24. RNAV1-capable arrivals from the southwest would flight plan via a new RNAV1 STAR (solid purple line) that crosses the Isle of Wight towards a new contingency hold over the sea (dashed green line). From this point, aircraft should expect to follow the STAR east past GWC, then north and then take radar vectors along the brown line towards right base. Sometimes it would be advantageous to the controller to keep the aircraft on the new RNAV1 STAR and then vector it left towards downwind right and right base from a point further north, as illustrated by the second brown line starting in CTA5. The second green dashed contingency hold at the opposite end of the downwind leg would only be used in contingency circumstances.

4.25. RNAV5 arrivals from the southwest would flight plan via a new RNAV5 STAR (same track as the RNAV1 STAR purple solid line) over the Isle of Wight towards a new contingency hold over the sea (dashed green line), then north (purple dashed line) towards the PEPIS green dashed line contingency hold. However, they should expect to be vectored along the same tracks described in paragraph 4.24 above.

4.26. The current all-vectored tracks do not cut across to the east side of the proposed CAS before heading north, as these proposed STARs would. This is because the proposed SIDs would predominantly use the west side of the CAS, forming a one-way north-south system.

Arrivals to Southampton and Bournemouth Airports from the East

4.27. Maps of the expected radar vectored paths are shown in Part D.

4.28. All arrivals to both airports from the east would flight plan via a new RNAV5 STAR ending at SAM (light blue dashed line, partly masked by Farnborough STARs in dashed purple, across Selsey Bill).

4.29. Southampton arrivals should expect to take westward radar vectors along the Solent and then the north bank of Southampton Water to join the existing Runway 20 downwind left pattern. Arrivals to Runway 02[1] should expect vectors either along the Solent, staying over water until joining the existing downwind right pattern, or sometimes westward vectors over the Isle of Wight on a wide right base to join final approach at the Needles.

4.30. Bournemouth arrivals should expect to take westward radar vectors over the Isle of Wight to the Needles. For Runway 26, they should expect a right turn onto left base, joining the existing left base flow from the south, over Milford and Lymington. Runway 08 arrivals should expect to continue west towards Bournemouth, Sandbanks and Poole, joining the existing downwind right pattern.

1 Southampton recently consulted upon a Runway 02 GNSS approach. This is independent from, but complementary to, the proposal presented here.

4.31. These intermediate arrival paths are very different from current-day arrival paths, which route via GWC and stay north of the M27 towards SAM. However, they all join existing arrival patterns by the time descent to 4,000ft is given.

4.32. No other Southampton or Bournemouth arrival routes are affected. No departure routes from either airport are affected.

Non-RNAV compliancy

4.33. Aircraft unable to comply with RNAV1 or RNAV5 standards (for whatever reason) would expect radar vectors to final approach. Aircraft unable to meet the RNAV1 standard are relatively uncommon at Farnborough (circa 90% of the fleet is already capable). The remaining 10% non-certified will shrink over time as the fleet is updated.

4.34. Southampton and Bournemouth aircraft only need to meet the RNAV5 standard in order to fly within the LTMA, unless exceptional circumstances prevail. RNAV1 procedures are not proposed for these airports.

5. Balance employed when proposing dimensions of airspace structures, and connectivity

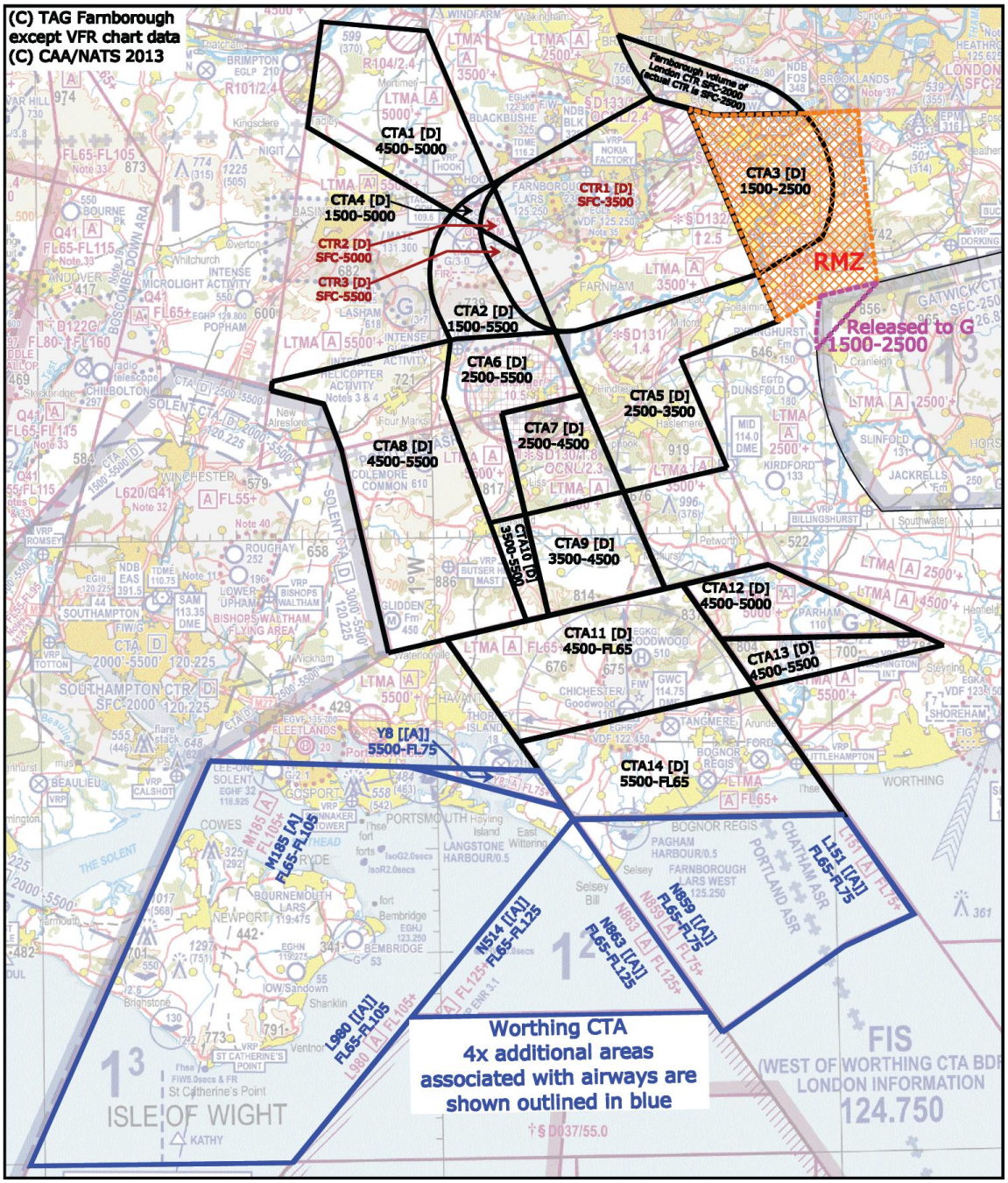


Figure E3: Proposed airspace structures overlaid on an extract of a VFR 1:500,000 chart

Black outlines illustrate proposed CAS boundaries.

Black text shows proposed Class D bases below existing Class A LTMA.

Dark red text shows Class D CTR areas.

Purple corner of Gatwick CTA *may* be released from Class A to Class G from 1,500ft-2,500ft (see paragraphs 5.41-5.44).

Orange area defines RMZ below existing LTMA and proposed CTA.

Blue outlines and text shows proposed Class A airway bases, below existing Class A airway bases, becoming part of the Worthing CTA Class A Complex.

5.1. This section is a summary of the reasons why the proposed airspace structures are the particular shape and size shown in Figure E3. This summary discusses how we balanced our requirements (based on the IFR routes already discussed) against those of other airspace users by minimising the CAS volumes we would need, and mitigating against the infringement risks of these smaller volumes.

5.2. More details of the evolution of the design are provided in Section 7, from Page E28.

5.3. The proposed CTA and CTR areas would be Class D, in order to accommodate VFR flight as far as possible, with the appropriate clearance. The majority of GA in this region occurs below 6,000ft.

5.4. Regarding balloonists specifically, access requests would be considered to any of the volumes as per conventional GA operations. As most professional balloon operations carry radios , Letters of Agreement could be arranged and progressed on request subject to negotiation.

5.5. Where airway bases are proposed to be changed (over the south coast/Isle of Wight), these would be FL65 apart from a tiny sliver of Y8 at 5,500ft, all of which would become parts of the Worthing CTA Class A Complex under LTC control.

5.6. An RMZ is also proposed, in the vicinity of OCK, shown in orange in Figure E3.

East of Farnborough

5.7. CTR airspace is proposed to protect IFR operations landing at, and taking off from, Farnborough. *CTR1 on* Figure E3

5.8. The lateral confines have been tailored to the minimum area required to facilitate tactical radar vectoring (arrivals and departures), proposed RNAV SIDs (see Section 3 on Page E8), and RNAV arrival routes (see Section 4 on Page E12). There is little requirement for airspace north of the extended centreline, due to already established noise sensitive areas and operational practice for aircraft handling in the area.

5.9. The northern boundary of the CTR is therefore only proposed to the minimum extent to protect the final approaches and climb-outs from Farnborough. The eastern edge of the CTR is aligned with existing airspace boundaries associated with the London TMA, for ease of promulgation. Blackbushe, after much discussion, would not be included within CAS, to give the based aircraft as much freedom as possible to operate independently as an AFISO unit. IFR Blackbushe aircraft joining or leaving airways would be integrated into the respective Farnborough pattern, benefitting from the enhanced efficiency and safety for as long as possible. Use of the Blackbushe ATZ would continue in a similar format to the airshow and CAS(T) operations.

5.10. The southern edge affords sufficient airspace to allow for both RNAV STARs and a radar-vectored pattern inbound for Runway 24, whilst still permitting GA access between it and the western edge of the Gatwick CTA. We have taken advice regarding the possible constriction of airspace in this region, and are negotiating with Gatwick regarding the release to Class G of the northwest corner of their CTA, in order to provide a wider Class G 'gap' between CAS volumes. We consider that an RMZ in this area would be beneficial to all.

5.11. The area of proposed CTA south of Fairoaks *CTA3 on* Figure E3 is proposed to allow unhindered GA operations to occur beneath IFR aircraft. It was considered during the earlier designs that this CTA should in fact be part of the CTR (i.e. having a base of the surface), in order to prevent/mitigate infringement risk to both this airspace and the London CTR. A base of the surface was not progressed due to the needs and requirements of Fairoaks (their operation would continue unhindered) and the possible impacts of any regulations introduced as a result of the Standardised European Rules of the Air (SERA), discussed later.

5.12. As part of the design process, the requirement to offer an additional transit route for GA VFR traffic was identified north of the extended centreline. Following extensive negotiation, a portion of the London CTR would be delegated to Farnborough up to 2,000ft, in agreement with LTC. *Shown between Fairoaks and Bracknell on Figure E3.* This area would technically remain part of the London CTR, and retain the classification of that area (currently Class A, however NATS has consulted on changing it to Class D as part of SERA and this is highly likely to be implemented late 2014). Fairoaks would receive an increased ability to transit via this area, more than what is possible today with LTC's Heathrow controllers. The project did consider GA requests for a formal release of this airspace to Class G, but this would expose Fairoaks to ATZ infringement risk, and would introduce additional complexity at the interface with the London CTR.

5.13. See Section 9 regarding recommended VFR transit routes through the proposed CTR via newly proposed VRPs.

Area West of Farnborough

5.14. The proposed CTR west of Farnborough *CTR1, 2, 3 on Figure E3* is the minimum amount of airspace required to protect a 3.5° glidepath for the Runway 06 final approach, and departing traffic from Runway 24. Consideration was given to raising the glidepath to higher angles, however this would not permit practical application of RNAV/RNP (such as SBAS/GBAS) arrivals in the future. Gliders from Lasham are the dominant GA user in this airspace and their presence has an effect on all users due to the vast numbers of aircraft they can have flying simultaneously. This affects RAF Odiham patterns, Farnborough patterns and other GA users. The proposed CAS is specifically designed to give as much access as possible to Class G for Lasham gliders. If you are a GA user we would welcome feedback on possible routes you might take through this Class G airspace and any reservations you might have about transiting Farnborough Class D as an alternative.

5.15. The southern edge of the CTR closes towards the western extended centreline – normally, each edge would remain parallel with the runway. This is a compromise which would reduce the volume of airspace converted from Class G, whilst remaining within acceptable criteria for radar vectoring.

5.16. The design of the western boundary *CTR2, 3 on Figure E3* is such that RAF Odiham remains entirely outside the CTR, allowing their requirements to be met to the maximum amount possible. However, the final approach to their Runway 27 and climb-out from Runway 09 would immediately penetrate the proposed CTR. We already work closely with RAF Odiham and would continue to do so (see later).

5.17. The CTA (base 1,500ft) west of the CTR *CTA2, 4 on Figure E3* is proposed for protection of the final approach for Runway 06. This is directly above RAF Odiham. An airspace sharing arrangement with gliding stakeholders is being considered, in order to allow access to this airspace, particularly when Runway 06 was not in use. By the nature of the operation at Lasham Airfield, a suitably robust mechanism for shared airspace ownership is yet to be identified, however we would welcome feedback. We considered establishing an RMZ in this area but felt this to be inappropriate due to the presence of Lasham gliders. We consider Lasham Gliding Society to be proactive, and would be able to manage their fleet appropriately to mitigate the infringement risk assuming this potential sharing arrangement progresses. CAS(T) arrangements for connectivity to airways would no longer be required, bringing benefits to Lasham gliders and other regular users throughout the year.

CTA area Northwest of Farnborough CTA1 on Figure E3

5.18. Aircraft arriving to Farnborough from the north currently do so by leaving CAS somewhere between CPT VOR and Farnborough's westerly extended centreline.

5.19. Various routing options were considered to enable these aircraft to be protected without making any amendment to airspace in this area. We considered these in order to avoid adverse impact on the diverse GA community in this area.

5.20. After significant investigation in combination with LTC controllers, suitable routing options were not identifiable within existing London TMA infrastructure in this area, including the Heathrow Radar Manoeuvring Area (RMA) for when Heathrow is operating easterly.

5.21. In order to continue to accommodate GA activity in this area, we have not proposed the most expeditious IFR inbound track for Farnborough Runway 06 arrivals from the northwest.

5.22. Instead, we have compromised the design to meet our minimum requirements in order to balance with those of the GA community, and to avoid overflying Fleet at low altitudes. We have proposed a very limited amendment to the volume of current airspace in this area.

