



FUTURE AIRSPACE STRATEGY REPORT

AIRSPACE SHARING AROUND FARNBOROUGH AIRPORT

FINAL

20160513-FASVIG-Farnborough Airspace Report

John Brady and Tim Hardy, FASVIG Joint Chairs

13 May 2016

Contents

- 1 Executive Summary
- 2 Introduction
- 3 Aim
- 4 ACP Objectives
- 5 Airspace User Operation Requirements for Airspace
- 6 Analysis
- 7 Recommendations
- 8 Summary

Appendix A : Examples Of Modern ATM Techniques Relevant To Farnborough Airspace

Appendix B : Schedule of Annual Movements at Farnborough Airport

Appendix C : Discussion on the outcome of the Airport Commission work on runway capacity in the South East of England.

Appendix D : Stakeholder comments made to initial circulation of the draft report

Appendix E : FASVIG responses to Stakeholder comments.

1. Executive Summary

- 1.1 The Future Airspace Strategy has at its heart the principle that airspace has the capacity to meet reasonable demand, balancing the needs of all users and mitigates the impact of aviation on the environment.
- 1.2 FASVIG is the Future Airspace Strategy VFR Implementation Group that works to ensure that airspace is available for VFR users through three core areas of activity namely Modernising Airspace Structures, Access to Airspace and VFR Efficiency Enablers. These core areas are all pertinent to the Farnborough Airspace Change Proposal.
- 1.3 The CAA agreed that FASVIG is well placed to review Farnborough's Airspace Change Proposal to identify what mitigations were available to balance the needs of VFR airspace users particularly the gliding community, whilst reaching a suitable compromise for the operation of Farnborough Airport.
- 1.4 FASVIG sought to identify the underlying rationale and impact of the proposed airspace on the various groups of VFR users through meetings, interview and correspondence.
- 1.5 FASVIG considered that the impact on powered aircraft would be manageable but that on gliding would be significant and whilst airspace sharing in parts of the proposed CTR could be effective, the CTAs remain a challenge.
- 1.6 The review shows that, whilst the Secretary of State has approved a rise in permitted movements to 50,000 per annum, the growth at Farnborough since has been modest and well below forecast.
- 1.7 The review has also highlighted the intention to exclude 'extraneous aircraft' from proposed controlled airspace by TAG Farnborough as stated in their appeal for a rise in permitted movements to 50,000.
- 1.8 The current airspace design relies upon acquisition of discreet blocks for the sole use of Farnborough traffic rather than using more innovative air traffic coordination tools now available, mitigating the need for new controlled airspace.
- 1.9 FASVIG have found that the process of consultation used has not engaged GA users and therefore does not address their specific needs.
- 1.10 FASVIG believe however that much could be done to lessen the impact of Farnborough's air traffic and conclude that a suitably amended design could form the basis of an agreement between all parties.
- 1.11 FASVIG has made recommendations for the lead stakeholders to consider and take action on before a revised ACP could be successful.

2. Introduction

2.1 On 22 October 2015 FASVIG offered to the CEO CAA that it could review the impact of the proposed Farnborough airspace on VFR users against the principles of the FAS and offer a view on where balance could be better achieved. The CAA accepted that offer and invited FASVIG to engage with the parties during the period when the airspace change process was paused.

2.2 The principle issues that FASVIG sought to understand were the impact of the proposed controlled airspace on powered aircraft, on gliders operating from Lasham aerodrome and gliders operating from Parham airfield to determine if further mitigation was practicable. It focussed on the FAS vision to establish *"safe, efficient airspace, that has the capacity to meet reasonable demand, balances the needs of all users and mitigates the impact of aviation on the environment"*

2.3 The TAG proposals seek to provide safety and security for their operations which, even if the permitted movement limit was reached would benefit only c 32k passengers compared to many more GA movements

2.4 FASVIG directors held meetings and discussions with TAG Farnborough, The Lasham Gliding Society and the Southdown Gliding Club and sought information from other organisations with an interest in the airspace, including MOD and RAF Odiham.

2.5 We found that TAG Farnborough had made substantial efforts to redesign the proposed airspace to accommodate other airspace users but there were still conflicts. FASVIG decided that having collected sufficient information it would draft a paper which it would circulate to the main interested parties for comment before submitting it as a final report to the CAA.

3. Aim

The aim of this paper is to assess the impact of the proposed controlled airspace on VFR operations and to determine how that impact might be further mitigated in order to seek a way forward for TAG Farnborough and their local airspace users through an appropriately amended design compromise.

4. ACP Objectives

TAG Farnborough seeks to *"enhance the overall efficiency of airspace management for Farnborough, and to achieve connectivity to the wider air route network"* to benefit as many users and residents as practicable and to benefit the wider air route network by reducing delays and giving more predictability¹.

¹ Farnborough ACP A para 1.7b

5. Airspace User Operation Requirements for Airspace

5.1.1 TAG Farnborough explained that their Board had set a requirement that all aircraft using Farnborough were to remain within CAS throughout arrival and departure. They were therefore unable to consider any non-CAS options although the local airspace situation was known when the operator bought the airfield and there would have been no guarantees that the CAA would have approved any subsequent ACP.

5.1.2 Powered aircraft operators sought access through the proposed airspace areas without increase in risk or undue delay

5.1.3 The Lasham Gliding Society expected to be able to operate largely as today with sufficient useable lateral and vertical airspace for training, local soaring and cross country soaring opportunities including competitions. They sought to maintain the operational effectiveness of Lasham Airfield as a major gliding centre and business.

5.1.4 The Southdown Gliding Club had a specific requirement that gliders on cross country tasks should have sufficient lateral and vertical airspace to be able to return to Parham Airfield from the north-west in the presence of a sea breeze front. They also had a requirement for sufficient vertical airspace for local training and qualification. Without these they believed their gliding operation would become severely constrained, limiting opportunity for future development generally and training the next generation of pilots in particular.

5.2 Powered Aircraft Operations

5.2.1 There was widespread concern amongst VFR operators and organisations that a Farnborough CTR would be less accessible than the equivalent airspace today and powered aircraft would tend to reroute to the west where they would interact with other transit aircraft and the intense gliding traffic near Lasham, increasing the risk of collision and infringement markedly. TAG Farnborough and NATS have simulated VFR access to the proposed CTR in conditions of busy IFR traffic (50,000 movements per year) and concluded that they can handle 20 VFR crossing aircraft per hour with minor delay to some 5%. They explained that they would provide more than one frequency and utilise simple procedures based on VRP to VRP routing. We have not audited the simulation but accepted TAG's statement that their delivery to that capacity would be open to scrutiny in practice.

5.2.2 FASVIG noted that to implement this there needed to be widespread change in attitude and practice amongst VFR pilots about utilising CAS crossing services and particularly the communications aspects. With a VFR traffic rate of 20 per hour ATC would have only 3 minutes per aircraft to provide clearances and instruction during a transit so concise, efficient communications would be critical to success. We referred to the recent CAA sponsored workshop on access to Class