5.23. A 500ft lowering of the existing CAS base (from 5,000ft to 4,500ft), together with a small 1nm lateral extension to the south, would enable arriving Farnborough traffic to remain protected by CAS whilst satisfactorily mitigating the potential impact on GA stakeholders.

Southern CTAs CTA5-14 on Figure E3

5.24. Volumes of proposed CAS south of Farnborough have been developed in order to allow our arriving and departing traffic to flow within a CAS structure, beneath current and future Gatwick and Heathrow traffic flows, whilst being as small as possible to reduce the change from Class G, mitigating the impact on GA.

5.25. The minimum lateral extent of each area is determined by interactions between Farnborough arrivals and departures versus Gatwick departures, and to a certain extent the Heathrow and Southampton traffic.

5.26. The bases of the CTA complex step upwards approaching the south coast. These CTA areas are proposed as Class D and the controlling authority would be Farnborough. CAS(T) arrangements for connectivity to airways would no longer be required, bringing benefits to regular users throughout the year.

5.27. We are considering Flexible Use of Airspace (FUA) in order to share CTA9 and CTA10 with the British Gliding Association, for their use under certain circumstances. Negotiations are in progress for this scenario, which would involve us using an alternate southbound SID routing via CTA6 and CTA8 then CTA11. This alternate SID is longer and would cause more fuel to be burned by our departures on days when this is active, if negotiations succeed.

Airways M185, L980, N863, N859 and L151 near/over the IOW/Solent/South Coast

5.28. We are proposing volumes of Class A CAS, base FL65, below these airways' existing Class A bases. There would be no change east of Littlehampton where the Class A base is 5,500ft, and no change west of Cowes/Lee-On-Solent where the Southampton CTR and Solent CTAs define the limit.

5.29. These connected volumes would accommodate traffic arriving into Farnborough, Southampton and Bournemouth from the east. These volumes are expected to be used regularly for the majority of this arrival traffic, moving the flow towards the coast or over the sea.

5.30. Within these connected volumes, a hold is proposed over the sea off the coast of Portsmouth as a contingency facility for Farnborough, Southampton and Bournemouth traffic FL70-FL100, with a FL65 CAS base. It is anticipated that the hold itself would be ***rarely*** used. New STARs would be drawn up to incorporate that contingency hold (see later for more information on STARs).

5.31. The classification of these airway base volumes is proposed to stay as Class A from FL65. The controlling authority would be LTC, and they would become associated with the Worthing CTA Complex. Discussion was undertaken with LTC with respect to Class C arrangements, but LTC explained that it would be difficult for their controllers to integrate successfully IFR and VFR aircraft in these volumes especially with low numbers and infrequent procedures. If you would be disadvantaged by Class A, feedback on access to these areas would be welcomed.

Funnelling effect in the vicinity of OCK

5.32. As part of the impact assessment of the various options considered, we are aware that the proposal has a potential 'funnelling' effect for aircraft that do not wish to, or are unable to, transit the proposed CAS with a clearance from Farnborough LARS.

5.33. We considered various methods to mitigate these impacts, such as:

a. Promulgation of suggested routes that would be segregated outside CAS. This has not been progressed due to the difficulty in mandating such routes in Class G

b. Defining multiple access points and routes inside the proposed CAS. This became a very complicated structure, and we agreed with GA stakeholders that it would be detrimental to pilot understanding

c. Defining a simple transit route structure. This is retained within the proposal, affording transit guidance around and through the proposed CAS, and existing line features retained for east-west transit

d. Continued provision of LARS West in the vicinity of the proposed airspace, to assist pilots in navigation around the proposal, mitigate risk of infringement, and provide guidance to assist pilots in operations in an area of high intensity. We have agreed to retain this service irrespective of ACP outcome

e. Considering establishment of a TMZ. This concept has been used in other areas in the UK to protect CAS from infringement. The continued service provision by LARS West achieves similar mitigation to infringement, and the adverse effect of non-transponder equipped transit traffic resulted in this not being proposed; and

f. Considering establishment of an RMZ. This would allow LARS West to provide traffic information, both generic and specific. In order to allow LARS West to mitigate the infringement risk, we are proposing a small RMZ east of the proposed CTR as shown in Figure E3.

   We welcome your feedback on these points. We will ask questions later in this document, in order to understand points of view of the GA user. We would especially welcome feedback from the microlight community, balloonists and gliders in addition to non-radio users.

5.34. A key issue for proposing an RMZ is the current aircraft equipage and pilot licensing of common airspace users in the region. This has influenced the areas proposed - many airspace users of areas to the west of the proposed CTR are unlikely to be able to comply with RMZ requirements. Exemptions could be considered, but would lead to a reduction in the efficacy of the RMZ[2].

5.35. RMZ principles for users in this area would be developed with GA associations, local users and the CAA.

5.36. Consideration was given to requirements of Surrey Hills Gliding Club at Kenley near Caterham, in a similar way to consideration given to Lasham to the west of the proposed CTR. The proposed RMZ boundary has been designed north through Ockham and south towards the Gatwick CTA corner, permitting non-radio operations from the east up to OCK to continue unhindered.

5.37. We are proposing relatively small CAS volumes that do not provide us with extensive internal 'buffers' to mitigate against potential infringing aircraft – infringement risk is an airport's major safety concern. This was a deliberate and balanced decision to minimise the extent of CAS required, resulting in less Class G needing to be converted to Class D.

5.38. We believe the proposed RMZ shown in Figure E3 is the smallest possible to reduce the risk of infringement from the east. We welcome feedback on the shape and extent of the proposed RMZ. It also mitigates the potential GA 'funnelling' effect in the vicinity of the northwestern corner of the Gatwick CTA between Dorking and Godalming. This is discussed further in paragraph 5.41 below.

5.39. We believe the establishment of a small RMZ region is a good balance between the competing requirements of:

a. ATC assurance against infringements (which would otherwise require more extensive CAS), versus

b. the freedom to operate unhindered within Class G (via no CAS and no restrictions at all).

5.40. Overall, we believe the best balance has been struck between the proposed establishment of minimal-sized CAS, the use of LARS, an RMZ to mitigate against infringements, and the freedom to fly in Class G around and below the proposed volumes.

5.41. Significant work was carried out in an attempt to secure the release of the northwestern corner of the Gatwick CTA to Class G from the current Class A 1,500ft to 2,500ft, offering a better selection of routes to the GA community below the LTMA Class A ceiling of 2,500ft, should they wish to transit in that vicinity. This area would also include continued provision of LARS service by Farnborough.

5.42. Gatwick Airport Ltd have kindly permitted us to consult on this, whilst we continue to negotiate for its formal release to Class G on behalf of the GA community.

2 See www.caa.co.uk/docs/33/20130809RMZPolicyDocumentFinal.pdf for more details.

5.43. If we are successful and Gatwick support the conversion to Class G, the funnelling effect would be mitigated by LARS, the new wider 'gap' below 2,500ft and the proposed RMZ.

5.44. If Gatwick are unable to ultimately support the conversion, the funnelling effect would remain, mitigated by LARS and the proposed RMZ.

Network connectivity

5.45. During the design process, routing structures were considered and developed, including those currently in use.

5.46. Predicted traffic increases precluded continued operation of today's routes, due to complexity to the northwest of Farnborough, associated with the existing traffic for Heathrow, Gatwick, Luton, Stansted and others.

5.47. The London Airspace Management Programme (LAMP) is planning various network changes to routes for all London TMA airfields, including Farnborough, and the route structures developed within this proposal need to be suitable for both our proposed implementation timescale and future LAMP timescales.

5.48. Combining this with the complexity mentioned in paragraph 5.46 above resulted in the requirement to move the current northbound departure flow, which currently routes towards CPT VOR shortly after takeoff.

5.49. The proposed route would instead take all departures southwest before joining airway Q41 northbound – for more details see the SIDs section later in this document.

5.50. This route change is expected to achieve an earlier climb than is possible today, and to a higher initial altitude. It also means less airspace would be required in a popular GA area, balancing our needs against GA activities.

6. Contingency procedures for Farnborough arrivals

Holding: Inbounds from the South

6.1. At Farnborough, the PEPIS hold is rarely used (once or twice a month). When holding does occur, it is usually because aircraft arrive earlier than planned, before the airport is open, or because low visibility (fog) prevents arrivals.

6.2. The previously discussed STAR fix for inbounds from the south also facilitates a new contingency hold over the sea. There would be four levels available (FL70 – FL100).

6.3. This southern holding facility would be shared between Farnborough, Southampton and Bournemouth, under the control of LTC Swanwick. It is not expected that this hold would be used regularly by any of the three airports.

6.4. Early arrivals to Farnborough from the southeast or southwest would be expected to hold at the new fix. LTC may decide to tactically reroute early arrivals from the north (via CPT) to the new southern hold, because holding at PEPIS usually causes disruption and complexity further up the air traffic control chain within LTC.

6.5. The new hold would reduce the 'damming' effect at PEPIS by moving the holding aircraft away from busy traffic flows.

Holding: Tactical contingency, near the Airport

6.6. For situations requiring tactical holding close to Farnborough the existing hold at TAGOX is currently available. Under this proposal it would be re-aligned/renamed and based upon a new holding fix, geographically very close to TAGOX. Realignment would support futureproofing the hold's design against RNAV criteria and would stay within the proposed CAS which is designed to enclose it.

6.7. This TAGOX-replacement hold would be available at 2,000ft and 3,000ft. Today, TAGOX is defined at 2,400ft, which is below current LTMA CAS.

Radio failure circumstances – Following RNAV1 STARs

6.8. If following any of the new RNAV1 STARs, it is expected that the full flight plan route to the TAGOX-replacement hold at 3,000ft near Farnborough would be flown.

6.9. There would be a new promulgated RCF route from the replacement hold - similar to today's route via the existing TAGOX contingency hold, detailed in the AIP pages AD-2-EGLF-8-1 to 8-6. The draft details of the radio failure route will be presented as part of the ACP.

Radio failure circumstances – Following RNAV5 STARs

6.10. From the north if following the new RNAV5 STAR to PEPIS, it is expected that the full flight plan route to PEPIS would be flown, to hold at FL70.

6.11. From the southeast and southwest if following the new RNAV5 STARs, it is expected that the intermediate contingency hold over the sea would be over-flown without entering that hold, and the STAR track to PEPIS would be flown, to hold there at FL70.

6.12. This would be followed by a new promulgated RCF route from PEPIS - this would be very similar to today's route via the existing TAGOX contingency hold, detailed in the AIP pages AD-2-EGLF-8-1 to 8-6. The draft details of the radio failure route will be presented as part of the ACP.

Likelihood of radio failure

6.13. The likelihood of these circumstances is extremely low - there is no record of the existing RCF route needing to be flown for a genuine radio failure.

7. Major design options (History)

7.1. Multiple versions of concepts were developed. In this document, they are referred to as 'Option (number)'.

7.2. Options 1 to 11 involved the consideration of the concepts described in Section 2, experimenting with elements from each concept and combining them at a very broad level.

Option 12

7.3. This was the first CAS option to be extensively taken to local stakeholders for input and consideration.

7.4. This option only attempted to manage traffic near to Farnborough and connectivity to the en-route network remained undeveloped. Routes for arriving and departing aircraft remained largely as today, however arrivals from the north to Runway 06 could not achieve a join onto final approach from the north.

7.5. This option also received challenge from stakeholders involved in GA activity due to the amount of required CAS northwest of Farnborough.

7.6. Because of the lack of connectivity to the network, this option was discounted.

Option 17

7.7. This option 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.

7.8. The required CAS north of Farnborough was reduced by means of raising proposed CTA bases, and the 'Farnham orbit' was removed by establishing a northerly arrival track terminating at 10nm final for Runway 06 at 4,000ft.

7.9. This option received challenge from stakeholders involved in gliding activity at Lasham, due to the relatively low base of CTA areas in the normal areas for glider operations (3,500ft).

7.10. After further discussions with LTC Swanwick, the proposed network connectivity was also rejected, as complexity in the CPT VOR area had not been addressed.

7.11. This option was therefore not developed further.

Option 19

7.12. This option attempted to address the challenge received from the stakeholders involved in gliding activity at Lasham, in relation to the base of CTA areas in the immediate overhead of Lasham airfield.

7.13. Additional amendment was made to the volume of CAS east of Farnborough, previously shown with a 1,500ft CTA base. NATS LTC Safety Manager expressed an issue with infringement risk in this area, and requested the CTA be made a CTR, which the project agreed to.

7.14. In removing that CTA base, additional CAS was proposed north of Farnborough, to enable the retention of the bi-directional route for northerly traffic to have some lateral and vertical tolerance. The workload associated with separating arrivals versus departing traffic fell solely on Farnborough, and those members of the design team based at Farnborough were only persuaded to retain this option provided a commitment to carry out a radical redesign of existing London traffic patterns could be guaranteed.

7.15. The issues raised by the network connectivity regarding Option 17 remained unresolved, and the commitment to these radical changes could not be established within suitable timescales.

7.16. At this stage, gliding stakeholders also challenged the option, expressing concern about a proposed CTA (base of 1,500ft) to the east of Lasham.

7.17. Due to the difficulties in satisfactorily interfacing airspace, routes and procedures between Farnborough and LTC, this option was discounted

Option 20

7.18. The design attempted to address the issues of Option 19 with regard to route connectivity and interface with LTC. Advice was taken from the London Airspace Management Programme (LAMP) design team, so that a track for the northerly departures would route initially south from Farnborough then turn north later.

7.19. The re-routing of this traffic added additional considerations due to the interaction with existing Solent and en-route airspace. The workload associated with integrating this traffic was only envisaged with an overarching LTMA sector, described as 'Hampshire Radar'.

7.20. The routes for the majority of Farnborough traffic established to the south of Farnborough restricted the ability to manage traffic during unusual/intensive traffic volumes. Consideration was given to additional areas that could provide holding capacity, descent profiles suitable to match procedures in the en-route network and the Farnborough-proposed airspace. The proposal was to lower the existing airway base over the sea in the vicinity of the Isle of Wight, with provision of a contingency hold. This contingency hold will only be used for a maximum of four aircraft concurrently (FL70-FL100). This hold would only be used during abnormal operations at Farnborough, Southampton and/or Bournemouth. Abnormal operations would normally be associated with blocked runways or poor weather conditions, or an aircraft that arrived excessively early before the airport opened.

7.21. The option provided for extensive areas of Class G to be untouched, by routing the IFR traffic within L620, and proposed no additional airspace to protect northerly arrivals.

7.22. The project was unable to provide commitment to 'Hampshire Radar' as an operational concept due to a non-compelling business case at the time. Northerly arrivals leaving CAS had the same challenge as Option 19, and would not meet the TAG Farnborough requirements.

7.23. These difficulties resulted in Option 20 being discounted.

Option 21

7.24. Further stakeholder input from the gliding community in the South Downs area indicated that their operation would be affected by the proposals in Option 20.

7.25. In an attempt to enable their aircraft to route south of the River Rother, the Option 20 CTA area with a base of 3,500ft was trimmed to expose the River Rother to a higher base, mitigating their concerns.

7.26. Additionally, LTC project members suggested moving the departure track of aircraft ultimately routing to CPT to an area north of L620. This was to utilise an area where Heathrow and Gatwick traffic is rarely a factor, and it was suggested this would alleviate the workload issues associated with the 'Hampshire Radar' concept (Option 20) with the assistance of Solent Radar controllers based at Southampton ATC.

7.27. This option was not extensively exposed to local stakeholder input, as further analysis exposed an issue with achieving vertical separation for arriving and departing traffic from/to the south.

7.28. Farnborough controllers highlighted insufficient CAS available to satisfactorily descend into Farnborough, particularly on Runway 06. The draft additional CAS required was not justifiable when considering other stakeholders.

7.29. This option was further refined through Option 22 into Option 23 below.

Option 23

7.30. The additional CAS required by Farnborough controllers in order to vertically separate arriving and departing tracks from/to the south of Farnborough was delivered by providing an additional CTA base of 2,500ft and removing the previous change introduced in Option 21 for the benefit of gliding stakeholders in the South Downs area.

7.31. Consideration had been given to ensure SID tracks remain fully inside CAS until joining the en-route network, which is a theoretical requirement of CAP778. This would require even more CAS to be established unnecessarily, and would be too restrictive on GA activity. The project committed to seeking mitigation for CAP778 non-compliance. Existing SIDs across the UK replicate this situation in theory without excessive CAS, because the aircraft in reality are much higher than the minimum SID altitudes and remain within established CAS structures at all times.

7.32. Challenge from the GA stakeholders for this option remained as before (specifically the CTA base of 1,500ft west of Farnborough). Despite significant efforts, we have been unable to identify further enhancements to mitigate this issue, however we would welcome feedback.

7.33. Option 23 was refined into Option 24.

Option 24

7.34. An assessment of SERA and access arrangements generally for Fairoaks resulted in taking the eastern edge of the proposed Farnborough CTR and raising the base to 1,500ft (creating a CTA in that area instead). This had been a feature of earlier options.

7.35. SVFR lanes were developed for a north-south transit route, to facilitate capacity to GA.

7.36. Further input from LTC requested a re-alignment of the proposed contingency hold over the south coast. All previous options had this east of the Isle of Wight. Option 24 moved this further north in the Solent, south of Portsmouth and Hayling Island.

7.37. Option 24 was formally simulated by controllers from LTC Swanwick, Farnborough and Southampton at the NATS Air Traffic Control Simulation Centre. This established the overall concept, but highlighted a number of operational issues which needed to be addressed.

7.38. In addressing these operational issues, Option 24 was refined into Option 25 recommended for consultation (detailed in full below, and illustrated in Figure E3 on Page E18).

Option 25

7.39. Routes to and from the south were realigned to offer 5nm separation between them. This enables controllers to 'procedurally' manage the traffic, without coordination between Farnborough and LTC Swanwick, increasing traffic handling capacity, and reducing controller workload. The route realignment required a small additional area of airspace between Alton and Petersfield to comply with CAP778. This additional area was designed to keep Petersfield outside the proposed changes.

7.40. The precise position of the new routing points was chosen to ensure the previously released information was amended to the absolute minimum.

7.41. This option was simulated for a further period involving RAF Odiham, Southampton, Farnborough and LTC Swanwick.

7.42. The team concluded that this design would effectively deliver the requirements of most of the stakeholders. Therefore, the project team determined that Option 25 was the version to be taken to public consultation.

7.43. The challenge from gliding stakeholders regarding CAS proposed near their operation remains. Since the second simulation, it was suggested that using FUA to release CTAs 9 and 10 under certain circumstances could be workable, and an alternate southbound SID was designed in order to avoid those CTAs. We welcome feedback on the proposed FUA and alternate SID. An observer from Lasham Gliding Society was present at this simulation to enable their members to further understand the airspace usage.

7.44. Although Option 25 is a refined design, there are potential consequences to the SERA[3] Class D VMC criteria which must become UK law in December 2014.

7.45. The CAA intends to apply for a derogation from the VMC minima in advance of it becoming law.

7.46. The CAA's intent is to change the as-consulted-upon '1,000ft vertically, or 1,500m laterally, from any cloud' to the CAA-proposed 'if at or below 3,000ft and flying at 140kt or less, clear of cloud in sight of the surface'. The latter matches today's Class D VMC criteria.

7.47. Note that there is no guarantee that the CAA will be successful in its derogation. Therefore we present Option 25 in two states: one where SERA is implemented with the VMC criteria derogated as above (our preferred outcome) and one where SERA is implemented where the CAA have been unable to secure derogation. SERA's major effect would be on the availability of VFR flight within the CTR with respect to transit requests.

The tables below explain the Farnborough design team's interpretation of the impact SERA would have, for each volume of proposed CAS.

a. Table E1 details the impacts for the proposed CTR assuming derogation is successful and VFR is available most of the time.

b. Table E2 details the impacts for the proposed CTR should the CAA fail to secure derogation and VFR is available less often.

c. Table E3 details the impacts for the proposed CTAs.

3 Standard European Rules of the Air, specifically the impact of SERA.5001 vs the current UK-filed Difference to ICAO Annex 2 Table 3-1. The CAA seeks derogation to preserve this Difference, allowing continued application of the VMC at Rules of the Air 2007 Rule 27(3) within Class D airspace.

CAS Volume Number	Design Methodology	Impacts	Mitigations/Notes
CTR1 CTR2 CTR3 Class D SERA Derogation Successful	Minimum CTR to protect IFR arrivals and departures for both Runways, compliant with CAP778 requirements.	Transit aircraft require clearance to enter airspace.	Proposal would establish a (S)VFR transit corridor through the airport overhead. VFR conditions would be common. Controller capacity exists to afford transit requests. SVFR conditions would be less common. Such transits may be restricted during periods of IFR operation at both Farnborough and RAF Odiham.
		RAF Odiham pattern penetrates the CTR.	Local procedures and Letters of Agreement permit airspace access for RAF Odiham.
		RAF Odiham ATZ partially in CTR including 618VGS/Kestrel operations	Letters of Agreement delegate a volume to RAF Odiham for VFR operations. Western edge of CTR designed to exclude RAF Odiham overhead from CTR.
		Aircraft routing WOD – OCK effectively 'blocked' without a transit clearance	Volume of London CTR delegated to Farnborough. Associated procedures introduced to permit (S)VFR transit of the delegated airspace.
		Blackbushe ATZ partially in CTR	Letters of Agreement delegates a volume to Blackbushe for VFR operations. Southbound departures during SVFR conditions would likely be restricted. VFR conditions more common, SVFR conditions less common
		Aerobatic operations commonly occur within the SE corner of the proposal	VFR entry requests can be made to Farnborough. Suitable segregation of operations against IFR patterns will be required. In SVFR conditions there would be more restrictions, unless IFR traffic was not expected. VFR conditions more common, SVFR conditions less common
		Danger Areas EGD132/133/133A are within the proposed CTR	Local arrangements with the Danger Area Authorities would continue
		Fairoaks traffic may wish to route via the CTR proposal	London CTR delegation utilised to afford Fairoaks an entry/exit route, based on line features, avoiding the CTR area. In SVFR conditions there would be a reduction in capacity within the delegated area. VFR conditions more common, SVFR conditions less common

Table E1: Option 25 Impact Analysis – CTR assumes SERA Class D VMC derogated to permit VFR flight clear of cloud in sight of surface

CAS Volume Number	Design Methodology	Impacts	Mitigations/Notes
CTR1 CTR2 CTR3 Class D SERA Derogation Unsuccessful	Minimum CTR to protect IFR arrivals and departures for both Runways, compliant with CAP778 requirements.	GA Transit aircraft require clearance to enter airspace.	Proposal would establish a (S)VFR transit corridor through the airport overhead. VFR conditions would be less common. Controller capacity exists to afford transit requests during these conditions. SVFR conditions would be more common. Such transits may be severely restricted during periods of IFR operation at both Farnborough and RAF Odiham.
		RAF Odiham pattern	As per Table E1
		RAF Odiham ATZ	As per Table E1
		Aircraft routing WOD – OCK effectively 'blocked' without a transit clearance	Volume of London CTR delegated to Farnborough. Associated procedures introduced to permit (S)VFR transit of the delegated airspace. SVFR conditions would be more common. Such transits may be severely restricted during periods of IFR operation at both Farnborough and within the London CTR.
		Blackbushe ATZ partially in CTR	Letters of Agreement delegates a volume to Blackbushe for VFR operations. Southbound departures during SVFR conditions would likely be restricted. SVFR conditions more common, VFR conditions less common
		Aerobatic operations commonly occur within the SE corner of the proposal	VFR entry requests can be made to Farnborough. Suitable segregation of operations against IFR patterns will be required. In SVFR conditions there would be more restrictions, unless IFR traffic was not expected. SVFR conditions more common, VFR conditions less common
		Danger Areas EGD132/133/133A	As per Table E1
		Fairoaks traffic may wish to route via the CTR proposal	London CTR delegation utilised to afford Fairoaks an entry/exit route, based on line features, avoiding the CTR area. In SVFR conditions there would be a reduction in capacity within the delegated area. SVFR conditions more common, VFR conditions less common

Table E2: Option 25 Impact Analysis – CTR assumes SERA Class D VMC criteria for VFRs to remain 1,000ft vertically, or 1,500m laterally, from any cloud

CAS Volume Number	Design Methodology	Impacts	Mitigations/Notes
CTA2 CTA4 Class D	Required to protect Runway 06 arrivals. Standard CAP778 containment rules reduced with lateral boundary proposed to be 2nm away from nominal track of arrival (usual requirement 3nm). Possible increase in Farnborough ILS glide angle to avoid CTA creation, or to restrict size was considered but not progressed. Airspace share with gliding activities considered and being progressed.	Farnborough pattern vectoring area is restricted	Procedures to allow vectoring closer to the edge of airspace than normal, with mandatory traffic proximity warning to IFR pilots.
		Highly restrictive to normal gliding activity in that area	Whilst a formal airspace sharing arrangement has not currently been developed, we will engage with the gliding community further to establish if a robust mechanism could be developed to allow regular access to this CTA when it is not required for IFR protection. Farnborough would consider an airspace access/sharing agreement during significant activity dates (competitions etc.)
		RAF Odiham underneath CTA, and common circuit patterns transit its lateral area	Local procedures and Letters of Agreement permit airspace access to RAF Odiham, with suitable coordination.
		618VGS/Kestrel area of operation within the proposed CTA	Local procedures and Letters of Agreement permit airspace access. Current Visual Approach procedures during Runway 06 operations mapped across to new proposal.
		Transit traffic may be 'blocked' without a suitable clearance	Local education and publications to encourage pilots to utilise alternative transit routes around the CTA. These would be through the Farnborough overhead (subject to Table E1 and Table E2), or with LARS West, routing west of Lasham. Existing unit practice to warn pilots of high traffic density, and other operations (i.e. gliding at Lasham) remain in place.
CTA3 Class D	Protects Runway 24 arrivals and 06 departures. Originally considered to be part of CTR in order to mitigate infringement risk - this was discounted due to adverse effects on GA activities, and converted to CTA.	Fairoaks operations route underneath	Letters of agreement and procedures to permit Fairoaks to operate under the CTA, which were extensively used during Olympic airspace, and shown to be robust.
		Funnelling point created proximate to the NW corner of the Gatwick CTA	The project considered release of part of the Gatwick CTA to Class G to widen the gap between the two airspace structures. This is under negotiation (see paragraph 5.41). LARS West service provision to assist pilots in situational awareness in the area. Creation of RMZ to: • ensure transit pilots are able to be informed about each other; and • mitigate the infringement risk.

CAS Volume Number	Design Methodology	Impacts	Mitigations/Notes
		Commonly used Helicopter routes within the London CTR exit in the vicinity of this CTA	Common levels used would either be below the CTA, or transit issued by Farnborough in advance of leaving the London CTR.
CTA1 Class D	Protects IFR arrivals from the north, whilst still avoiding significant airspace 'take' from Class G operations	GA activity impacted by base lowered by 500ft Additional 1nm of lateral footprint to the south	Base lowering held at only 500ft, and the proposed area would be Class D to facilitate VFR transit requests when no IFR aircraft are expected. IFR aircraft would be transferring from LTC to Farnborough within this CTA, and provision of traffic information on VFR flights would not always be possible.
CTA5 CTA6 CTA7 Class D	To enable IFR sequencing, with particular reference to Runway 06 where inbound and outbound traffic will require to cross tracks. Additionally to protect outbound traffic for both Runways and enable sequencing of Runway 24 arrivals. Laterally dimension required to create two routes separated by 5nm, to ensure the interface with London Control is robust.	Base would be lowered from LTMA levels to a significant level for GA traffic	Class D airspace proposed, allowing (S)VFR transit when able. Area proposed is the minimum volume to meet ATC requirements. Any increased complexity in the ATC system would reduce overall capacity for other airspace activities.
		Lateral funnelling of transit traffic wishing to route N–S towards Solent CTAs and Lasham	Such traffic may be better served routing via the proposed (S)VFR transit lane through the Farnborough overhead (subject to Table E1 and Table E2). Service provision by LARS West will be retained.
		Gliding operations aiming to return from the NW to Parham (and other sites SE) would be unlikely to be able to route underneath this area, and make it back to destination.	Design proposals, specifically CTA8, CTA9 and CTA10, permit deviation from a direct route. Whilst not ideal, other options do not provide suitable segregation of IFR and other activities.
CTA8 Class D	Provides airspace to protect N and SW departures in interface between Farnborough and Solent/LTC.	Lasham operations beneath CTA 8 restricted vertically to 4,499ft, as per CTA1.	Lowering of base unavoidable when compared with alternative options where lower CAS was considered north of Lasham. Potentially, this area would also be used southbound when FUA airspace sharing of CTA9 and 10 is in progress – an alternate SID would probably be level at 5,000ft in this area. In considering common areas of operation, we believe the balance is that this is the least restrictive overall.

CAS Volume Number	Design Methodology	Impacts	Mitigations/Notes
		Vertical 'cap' on transit traffic underneath the CTA	Majority of transit traffic is generally at altitudes below the proposed base of 4,500ft. We believe the proposed 'cap' would not be a large impact on the majority of transit traffic
CTA9 CTA10 Class D	Provides an area of airspace for the interface between LTC and Farnborough. Base of 3,500ft is required when considering Farnborough traffic is unable to stay higher than 4,000ft against Gatwick traffic procedurally climbing to 5,000ft above. This 5,000ft Gatwick SID climb is already higher than current day procedures at the request of Farnborough. Higher climb gradients from Gatwick were considered, but this was not possible following feedback from principle Gatwick operators.	Significant impact on gliders in the vicinity of the South Downs, who commonly operate south of the River Rother up to 4,499ft.	Attempts to restrict the airspace to portions north of the River Rother were shown to not be effective for IFR separation purposes. The airspace base has been stepped up from lower CTAs as close to Farnborough as practicable. Airspace proposed is Class D, permitting VFR transit requests. Farnborough would consider an FUA airspace sharing arrangement with competent organisations during significant activity dates (e.g. competitions etc.). This would require additional use of CTA8 due to the southbound SIDs would be relocated temporarily when this FUA was activated. FUA is subject to continued investigation and negotiation.

CAS Volume Number	Design Methodology	Impacts	Mitigations/Notes
CTA11 CTA12 CTA13 Class D	Provides an area of airspace for the interface between London Control and Farnborough. This is primarily for inbound traffic, and climb through of outbounds.	Impact on gliders in the South Downs area, Parham airfield overhead and via Goodwood Goodwood Spitfire school may be affected.	Base of airspace proposed kept at 4,500ft would permit most activity to be carried out below. IFR aircraft would be transferring from LTC to Farnborough within this CTA, and provision of traffic information on VFR flights would not always be possible. STARs from the south would flight plan via CTA11, however CTAs 12 and 13 would get regular tactical use by LTC (see para 4.15). We welcome specific feedback from Parham Gliders - further modifications of CTA 12/13 may be possible Feedback welcomed and access arrangements considered. Goodwood Airport potential for GPS approach discussed and airspace design may be modified as requested and practicable.
CTA14 Class D	Provides CAS for LTC to manage Farnborough traffic at the link to the en route network	1,000ft less Class G availability below the LTMA, 'capping' activities to 5,499ft.	Majority of activity is generally at altitudes below the proposed base of 5,500ft. Class D affords VFR access subject to clearance. We believe the proposed 'cap' would not be a large impact on the majority of activities.
Airway volumes from the south coast (L151, Y8, M185, N859, N863, L980 and N514) Class A	To facilitate new contingency hold and segregation of Solent/Farnborough traffic Southampton and Bournemouth arrivals from the east would be realigned off the south coast. Offers descent/climb underneath Gatwick/ Heathrow traffic flows	Lowering of the base to a common FL65 level may affect some military operations in connection with Danger Area EGD037. Y8 'sliver' (only 5.5nm^2) base would need to be 5,500ft to align with adjacent CTAs.	Majority of activity below CAS in these areas is generally below 6,000ft. We believe lowering these bases would not impact significantly on these activities. The proposed contingency hold has been realigned to avoid additional CAS being required inside EGD037. These volumes would become part of the Worthing CTA Complex, adjacent to the east. Class A CAS does not afford VFR access. LTC would control these areas.

Table E3: Option 25 Impact Analysis – CTAs. This depends far less on SERA Class D VMC derogation

8. Discounted design options

8.1. Due to the complex and restricted area around Farnborough, design options were severely limited by Heathrow (RMA, SID, future designs, environment, commercial pressure, current airspace separation requirements) and Gatwick (RMA and SID designs). This results in airspace being lower than ideal as Farnborough are having to operate beneath the procedures of these other airports.

8.2. An option which has been considered which provided the amount of airspace around Farnborough similar to other airfields in the UK created too many issues, not only with the link to the en-route network but also the diverse GA community.

8.3. The resulting designs reduced the amount of CAS required, but also found a solution to managing the departures in a manner which provides connectivity to the network, and leaves airspace 'free' in the vicinity of Lasham Airfield, a particularly intense GA activity area.

8.4. A further consideration was given to the area to the northwest of Farnborough. Ideally a small amount of airspace in addition to the proposed CTA would allow joining Runway 06 final from the north on left base. However even this small amount of airspace has been discounted as the effect on the GA community would be great.

8.5. Additionally, NATS En-Route Ltd are progressing a Navigational Aid withdrawal program. This is making way for Area Navigation (RNAV) to replace the way aircraft navigate around the skies, as part of FAS.

8.6. RNAV procedures were considered for the whole of the Farnborough airspace, and many routes within the design are to RNAV1 criteria.

8.7. Introduction of an RNP environment for Farnborough would result in a delay to the project due to regulatory process and aircraft equipage. Provision is made for this to be introduced at a later date when required.

8.8. The current design is based on RNAV1 and RNAV5 criteria, with radar vectoring support.

8.9. See Table E4 for more detail on discounted design considerations.

Other design methods considered	Disadvantages	Benefits	Reasons for not progressing
Continued operation in Class G	Continuation of current lack of predictability with an expected increase in movements to Farnborough leading to further efficiency issues. Increase in airspace user risk exposure when any increase in movements is factored into the operation. Inefficient operation of IFR aircraft. LTMA capacity affected whenever Farnborough unable to expeditiously manage traffic	GA traffic unaffected by proposals Separation standards not applicable to Class G	Would not provide adequate protection for TAG Farnborough traffic as it increases, therefore the requirements are not met. All operators in the airspace subject to displacement and increased interaction with possibility to enhance safety and efficiency not taken.
Higher mandated climb gradients at Heathrow (than already proposed here)	Increased costs to Heathrow operators Environmental impact (noise, local air quality potential)	Farnborough departures could climb higher earlier, and arrivals remain higher for longer than the option proposed.	Not acceptable to Heathrow Airport
Higher mandated climb gradients at Gatwick (than already proposed here)	Increased costs to Gatwick operators Environmental impact	Farnborough departures could climb higher earlier, and arrivals remain higher for longer than the option proposed.	Not acceptable to Gatwick Airport
Await LAMP Phase 2 developments	Details of what LAMP Phase 2 will or could deliver is not yet clear. Timescales of LAMP Phase 2 do not meet TAG Farnborough's requirements The disadvantages applicable to Class G operation above would also apply until/if Phase 2 is introduced. Would not alter significantly those portions of CAS proposed close to Farnborough	Farnborough-specific benefits are not able to be quantified yet	All operators in the airspace subject to displacement and increased interaction with possibility to enhance safety and efficiency not taken as LAMP 2 would not deliver low level connectivity to runway.
Raising glidepath angle at Farnborough to 4.4°	Not all operators can accept such a gradient. Not futureproofed for RNAV arrival requirements. Possible restriction on aircraft operating above certain weights Certification requirement over and above current AOCs	The increase in base altitudes of CTAs close to Farnborough would increase by 1,000ft, but to enable stabilised approaches those bases would extend further towards the west (overhead Lasham Airfield)	No genuine benefit to Farnborough or to other airspace users

Other design methods considered	Disadvantages	Benefits	Reasons for not progressing
RNP1 Arrivals to the runway threshold	Approvals for such arrivals not available within customer timescale requirements. Containment of RNP1 arrivals not significantly less than detailed in the proposed controlled airspace. Not all operators could comply with RNP1 approach and landing requirements at this time	Lower controller involvement/workload. Future strategy for ILS replacement built into concept. Predictable routing of arriving IFR traffic. Cockpit workload reduction. Significant environmental benefits in terms of track keeping.	Regulatory approval timescales for UK RNP1 design guidance for arrivals do not meet TAG Farnborough's requirements, therefore this option not yet progressed. However, in future, we may progress this (following standard CAP725 airspace change guidance and with CAA guidance). Flight planning requirements have led us to propose new routes to RNAV1 standard, terminating at a suitable point for radar vectoring and radio failure procedures.
Airspace sharing with gliders in the Lasham area, via the competent association	Difficulty of promulgation. Arrangements for return of airspace when required by Farnborough not able to be robust. Operational risk of infringement not being acted upon. Does not provide a universal benefit to other GA traffic. Weather conditions where options may be explored are not conducive to effective use. Flexibility of operation for gliders would be reduced due to a need to 'control' access.	Lasham gliding operations may continue with little impact during certain operational configurations.	Manageable small areas of airspace may be delegated with robust arrangements. We welcome further dialogue and feedback.
TMZ/RMZ with no supporting CAS	Aircraft are not obliged to adhere to controller requests, leading to inefficient and unpredictable IFR operations. Deconfliction minima as per Class G still exists with associated ramifications for Farnborough and GA community Final approach and climb out tracks still within Class G and exposed to non-participating or non-compliant transit aircraft. Equipment and pilot licence requirements preclude some operations. Non-radio and non-transponder-equipped arrangements would be required, increasing operational complexity.	Creates a known traffic environment (in terms of who and what is in the airspace) Class G activity does not require specific clearance. Promulgation areas would be less complex than proposed CAS.	Lack of suitable IFR segregation and 'control' of transit traffic. Does not meet TAG Farnborough requirements.

Other design methods considered	Disadvantages	Benefits	Reasons for not progressing
Final Approach 'corridor' of airspace with no en-route connectivity	Corridor not wide enough to satisfactorily react to infringement. Interface between LTC, Farnborough LARS and a join onto final approach is sufficiently complex to be poorly understood. Runway 06 protection would still impact upon other stakeholders, and be a large vertical 'column/wall'.	Significantly smaller CAS requirement.	Would not provide adequate protection for TAG Farnborough traffic as it increases, therefore the requirements are not met.
Class E CAS instead of Class D	VFR flight is not necessarily known, with higher risk of incident Class E is not available for CTRs under SERA and all Class E CTRs in the UK have been changed to Class D.	VFR flight available without a clearance	Class E CTR not available under SERA from December 2014. Class E CTAs would not provide adequate protection for TAG Farnborough traffic as it increases, therefore the requirements are not met.
Short Approach Arrivals	Would require ground infrastructure to offer visual references. Unclear under what criteria the prescribed route could be designed. Weather criteria would limit availability. Airspace structures to protect standard approaches would still be required.	Weather dependent possibility of airspace sharing, albeit with similar challenges to robust operation as per airspace sharing discussion above.	TAG Farnborough requirements not met within mandated timescales as traffic increases. Not universally adopted in the UK. This option has therefore not been progressed at this time, but remains a possibility. We are actively considering these approaches following discussion with operators to consider benefits.

Table E4: Details of discounted design considerations

9. General GA operations in the vicinity of proposed CTR

9.1. The design concept for the proposal has always been to establish the minimum CAS required for protection of our IFR operations, allowing maximum use of Class G for other activities and to provide for (S)VFR transits as much as possible. Farnborough remains committed to working with the GA organisations and local airfields to encourage pilots to request transit of the airspace, including offering a simplified RT package, training package and publicity

9.2. The use of CTA bases rather than a wider CTR affords more areas for the GA to utilise than for other similar CAS-equipped aerodromes.

9.3. The CTR is proposed to contain revised VRPs, enabling expeditious transit clearances to be issued against IFR operations, with suitable traffic integration. The routes provide a north-south transit 'lane' through the Farnborough overhead, which replicates common transit routes today.

9.4. Consideration of the RAF Odiham instrument pattern has been factored into this, and when the pattern is active, VFR transits may be given a clearance at a lower altitude than current operations, in order to achieve satisfactory integration.

9.5. Additional VRPs are proposed, providing a recommended set of routes to cross the proposed CTR north-south and east-west in order to integrate with our IFR arrivals. Familiar line features would be retained.

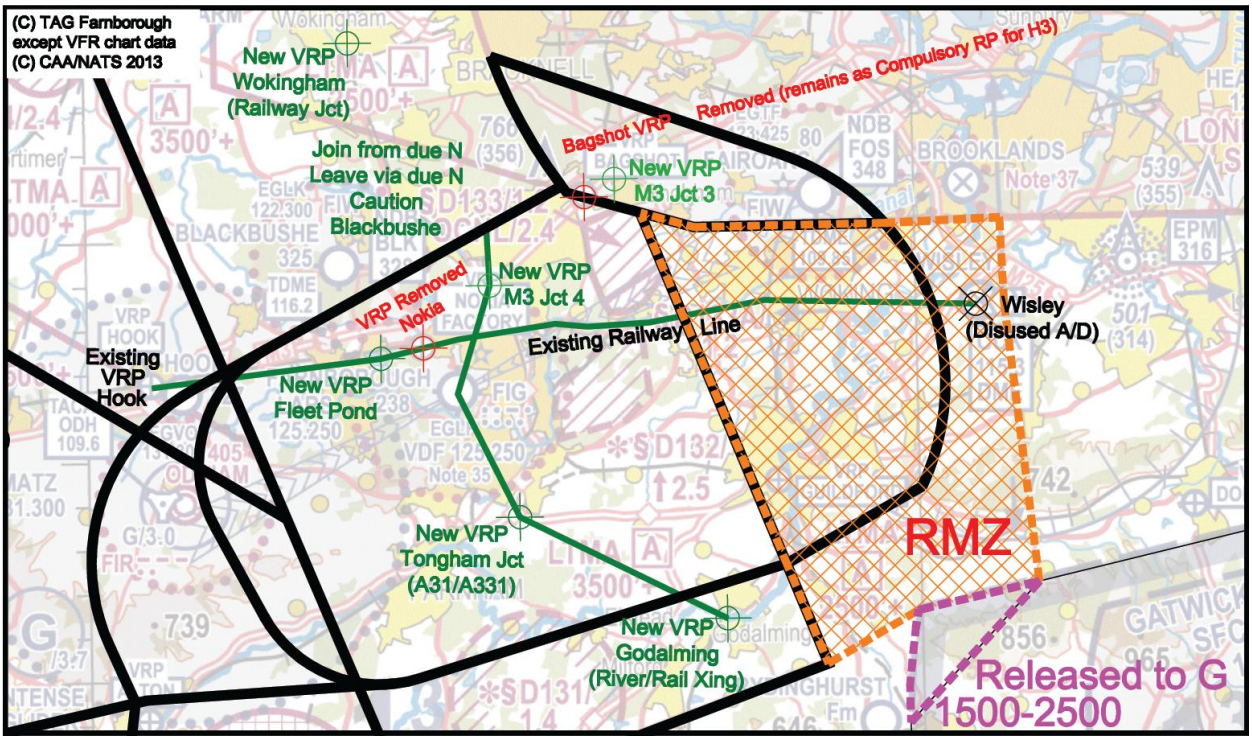


Figure E4: Proposed changes to VRPs and recommended transit routes through the CTR

Green text highlights new VRPs. Red text highlights removed VRPs. Black text is existing (unchanged) commonly used visual references. Orange hatching is proposed RMZ. Pink triangle is the sliver of Gatwick CTA proposed to be released to class G to 2,500ft.

9.6. The new VRPs are proposed as:

a. Godalming (specifically where the River Wey crosses the railway line)

b. Tongham (the A31 junction with the A331)

c. M3 Junction 3

d. M3 Junction 4

e. Wokingham (specifically where the two railway lines join); and

f. Fleet Pond.

9.7. The Nokia VRP would be withdrawn. The Bagshot VRP would be withdrawn from the 250K and 500K VFR charts, however it would remain as a compulsory reporting point for rotary traffic joining or leaving the London CTR via H3.

9.8. The northbound recommended transit route would be Godalming-Tongham-Farnborough Overhead-M3 J4-track north until outside the CTR (due to proximity of Blackbushe ATZ). The southbound transit route would be the reverse, again recommending aiming for the CTR boundary and the M3 J4 from due north in order to avoid Blackbushe ATZ.

9.9. The westbound recommended transit route would be Wisley disused airfield-Woking to follow the railway line-Fleet Pond-Hook, the same as today except Fleet Pond replaces the Nokia VRP due to its improved visibility from the air.

9.10. SVFR access to the CTR is possible, but to a lower capacity than that available in VFR operations. Separation requirements for SVFR versus IFR operations lead to an increased likelihood of delayed clearance or re-routing of the SVFR aircraft. We held simulations to develop this, which highlighted a particular impact when Farnborough and RAF Odiham are operating at high intensity at the same time. The regulatory requirement to ensure that SVFR does not hinder IFR operations also has an impact on the available transit capacity.

9.11. We are aware of the SERA developments, and we highlighted various impacts SERA would have on us to the CAA as part of their consultation process. The most significant one of these is a change in the ratio of transit traffic requesting SVFR, when VFR would have been acceptable prior to SERA. In light of the impacts mentioned above, the volume of transit requests expected would be less likely to be afforded un-delayed access without adjustments to the possible impact of SERA. The CAA intend to mitigate the possible impacts mentioned here by derogation of the Class D VMC from SERA to match today's permitted clear-of-cloud-in-sight-of-surface at or below 3,000ft. However, it is not certain that they will succeed.

9.12. We considered other methods of reducing transit delay. Additional controller provision (with additional RTF frequencies) would not increase capacity of the system, due to increased controller-to-controller coordination requirements, and in fact could lead to a less resilient operation. We will consider other options during and post-consultation to mitigate against potential mid-air conflict due to the accuracy of routes flown by aircraft using GPS. This may include a 'gate' concept rather than defined specific VRPs.

GA transits north of the Gatwick CTA

9.13. See discussion of RMZ and Gatwick CTA Corner in Section 5 above.

10. Blackbushe

10.1. Blackbushe requirements at the inception of the project were to be included in the process, and if CAS was available to protect their operations, they may be happy to accept.

10.2. We identified that a likely side effect of such a proposal would be a requirement to operate Blackbushe under ATC provision as opposed to the current AFISO structure. This ultimately would not be financially viable to Blackbushe.

10.3. The design proposed therefore leaves Blackbushe outside the proposed CTR. A portion of the Blackbushe ATZ lies within the proposed CTR but would be delegated to Blackbushe under a Local Flying Area agreement.

10.4. IFR traffic to/from Blackbushe would still be accommodated within the overall traffic pattern, in order to sequence it against the Farnborough IFR operation.

11. Fairoaks

11.1. The airspace proposal has been extensively discussed pre consultation with Fairoaks, in light of their close proximity to the Farnborough operation. The proposals allow continued operations as they do today, with the added flexibility of a new London CTR delegation to Farnborough, with an entry/exit lane for Fairoaks use.

11.2. This proposed lane approximately follows the roads A319 and A322 between Chobham and Bracknell. It crosses the current helicopter route H3 inside the London CTR, and can link with the existing Burnham-Ascot route. LTC have been consulted on necessary interface arrangements.

11.3. The delegated volume of the London CTR would also allow transit access for non-Fairoaks based traffic, but risk mitigation requirements against the Fairoaks operation may require transit clearances to be issued allowing for the Fairoaks traffic underneath. The best procedure would be Fairoaks traffic operating not above 1,500ft and non-Fairoaks traffic to operate at 2,000ft, all VFR. In SVFR conditions this route would not be available.

11.4. Note that this corridor is designed to facilitate ***transit across*** the CTR corner.
It is not designed to be used by those wishing to operate continuously in this location e.g. continuous orbits or multiple back and forth transits.

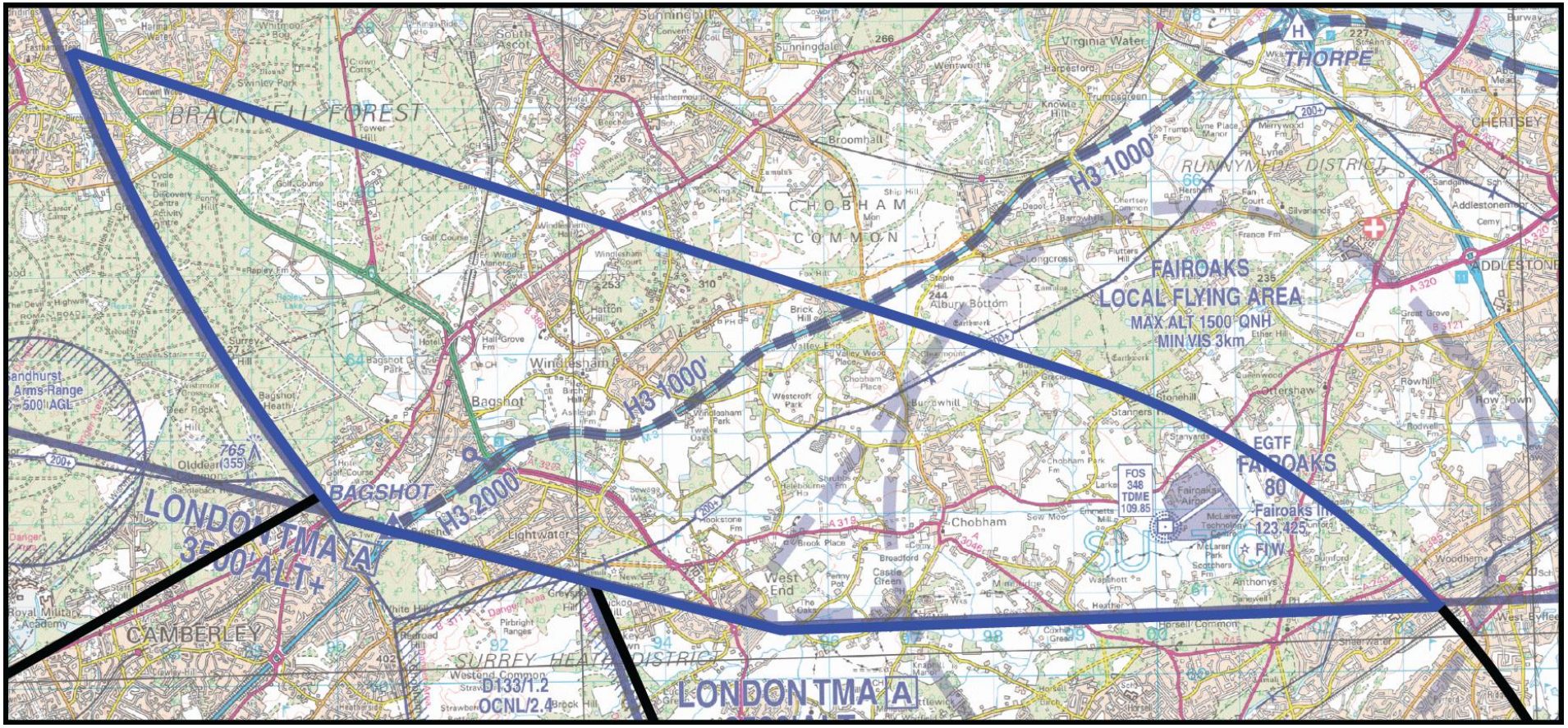


Figure E5: Portion of London CTR delegated to Farnborough to 2,000ft, primarily for Fairoaks use to/from Bracknell/Sandhurst area (VFR)

12. RAF Odiham, including 618 Volunteer Glider Squadron and Kestrel Gliding Club

RAF Odiham traffic

12.1. As part of development work in the simulator, RAF Odiham and Farnborough controllers highlighted a sub-optimal traffic interaction during certain runway configurations.

12.2. RAF Odiham permits us to propose an amendment to two of their current SID procedures to reduce the operational impact. We assessed what changes could be achieved, and have proposed the following:

a. Odiham CPT 27 IFR Departure: Minor adjustment to post-departure lateral track when establishing on the inbound radial to CPT. This results in the track being more northerly (further west than today), and removes the partial turn back towards Farnborough. These are used on average 25 times per month, weekdays only.

b. Odiham HAZEL/SAM 09 IFR Departure: Complete change from the current left turn through 270° over Odiham, to a SID that climbs straight ahead for 3.5nm before turning south towards GWC VOR, and ultimately establishes on a radial to SAM VOR. The benefit of this would be to segregate this SID from the Farnborough Runway 06 base leg, which would have more traffic on it under the design proposal, due to the constraint of airspace 'take' to allow other stakeholders continued access to their common areas of operation. These are rarely used, about twice per month on average, weekdays only.

12.3. It is not expected that this change would cause issues for the aviation community, and should move the Chinook operation on the HAZEL/SAM 09 SIDs further away from Lasham. See Figure E6 overleaf for more details.

618VGS/Kestrel

12.4. Existing operations within the RAF Odiham area, without ATC coverage, for the benefit of 618 Volunteer Gliding Squadron and Kestrel Gliding Club, are integrated with Farnborough IFR operations in a number of ways.

12.5. The proposed CAS would encompass the common areas of operation for 618VGS and Kestrel, utilising the existing and enhanced arrangements and also adding to the access for Kestrel specifically.

12.6. VFR flight would continue to be possible without significant impact when the VMC meet the SERA requirements (whether derogated or not).

12.7. Possible options to standardise shortened Runway 06 arrival procedures using RNAV technology have been considered, but significant ground infrastructure would be required, and the possibility of achieving the requirements is not clear at this stage.

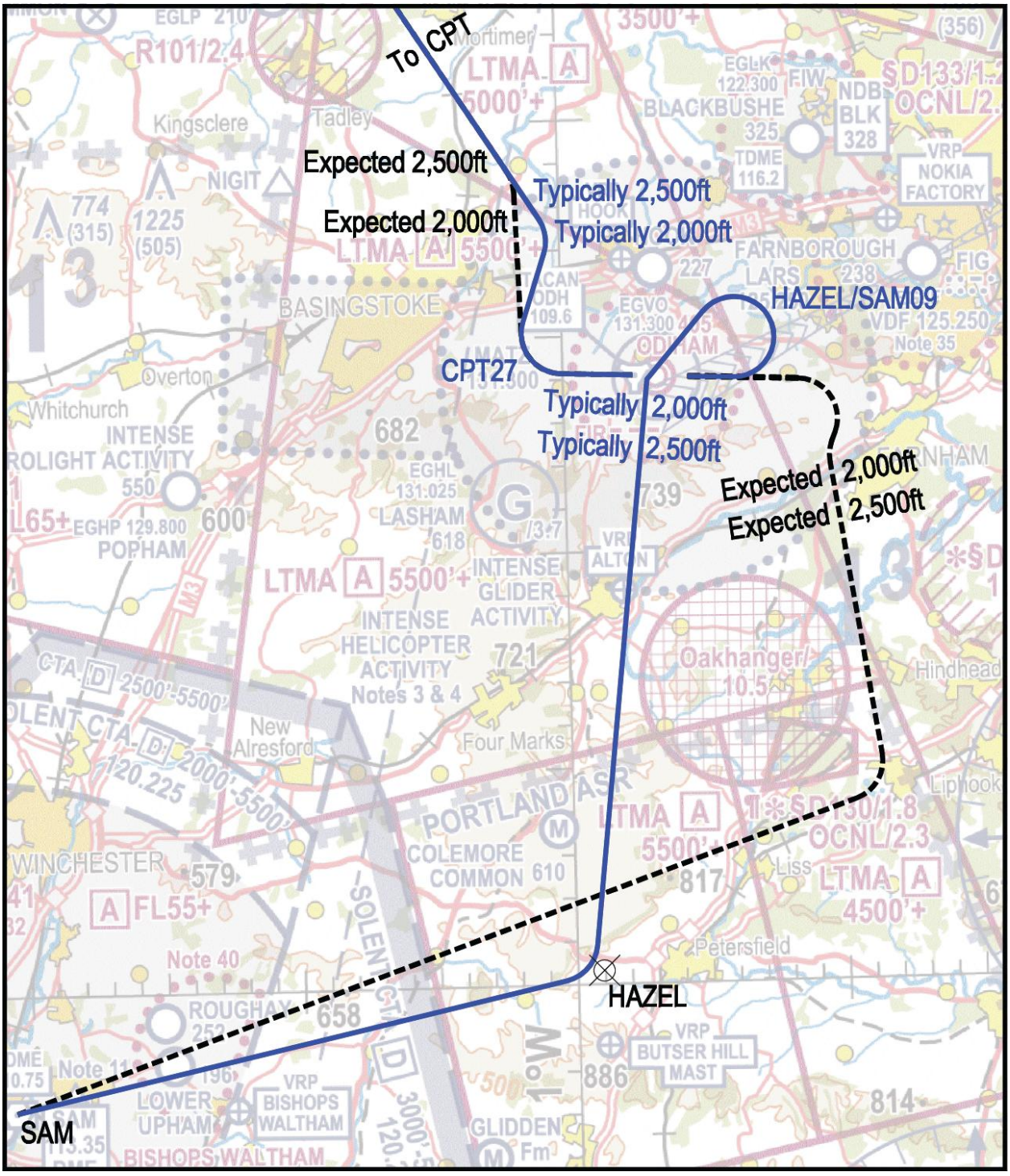


Figure E6: Current Odiham SIDs in Class G (blue), proposed (black dashed)

13. Southampton and Bournemouth Airports

13.1. NATS Solent Radar (the controlling authority for Southampton and Bournemouth traffic) has been heavily involved in the project, and Bournemouth ATC has also been engaged.

Farnborough northerly, easterly and southwesterly departures via Solent airspace

13.2. Traffic routing to/from Southampton and Bournemouth from the southeast interacts with the current and proposed traffic flows for Farnborough.

13.3. The design proposal includes increased flexibility for these aircraft, where the lateral tracks of arrivals and departures are segregated, allowing for more expeditious climb, combined with additional flexibility for arrivals. These changes occur predominantly over the sea.

13.4. A key option to reduce the size of the CAS required was achieved by routing Farnborough's northerly, easterly and southwesterly departures through existing airspace, which is currently used by Solent Radar traffic, to join airway Q41 south of PEPIS. Simulations confirm that this airspace (and Solent Radar) has the required capacity to accept this traffic.

13.5. In order to improve arrangements with LTC in the vicinity of the south coast, the main arrival path to Southampton and Bournemouth from the east would be shifted south of the coastline over the sea. This would lengthen arrival tracks with some runway configurations, but would stay the same or reduce in others. It would also significantly reduce the net population over-flown in the region.

13.6. For greater detail on the proposed arrival routes from the east to Southampton and Bournemouth, see paragraphs 4.27-4.32 on Page E16, and also see Part D of this consultation.

14. Gliders at Lasham / Lasham Aircraft Maintenance Base/ Southdown Gliders at Parham / Surrey Hills Gliders at Kenley

Gliders at Lasham

14.1. Throughout the early stages of the design phase, Lasham Gliding Society (LGS) and the British Gliding Association (BGA) were invited to offer their requirements to be included within the design concept.

14.2. In all stakeholder interactions, there is invariably a compromise that must be struck, and we have adjusted the proposed CAS in a number of ways in order to attempt to address as many of LGS and BGA requirements as possible.

14.3. Further consideration was given to possible airspace sharing arrangements that could be deployed. Certain areas of the proposed airspace are principally for operations on only one of the runways at Farnborough, and if a robust 'sharing' procedure could be developed, there is an opportunity to offer this. The operations at Lasham are essentially uncontrolled and often without RTF fitted to the gliders. This would make the switching of airspace from 'Lasham' to 'Farnborough' difficult to carry out in a manner guaranteed to reach all airborne gliders in good time. However, we seek your feedback on the airspace sharing concept.

14.4. By ensuring Lasham and its immediate area remains outside proposed CAS, and by limiting amendments to existing airspace to the north of Lasham to a small region, we have increased our aircraft's track mileage (both for departures to, and arrivals from, the north). The current practice of turning Runway 06 arrivals onto final approach from the south at a shorter than usual range from touchdown is retained, which again ensures the minimum CAS requirement in the vicinity of Lasham.

14.5. We have engaged with LGS and BGA regarding their requirements and will continue to do so during this consultation and beyond.

Lasham Aircraft Maintenance Base (Lasham ATC)

14.6. Lasham ATC operates an airliner maintenance facility at Lasham aerodrome, and has regular (but small in number) IFR traffic operations – these tend to be airliner sized.

14.7. Lasham ATC expressed a wish to have their operation contained within CAS. This requirement is at odds with the LGS requirements. The project assessed that, because current Lasham ATC operations are carried out in Class G and they are relatively infrequent, this situation could continue, enabling LGS to retain flexibility.

14.8. IFR traffic would be managed in a similar way to today, joining CAS after departure, and leaving CAS inbound. Farnborough controllers would continue to provide services to this traffic and integrate it with other activities. We will continue to engage with Lasham ATC.

South Downs Gliding Club at Parham

14.9. Parham is located under the eastern edge of the proposed CAS. They carry out operations within the lateral and vertical confines of some of the CTA areas we propose to establish.

14.10. Their requirement was to continue to allow Parham operations to route to their northwest, especially towards Lasham.

14.11. We have engaged with Parham regarding their requirement and will continue to do so during this consultation and beyond.

Surrey Hills Gliding Club at Kenley

14.12. Kenley is located near Biggin Hill Airport. They carry out operations within the lateral and vertical confines of some of the CTA areas we propose to establish.

14.13. Their requirement was to continue to allow SHGC operations to route to their west, via Guildford and Lasham.

14.14. We have engaged with SHGC regarding their requirement and will continue to do so during this consultation and beyond.

15. GA Activity over the Isle Of Wight, Solent and Selsey Areas (Class A airway bases being lowered)

15.1. LTC has requested these Class A airway bases be lowered to FL65 south of the coast and over the Isle Of Wight, in order to improve their management of arrivals to Farnborough and the Solent. This would add four more CTAs to the Worthing CTA Class A Complex. See also paragraph 5.31 on Page E23.

15.2. The majority of GA VFR activity beneath these airways already occurs below FL65. However, we are aware that some activity takes place between FL65 and FL125.

15.3. We believe that the potential capping of GA VFR activity below FL65 due to this proposal would still meet the requirements of as many users as possible most of the time. We welcome your feedback on this.

16. Effect on Heathrow and Gatwick Operations

Heathrow today and the near term

16.1. The proposed airspace design for Farnborough is situated underneath the Heathrow departure routes to the south and southwest (MID and SAM SIDs).

16.2. To provide separation of these SIDs from our proposed CAS, increasing their promulgated minimum climb gradient was required. Heathrow's departures already meet or exceed the new climb gradient, therefore there would be no change to engine settings etc – the new formal minimum gradient would simply establish a 'wedge' beneath the existing actual gradient. Two major UK airlines have been consulted and do not object to the proposed gradient changes.

16.3. There would be no change to Heathrow's SID tracks over the ground due to this change.

16.4. A portion of the London Control Zone would be delegated to Farnborough, primarily for Fairoaks and GA transit use (see Section 11).

16.5. Heathrow Airport Ltd (HAL) has agreed to the proposed changes.

Gatwick today and the near term

16.6. Currently, Gatwick's SAM and KENET SIDs theoretically end at 4,000ft. However, they always climb higher earlier.

16.7. Raising the Heathrow SID gradients allows a procedural raising of these Gatwick SIDs beneath, from terminating at 4,000ft to 5,000ft.

16.8. Gatwick's departures already meet or exceed the new climb gradient and are not held down to 4,000ft anyway, therefore there would be no change to engine settings etc – the new formal minimum gradient would simply establish a 'wedge' beneath the existing actual gradient. Two major UK airlines have been consulted and do not object to the proposed gradient changes.

16.9. There would be no change to Gatwick's SID tracks over the ground due to this change.

16.10. Gatwick Airport Ltd (GAL) has agreed to the proposed gradient change.

16.11. We are negotiating with Gatwick regarding the release of part of the CTA to Class G – see paragraphs 5.41-5.44.

Heathrow and Gatwick in the longer term

16.12. Future projects involving NATS and Heathrow Airport would lead to wider changes to SID tracks and gradients. This is a separate project which is being coordinated with our project, meaning that future Heathrow changes would not require subsequent changes to the proposal detailed here.

16.13. In October 2013, the London Airspace Consultation was launched[4], detailing proposed changes to Gatwick SIDs amongst other changes further away from Farnborough. These proposed changes (whilst still in the early design phase) are being coordinated with our project, meaning that future Gatwick changes would not require subsequent changes to the proposal detailed here.

4 That consultation closed 21st January, before this consultation launches

17. Fuel and CO_2 calculation method

17.1. See Part A Section 10 for more detailed information on fuel use and CO_2 emissions due to this proposal. This section of Part E describes what happens today, and the method we used for making the calculations leading to the results in Part A Section 10.

17.2. Today, northbound departures via CPT can route that way relatively soon after takeoff. Under the proposed SIDs in this document, Runway 06 departures to the north would have the largest increase in fuel use, followed by Runway 24 departures to the north. This is because we have designed the new departure routes to fly south and west before joining airway Q41, in order to combine a net reduction in population over-flown with the avoidance of the airspace region northwest of Lasham.

17.3. Arrivals would be less affected by track lengthening in the vicinity of the airport. Currently, if the GA and/or RAF Odiham situation permits, *and* LTC *and* our approach radar controller have been able to provide a rapid descent, about half the Runway 06 arrivals from the northwest can join left base at a relatively short final. The remaining half from CPT are either too high to make the descent, or other (GA, Odiham etc) traffic prevents the manoeuvre being planned and executed by the radar controller. These flights follow the standard longer pattern (overhead the airport/crosswind/ downwind right /right base), which would become the new standard pattern for *all* Runway 06 traffic arriving from the northwest.

17.4. The detailed calculation spreadsheets will be available to the CAA upon request as part of the ACP, once any potential changes due to this consultation have been considered and incorporated if appropriate.

17.5. The process we followed was:

a. The aircraft type mix was extracted from a typical data sample.

b. BADA dataset (v3.8) and the NATS specialist tool 'KERMIT' was used to calculate the typical fuel usage and CO_2 emissions per nm for various types or categories of aircraft at cruise levels.

c. We calculated the differences in track mileage between the current and proposed typical tracks between common points, for each runway configuration, for arrivals and for departures to/from each direction.

d. We applied these changes in route length to calculate the overall change in fuel usage per aircraft type. In changing the route length, we are effectively changing the distance flown at cruising levels.

e. We used typical annual figures to multiply up the usage per aircraft type.

f. We then applied relevant forecasts to these numbers in order to estimate traffic levels for the proposed implementation year (2015) and for 2019.

g. These steps lead to the fuel and CO_2 figures quoted in Part A Section 10.

18. Questions

18.1. In this part, there are 17 specific questions we would like you to answer (plus a general question). This part is aimed at the aviation industry, including pilots and aircraft operators who use the airspace in the Farnborough area and over the south coast near the Solent.

18.2. Each question assumes that you have read and understood the relevant sections of this document, and other relevant parts of this consultation.

18.3. To respond to this consultation please complete the online questionnaire which can be found at:

www.Consultation.TAGFarnboroughAirport.com

18.4. All the questions in the online questionnaire for Part E are given below. It is highly recommended that you prepare your answers to the questions in advance.

Question E1 – Justification for Route Establishment (see Section 2)

This question is about the *concept* of establishing formal IFR routes.
We will ask about the *specific routes* later.

Farnborough's air traffic movements are predicted to increase beyond the point where 'do nothing' remains a sustainable option.

We believe the establishment of formal IFR departure and arrival routes is the safest way to manage this increase, because it would make the flight-paths very predictable for *all* airspace users.

Do you agree with our justification that establishing formal IFR departure and arrival routes is the best way to safely manage the increase in Farnborough's traffic?

1 Strongly agree
2 Generally agree
3 No preference
4 Generally disagree
5 Strongly disagree

You are welcome to provide a statement to support your answer.

Question E2 – Justification for establishing RNAV1 SIDs (see Section 3)

This question is about the *concept* of establishing RNAV1 SIDs.
We will ask about the *specific routes* next.

The establishment of RNAV1 SIDs is the best way to manage our departures through this region, because it would make the departure routes more predictable for *all* users *and* would meet with the forthcoming FAS requirements for PBN procedures UK-wide. It would also require the least possible airspace.

SDRs, Omnis, RNAV5 SIDs and 'conventional' SIDs were discounted due to either being unsuitable for the required task, or for requiring excessive airspace 'take'.

Do you agree with our justification that establishing RNAV1 SIDs is the best way to safely manage the increase in Farnborough's traffic with the least possible change in airspace at low altitudes?

1 Strongly agree
2 Generally agree
3 No preference
4 Generally disagree
5 Strongly disagree

You are welcome to provide a statement to support your answer.

Question E3 – Balance - Proposed tracks for specific RNAV1 SIDs (see Section 3)

This question is about *balance*, regarding the *specific tracks* of the RNAV1 SIDs proposed.

Figure E1 on Page E9 shows the proposed tracks for our SIDs, including an occasional-use southbound SID if FUA is negotiated and activated.

Paragraphs 3.9-3.12 describe our priorities and the balance / compromise we strike between these priorities.

The subsequent text in Section 3 describes why each SID is proposed to follow that particular track.

Do you agree with the way we balanced noise impact, initial altitudes and avoiding GA areas for the proposed SID tracks?

1 Strongly agree
2 Generally agree
3 No preference
4 Generally disagree
5 Strongly disagree

You are welcome to provide a statement to support your answer.

Question E4 – Justification for establishing RNAV STARs (see Section 4)

This question is about the *concept* of establishing STARs.
We will ask about the *specific routes* next.

The establishment of RNAV1 and RNAV5 STARs is the best way to manage arrivals through this region, because it would make the arrival routes more predictable for *all* users *and* would meet with the forthcoming FAS requirements for PBN procedures UK-wide.

RNAV1 STARs require the least possible airspace at lower altitudes near the airport.

RNAV5 STARs require much more airspace, but they are designed to end at much higher altitudes further away from the airport(s).

We would still expect aircraft to accept radar vectors to final approach and to short-cut the STARs where appropriate (or if not suitably equipped), retaining flexibility.

Do you agree with our justification that establishing RNAV1 and RNAV5 STARs is the best way to safely manage the increase in Farnborough's traffic with the least possible change in airspace at low altitudes?

1 Strongly agree
2 Generally agree
3 No preference
4 Generally disagree
5 Strongly disagree

You are welcome to provide a statement to support your answer.

Question E5 – Balance - Proposed tracks for specific RNAV1 STARs (see Section 4)

This question is about *balance*, regarding the *specific tracks* of our arrivals.

Figure E2 on Page E13 shows the proposed tracks for our arrival routes, including RNAV1 STARs that end at low altitude near the airport, RNAV5 STARs that end at high altitude some way from the airport, and the most likely radar vectoring tracks.

Paragraphs 4.4-4.7 describe our priorities and the balance / compromise we strike between these priorities.

The subsequent text in Section 4 describes why each arrival route is proposed to follow that particular track.

Do you agree with the way we balanced noise impact, descent profiles and avoiding GA areas for the proposed arrival tracks?

1 Strongly agree
2 Generally agree
3 No preference
4 Generally disagree
5 Strongly disagree

You are welcome to provide a statement to support your answer.

Question E6 – Balance for proposed dimensions of Class D CAS at lower and intermediate altitudes (see Section 5)

This question is about *balance.* It is about proposing the fewest possible restrictions to airspace users (Class D CAS at low and intermediate altitudes, affording VFR flight with clearance, and potentially releasing a volume of Gatwick CAS to Class G), whilst remaining confident that infringement risks have been mitigated as much as possible.

Do you agree with our balance - that the Class D CAS proposed here is the minimum required, consistent with safely mitigating against infringement risks?

1 Strongly agree
2 Generally agree
3 No preference
4 Generally disagree
5 Strongly disagree

You are welcome to provide a statement to support your answer.

Question E7 – Balance for proposed dimensions of Class A CAS (airways) at higher altitudes (see Section 5)

This question is also about *balance.* It is about proposing the fewest possible restrictions to airspace users at higher altitudes whilst remaining confident that links to and from the en-route airway environment via LTC are as predictable and efficient as possible.

Do you agree with our balance - that the Class A CAS proposed here is the minimum required, consistent with efficient use and safely mitigating against infringement risks?

1 Strongly agree
2 Generally agree
3 No preference
4 Generally disagree
5 Strongly disagree

You are welcome to provide a statement to support your answer.

Question E8 – Funnelling in the vicinity of OCK (see Section 5)

This question is about *proposed mitigations* for this potential scenario.

In order to mitigate against the potential funnelling between the proposed Farnborough CTR/CTA and Gatwick CTR/CTA, we explain in Section 5 that an RMZ in the Class G volume west of OCK, combined with a potential release of a triangle of Class A to Class G at the northwestern corner of the Gatwick CTA, would provide the least restrictive solution to other airspace users *without* needing to establish additional Class D CAS.

Remember that the triangle release of Class A to Class G is *under negotiation* and may ultimately not be supported by Gatwick. The size of the triangle is the largest possible, allowing Gatwick's operation to continue unhindered.

LARS would continue to provide ATSOCAS on request, regardless of this proposal.

Which statement best describes your opinion about funnelling in this area?

Choose one option from the RMZ section below, and one option from the Triangle Release section below that.

If none apply, select 'Other' and send us your comments:

1 The RMZ would mitigate the effect of funnelling because it would create a known environment without restricting GA operations

2 The RMZ is too small to be an effective mitigation (add comments if you wish)

3 The RMZ is too wide and restrictive (add comments if you wish)

4 Funnelling in this area is unlikely even if there was no RMZ

5 Other (please add comments)

---

1 The triangle release of Class A to Class G would reduce the likelihood of funnelling because it would provide more track and altitude options without restricting GA operations

2 The triangle release of Class A to Class G is too small to be an effective mitigation (add comments if you wish)

3 Funnelling in this area is unlikely even if the triangle was not released back to Class G.

4 Other (please add comments)

You are welcome to provide a statement to support your answers.

Question E9 – Airspace Sharing – FUA – Gliders only

This question is about the *potential benefit of FUA* and comes in two parts.

Part 1 – CTAs 9 and 10 specifically

In Section 3 paragraph 3.23-3.25 and Section 5 paragraph 5.27 we described how an alternate southbound SID might be employed, temporarily ensuring that two volumes of Class D (CTAs 9 and 10) would not be used IFR by Farnborough aircraft for defined periods. This could potentially benefit organised gliding events organised by the competent organisation. The CTAs would remain available to all VFR users upon request, i.e. they would not be 'reserved' for sole use of gliders.

Note that this depends on negotiations still to be had, and must require the establishment of robust safety agreements between party organisations.

To what extent do you agree with the following statement: FUA would benefit the gliding community if CTA9 and 10 could be 'cleared' of IFR aircraft by activating a pre-arranged agreement (details to be negotiated)?

1 Strongly agree
2 Generally agree
3 No preference
4 Generally disagree
5 Strongly disagree

You are welcome to provide a statement to support your answer.

Part 2 – Other volumes of proposed CAS

Please consider the *other* volumes of CAS shown in Figure E3 (not CTA9 or CTA10).

If you believe an FUA arrangement would benefit your organisation, which of the remaining CAS volumes would be the most appropriate for us to consider?

Select as many as you wish from the list below.

CTA1	CTA2	CTA3	CTA4
CTA5	CTA6	CTA7	CTA8
CTA11	CTA12	CTA13	CTA14
	CTR2	CTR3	

You are welcome to provide a statement to support your answer.

Question E10 – VFR transit through the proposed CTR (see Section 9)

This question is about *VRPs and transit routes*. If you regularly fly VFR in this area, please use your local knowledge to consider these places and tell us how suitable you think they would be.

The railway line Woking to Hook and vice versa is an already-established existing line feature, and Wisley disused aerodrome is also an established landmark.

If these suggestions are not suitable, please suggest a local alternative.

Godalming (specifically where the River Wey crosses the railway line)

This VRP is suitable ***OR*** This VRP is unsuitable, a local alternative is (please describe)

Tongham (A31 junction with A331)

This VRP is suitable ***OR*** This VRP is unsuitable, a local alternative is (please describe)

M3 Junction 3 at Lightwater

This VRP is suitable ***OR*** This VRP is unsuitable, a local alternative is (please describe)

M3 Junction 4 at Frimley

This VRP is suitable ***OR*** This VRP is unsuitable, a local alternative is (please describe)

Wokingham (specifically where the two railway lines join)

This VRP is suitable ***OR*** This VRP is unsuitable, a local alternative is (please describe)

Fleet Pond

This VRP is suitable ***OR*** This VRP is unsuitable, a local alternative is (please describe)

You are welcome to provide a statement to support your answer.

Question E11 – For VFR pilots - regarding Class D transit in general

This question is about *how often* you, as a pilot, contact a Class D ATC unit to request VFR transit of a CTR or CTA.

Do you already use standard RT procedures to request entry to Class D CAS within the UK?

1 Very familiar with the procedure and regularly make a request
2 Familiar with the procedure and sometimes make a request
3 Somewhat familiar with the procedure but rarely make a request
4 Very rarely make a request

If you did not answer 1 or 2, what could Farnborough ATC do to *improve* that likelihood?

Which of the following would be useful to you, as a VFR pilot flying in the vicinity of Farnborough's CAS if it was implemented? Choose all that apply.

1 Presentation or roadshow by ATC staff to local flying organisations
2 Visits by local flying organisations to Farnborough control tower
3 Articles in GA magazines or newsletters
4 Other (please describe)

You are welcome to provide a statement to support your answer.

Question E12 – For VFR pilots - transit through the proposed delegated corridor of the London CTR (see Section 11 and Figure E5)

This question is about *the likely use of this transit corridor* between Fairoaks and Bracknell.

If you regularly fly VFR in the Farnborough area, please use your local knowledge to consider this bi-directional corridor, and tell us how useful you think it would be.

In SVFR conditions it would not be available for general transit – it would only be available for Fairoaks arrivals and departures.

Assuming the Farnborough CTR and CTAs are implemented as per this proposal, to what extent would you be likely to request access to this corridor?

1 Often
2 Sometimes
3 Occasionally
4 Infrequently
5 Rarely or never

You are welcome to provide a statement to support your answer.

Question E13 – For VFR pilots - the Isle of Wight, Solent and Selsey areas (see Section 15)

This question is about *the likely impact* of the proposed lowering of Class A airway bases on VFR GA in this region.

Assuming the Class A airway bases are lowered to FL65 as per this proposal, how often would your operation be impacted in this area?

1 Often
2 Sometimes
3 Occasionally
4 Infrequently
5 Rarely or never

You are welcome to provide a statement to support your answer.

Question E14 – Aircraft operators and IFR pilots using TAG Farnborough Airport

This question is about *your support* of the proposal, based on your opinion of how it would affect your IFR operation.

In particular, please consider whether this proposal would bring the stated benefits of a predictable and efficient service to your operation, and balance the scale of these benefits against the potential short-term fuel increase for certain routes.

To what extent do you support this proposal as detailed in our consultation?

1 Strongly support
2 Somewhat support
3 Neutral
4 Somewhat object
5 Strongly object

You are welcome to provide a statement to support your answer.

Question E15 – Powered GA VFR pilots – Where would you fly if CAS is implemented?

This question is about *where* you, as a powered GA pilot, would choose to fly, assuming the CAS presented here is implemented. This question comes in two parts – one about the general impact of CAS, the second specifically about transiting the vicinity of Lasham.

Tell us whether you would request a transit, or if you would fly around the new CAS (and if so, where), or whether you would choose to operate in a different place from today (where?)

We have provided a template based on the descriptions of the main blocks of CAS in Section 5 – you may use this template, or supply your own equivalent text. Structuring your response like this makes it easier for us to analyse your feedback, making it more effective on your behalf.

General impact

Regarding *this* airspace structure…

The CTR
CTA3 and the RMZ to the east of Farnborough
CTA2 and CTA4 to the west of Farnborough
CTA1 to the northwest of Farnborough
CTA5-CTA14 complex to the south of Farnborough
Airways/CTAs over the IOW/Solent/South Coast

If I was planning to fly in this vicinity, I would…

Contact LARS to request a CAS or RMZ transit
Fly beneath the CTA
Avoid this area by flying around it to the north
Avoid this area by flying around it to the south
Avoid this area by flying around it to the east
Avoid this area by flying around it to the west
Avoid this area and fly elsewhere (please briefly describe where)
Other (please describe)

You are welcome to provide a statement to support your answer.

Flights in the vicinity of Lasham

If I was flying from the south or east of Farnborough, and did not intend to transit the new CTR, I would probably fly…

New Alresford – CPT staying well west of the Lasham area

Ropley – CPT staying west of the Lasham area

Four Marks – CPT avoiding the Lasham intense glider activity circle on the VFR chart

Alton – Lasham overhead – CPT

Alton – request transit of CTA2 and transit the Odiham ATZ, remaining east of the Lasham intense glider activity circle on the VFR chart

Other route (please describe)

You are welcome to provide a statement to support your answer.

Question E16 – Use of Farnborough LARS West 125.25MHz

This question is about *your use of Farnborough LARS West.*

How do you currently use it and how would you use it if the proposal was implemented?

Which two statements best describe your current use of LARS West, and how you think you would use it if this proposal was implemented?

Choose one from each column

Today, I…	If this proposal was implemented, I...
1 Use LARS frequently	1 Would use LARS more often
2 Use LARS occasionally	2 Would use LARS about the same as today
3 Use LARS rarely/never	3 Would use LARS less often

You are welcome to provide a statement to support your answer.

Question E17 – The Overall Proposal from an aviation perspective

This question is about the *balance* of the proposal as a whole.

We know that it is impossible to satisfy the requirements of all airspace users all of the time.

We have considered the requirements of as many users as we can, and have invited comment at early design stages in order to inform the evolution of the proposal to its present state.

We have discounted many options that restrict other airspace users excessively.

We believe that this proposal provides the best balance for all airspace users in the vicinity of Farnborough.

To what extent do you agree with the following statement:

This proposal as a whole has considered the competing requirements of airspace users, and has produced a balanced design.

1 Strongly agree
2 Generally agree
3 No preference
4 Generally disagree
5 Strongly disagree

You are welcome to provide a statement to support your answer.

General Question

If there is something that you think we should know that hasn't already been covered by the questions in this document (or by other questions in other parts of this consultation), please provide a statement.

Farnborough Airport

Airspace Consultation

Part F: Appendices

Contents

Appendix A: References

This appendix lists the documents that make up the guidance framework within which airspace change sponsors have to pay regard in order to progress airspace changes. Web addresses[1] were correct at time of consultation launch.

1.1. Transport Act 2000 - Part 1 Air Traffic

www.legislation.gov.uk/ukpga/2000/38/pdfs/ukpga_20000038_en.pdf?timeline=true

1.2. The Civil Aviation Authority (Air Navigation) Directions 2001 (incorporating Variation Direction 2004)

www.caa.co.uk/docs/7/DfT%20CAA%20Directions.pdf

1.3. Department for Transport Guidance to the Civil Aviation Authority on Environmental Objectives relating to the exercise of its Air Navigation Functions (Jan 2014)

www.gov.uk/government/uploads/system/uploads/attachment_data/file/269527/air-navigation-guidance.pdf

1.4. CAP724 Airspace Charter (30 Jan 2009)

www.caa.co.uk/docs/33/CAP724.PDF

1.5. CAP725 CAA Guidance on the Application of the Airspace Change Process (30 March 2007)

www.caa.co.uk/docs/33/CAP725.PDF

1.6. Radio Mandatory Zone (RMZ) Policy Statement, CAA

www.caa.co.uk/docs/33/20130809RMZPolicyDocumentFinal.pdf

1.7. Future Airspace Strategy (FAS)

www.caa.co.uk/default.aspx?catid=2408 and www.caa.co.uk/docs/2408/FAS%20brief.pdf

1.8. Rushmoor Borough Council, airport monitoring (including reports on noise, movements and air quality)

www.rushmoor.gov.uk/article/3287/Airport-monitoring

1.9. Rushmoor Borough Council, airport planning history including reports and decisions

www.rushmoor.gov.uk/article/2564/Farnborough-Airports-planning-history

1.10. Farnborough Airport Master Plan

www.tagfarnborough.com/wp-content/uploads/2012/07/TAGFarnboroughMP.pdf

1 TAG Farnborough is not responsible for the content of websites not under our direct control.

1.11. US Army Public Health Command, Operational Noise for aircraft including CH-47 Chinook helicopters

www.energy.gov/sites/prod/files/EA-1606-DEA-AppendixC-2011_1.pdf

Appendix B: Glossary

This glossary is for terms used within the consultation, and for additional background information stakeholders may find useful.

Airports Commission	A commission set up by the Government to look into options for the development of runway infrastructure in the South East
Altitude	The distance measured in feet, above mean sea level. Due to variations in terrain, air traffic control measures altitude as above mean sea level rather than above the ground. If you are interested in the height of aircraft above a particular location to assess potential noise impact, then local elevation should be taken into account when considering aircraft heights; for example an aircraft at 6,000ft above mean sea level would be 5,500ft above ground level if the ground elevation is 500ft. All altitudes in the consultation document are defined as above mean sea level
AMSL	Above mean sea level
AONB	Area of Outstanding Natural Beauty
ATC	Air traffic control
ATC intervention	This is when ATC instruct aircraft off their planned route, for example, in order to provide a short cut, they may be instructed to fly directly to a point rather than following the path of the published route
ATS Licence	The Air Traffic Services licence to provide air traffic control services for UK 'en route' airspace issued by the Government
CAA	Civil Aviation Authority, the UK Regulator for aviation matters
Capacity	A term used to describe how many aircraft can be accommodated within an airspace area without compromising safety or generating excessive delay
CAS	See Controlled Airspace
Centreline	The nominal track for a published route (see Route)
CO_2	Carbon dioxide

Concentration	Refers to a density of aircraft flight paths over a given location; generally refers to high density where tracks are not spread out; this is the opposite of Dispersal
Consultation swathe	This is the broad area within which we will need to position a route
Continuous climb or continuous descent	A climb or descent that is constant, without periods of level flight – the latter is referred to as step climb or step descent
Controlled airspace (CAS)	Generic term for the airspace in which an air traffic control service is provided as standard; note that there are different sub classifications of airspace that define the particular air traffic services available in defined classes of controlled airspace. Abbreviated to CAS
Conventional navigation	The historic navigation standard where aircraft fly with reference to ground based navigation aids
Conventional routes	Routes defined to the conventional navigation standard
Davies Commission	See Airports Commission
Dispersal	Refers to the density of aircraft flight paths over a given location; generally refers to low density – tracks that are spread out; this is the opposite of Concentration
Easterly operation	When an runway is operating such that aircraft are taking off and landing in an easterly direction; see Runway 06 for Farnborough operations
FAS	See Future Airspace Strategy
Final approach path	The final part of a flight path that is lined up with the runway; Farnborough aircraft usually join final approach between 6nm and 10nm from the runway
Flight plan	The flight path that an aircraft has to carry fuel for, which covers the whole route, not including any changes to the flight-path made tactically by air traffic control – which may be either to shorten the flight-path when it is not busy or lengthen the flight-path when there is a queue to land
Flight-path	The track flown by aircraft when following a route, or when being directed by air traffic control (see also Vector)

ft, feet	The standard measure for vertical distances used in air traffic control
Fuel uplift	The amount of fuel that aircraft have to carry on a journey, this includes the fuel for the flight plan, contingency fuel for airborne delay and contingency for emergencies
Future Airspace Strategy	The CAA's blueprint for modernising the UK's airspace.
GA	See General Aviation
GAL	Gatwick Airport Limited
General Aviation (GA)	All civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire. Farnborough airport is predominantly used by commercial corporate jet flights. These are not considered general aviation flights in this consultation. The most common type of GA activity is recreational flying by private light aircraft and gliders, but it can range from paragliders and parachutists to microlights and private corporate jet flights.
Holds/Holding Stacks	An airspace structure where aircraft circle above one another at 1,000ft intervals when queuing to land. At Farnborough these are only used for contingency circumstances
Intermediate airspace	Airspace with routes at altitudes between 4,000ft and 7,000ft Airports and the national 'en route' ATC agency both have requirements to use this airspace.
LAMP	London Airspace Management Programme
Low altitude airspace	Airspace in the vicinity of the airport containing arrival and departure routes below 4,000ft. Airports have the primary accountability for this airspace, as its design and operation is largely dictated by local noise requirements, airport capacity and efficiency
MOD	Ministry of Defence
NATS	The UK's licenced air traffic service provider for the en route airspace that connects our airports with each other, and with the airspace of neighbouring states
Nautical Mile	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 statute mile.

Network airspace	En route airspace above 7,000ft in which NATS has accountability for safe and efficient air traffic services for aircraft travelling between the UK airports and the airspace of neighbouring states
nm	See Nautical Mile
OCAS	Outside Controlled Airspace (see Uncontrolled Airspace).
p/a	Per annum (per year)
PBN	See Performance Based Navigation
Performance Based Navigation (PBN)	Referred to as PBN; a generic term for modern standards for aircraft navigation capabilities (as opposed to 'conventional' navigation standards).
Radar, radar blip, radar target, radar return	Generic terms covering how ATC 'sees' the air traffic in the vicinity. One type of radar (Primary) sends out radio pulses that are reflected back to the receiver (the 'return'), defining the target's position accurately and displaying a marker on the controller's screen ('blip' or 'target'). The other type (Secondary, often attached to the Primary and rotating at the same speed) sends out a request for information and receives coded numbers by return (see Transponder). These numbers are decoded and displayed on top of the Primary return, showing an accurate target with callsign identity and altitude. Many airports (such as Farnborough) have their own radars, and also receive feeds from other local radars in order to reduce the impact of any one failure.
Radio Mandatory Zone (RMZ)	A region where all airspace users are required to communicate with ATC even if outside CAS, maintaining their operational freedom. This is an airspace structure that is being considered as one element of this proposal.
RNAV	Short for aRea NAVigation. This is a generic term for a particular specification of Performance Based Navigation
RNAV1	See RNAV. The suffix '1' denotes a requirement that aircraft can navigate to with 1nm of the centreline of the route 95% or more of the time

RNAV1 Transition	The part of an arrival route, defined to the RNAV1 standard, between the last part of the hold and the final approach path to the runway
RNP1	Required Navigation Performance 1. An advanced navigation specification under the PBN umbrella. The suffix '1' denotes a requirement that aircraft can navigate to with 1nm of the centreline 95% or more of the time, with additional self-monitoring criteria
Route	Published routes that aircraft plan to follow. These have a nominal centreline that give an indication of where aircraft on the route would be expected to fly; however, aircraft will fly routes and route segments with varying degrees of accuracy based on a range of operational factors such as the weather, ATC intervention, and technical factors such as the PBN specification
Route system or route structure	The network of routes linking airports to one another and to the airspace of neighbouring states.
Runway 06 (Farnborough)	The name given to the runway at Farnborough when operating in an 'easterly' direction (i.e. taking off and landing on the easterly heading of 060º)
Runway 24 (Farnborough)	The name given to the runway at Farnborough when operating in a 'westerly' direction (i.e. taking off and landing on the westerly heading of 240º)
Separation	Aircraft under Air Traffic Control are kept apart by standard separation distances, as agreed by international safety standards. Participating aircraft are kept apart by at least 3nm lateral separation or 1,000ft vertical separation. These distances are different in certain airspace environments, however the ones stated here are used at Farnborough.
Sequence	The order of arrivals in a queue of airborne aircraft waiting to land
SID	See Standard Instrument Departure
Simulation modelling	Computer based analysis where the air traffic is 'flown' through a virtual airspace system; used to assess the effects of changing airspace and routes on the efficiency of air traffic flows

Standard Arrival Route	The published routes for arriving traffic. In today's system these bring aircraft from the route network to the holds (some distance from the airport), from where they follow ATC instructions (see Vector) rather than a published route. Under PBN the published arrival route would go most of the way to the runway, reducing controller workload.
Standard Instrument Departure	Usually abbreviated to SID; this is a route for departures to follow straight after take-off
STAR	See Standard Arrival Route
Statute mile	A standard mile as used in normal day to day situations (e.g. road signs) but not for air traffic where nautical miles are used
Stepped climb	A climb that is interrupted by periods of level flight required to keep the aircraft separated from another route in the airspace above
Stepped descent	A descent that is interrupted by periods of level flight required to keep the aircraft separated from another route in the airspace below
Systemisation	The process of reducing the need for human intervention in the air traffic control system, primarily by utilising improved navigation capabilities to develop a network of routes that are safely separated from one another so that aircraft are guaranteed to be kept apart without the need for air traffic control to intervene so often
Tactical methods	Air traffic control methods that involve controllers directing aircraft for specific reasons at that particular moment (see Vector)
Terminal airspace	An aviation term to describe a designated area of controlled airspace surrounding a major airport or cluster of airports where there is a high volume of traffic; a large part of the airspace above London and the South East is defined as terminal airspace (or Terminal Manoeuvring Area – TMA). This is the airspace that contains all the arrival and departure routes for Heathrow, Gatwick, Stansted, Luton and London City from around 2,000ft-3,000ft up to approximately 20,000ft. Farnborough is below the London TMA.
Tonne, t	Metric Tonne (1,000kg)

Transponder	An electronic device on board aircraft which sends out coded information which is picked up by radar and other systems. Most importantly the aircraft altitude, and identity code, by which the aircraft can be identified on the radar screen.
Transponder Mandatory Zone (TMZ)	A region where all airspace users are required to use a functioning transponder even if outside CAS, maintaining their operational freedom. This is an airspace structure that has currently been discounted from this proposal.
Uncontrolled Airspace	Generic term for the airspace in which no air traffic control service is provided as standard. The airspace surrounding Farnborough airport is currently uncontrolled airspace. Any aircraft can fly in this airspace without having to contact Farnborough ATC. This means that Farnborough ATC do not have control over all aircraft in the airspace, and do not have information on many of the aircraft that may be present in the airspace. Aircraft that are not participating in ATC services are referred to as 'unknown traffic'.
Unknown traffic	Aircraft not participating in ATC services. They may show on radar with altitude information (if they are operating with a Transponder) or in the worst case they will only show as a blip on the radar screen (a radar primary return) with no other information. If ATC sees a primary return on radar, they have to assume that it could be at the same altitude as any flight they are controlling, and hence the flight has to be tactically vectored to safely avoid it.
Vector, Vectoring, Vectored	An air traffic control method that involves directing aircraft off the established route structure or off their own navigation – ATC instruct the pilot to fly on a compass heading and at a specific altitude. In a busy tactical environment, these can change quickly. This is done for safety and for efficiency.
Westerly operation	When a runway is operating such that aircraft are taking off and landing in a westerly direction; e.g. when Runway 24 is in use at Farnborough, the airport is said to be on westerly operations.

Appendix C: Stakeholder List

This appendix lists the stakeholders who have been identified for inclusion in the initial distribution of consultation material.

Whilst we have tried to predict all relevant stakeholders, it is impossible to identify everyone who may have an interest.

Anyone who considers themselves a stakeholder may respond to this consultation.

Parliamentary Constituencies

Aldershot

Arundel and South Downs

Basingstoke

Bognor Regis and Littlehampton

Bournemouth East

Bournemouth West

Bracknell

Brighton, Kemptown

Brighton, Pavilion

Chichester

Christchurch

Dorset County

East Hampshire

East Worthing and Shoreham

Eastleigh

Esher and Walton

Fareham

Gosport

Guildford

Hampshire County

Havant

Horsham

Hove

Isle of Wight

Meon Valley

Mid Dorset and North Poole

Mole Valley

New Forest East

Parliamentary Constituencies (continued)

New Forest West

Newbury

North Dorset

North East Hampshire

North West Hampshire

Poole

Portsmouth North

Portsmouth South

Reading West

Romsey and Southampton North

Runnymede and Weybridge

South Dorset

South West Surrey

Southampton, Itchen

Southampton, Test

Surrey County

Surrey Heath

West Sussex County

Winchester

Windsor

Woking

Wokingham

Worthing West

County Councils

Dorset

Hampshire

County Councils (continued)

Surrey

West Sussex

Borough Councils & Unitary Authorities

Adur

Arun

Basingstoke and Deane

Bournemouth

Bracknell Forest

Chichester

City of Brighton and Hove

City of Portsmouth

City of Southampton

East Dorset

East Hampshire

Eastleigh

Elmbridge

Fareham

Gosport

Guildford

Hart

Havant

Horsham

Isle of Wight

Mid Sussex

Mole Valley

New Forest

Borough Councils & Unitary Authorities (continued)

Poole

Reading

Runnymede

Rushmoor

Surrey Heath

Test Valley

Waverley

West Berkshire

Winchester

Windsor and Maidenhead

Woking

Wokingham

Worthing

National Air Traffic Management Advisory Committee (NATMAC)

Aircraft Owners and Pilots Association (AOPA)

Aviation Environment Federation

BAE Systems

British Air Transport Association (BATA)

British Airline Pilots' Association (BALPA)

British Airways

British Balloon & Airship Club (BBAC)

British Business & General Aviation Association (BBGA)

British Gliding Association (BGA)

British Hang Gliding & Paragliding Association (BHPA)

NATMAC (continued)

British Helicopter Association (BHA)

British Microlight Aircraft Association (BMAA)

British Model Flying Association (BMFA)

British Parachute Association (BPA)

European UAV Systems Centre Ltd

General Aviation Safety Council (GASCo)

Guild of Air Pilots & Air Navigators (GAPAN)

Guild of Air Traffic Control Officers (GATCO)

Helicopter Club of Great Britain (HCGB)

Light Aircraft Association (LAA)

National Air Traffic Services (NATS)

PPL/IR Europe

Aviation Stakeholders

51 North

Acropolis Aviation

Adventure Balloons

Air Ambulance (Hants & IOW)

Air Ambulance (Surrey)

Air Engiadina

ASP

Avijet

BAE Corporate Travel

BAE Systems Marine

Blackbushe Airport

Blink

Aviation Stakeholders (continued)

BMI Regional

Bookajet

Bournemouth Flying Club

Bournemouth International Airport

Brimpton Airfield

British School of Ballooning

Cessna

Corporate Jet Management

Denham Airfield

Direct Aviation

Dubai Air Wing

Dunsfold Aerodrome

Eastern Airways

Easyjet

Econet Wireless

Embraer

Euro Flight Services

European Skytime

Excellence Aviation

Execujet UK

Executive Jet Charter

Fairoaks Airport

Farnborough Aero Club

Farnborough Airport Consultative Committee

Farnborough International Ltd

Flybe

Gamma Aviation

Aviation Stakeholders (continued)

Gatwick Airport

Gexair

Global Jet

Goodwood Airport

Grantex

Greyscape

GX Holdings

Harrods Aviation

Head Start Aviation

Heathrow Airport

Heathrow Weekend Freight

Homestead Farm

International Air Transport Association (IATA)

International Jet Club

J&P

Jet Aviation

Lasham ATC

Lasham Gliding Club

LEA

Liberty Global

LOWA

Manhattan

Microlight Sport Aviation Ltd

Ministry of Defence (MoD)

Mike Smith Enterprises

Netjets TA

Oxford Air Training (CAE)

Aviation Stakeholders (continued)

Popham Airfield

Premiair Aviation

Qatar Amiri Flight

RAF Odiham

Reach4thesky

Royal Aero Club

Satcom Direct

Scotland Farm

Solent School of Flying/ Bournemouth Helicopters

Southampton Airport

TAK Aviation

TGC Aviation

Thames Valley Hang Gliding & Paragliding Club

Thunder Air

Titan Airways

Tongham Airfield

Triar

Unmanned Aerial Vehicle Systems Association (UAVSA)

Virgin Balloon

Vistajet

White Waltham Airfield

Wycombe Air Park (Booker Airfield)

ZC Aviation

Local Stakeholders, Local and National Environmental Groups

Campaign to Protect Rural England

Chichester Harbour AONB

Colemore Common

Cranborne Chase and West Wiltshire Downs AONB

Dorset AONB

English Heritage

Environment Agency

Frimley Park Hospital

Isle Of Wight AONB

National Trust

Natural England

New Forest National Park

South Downs National Park

Surrey Hills AONB

Twesledown Racecourse

Valentine Farm

This page is intentionally blank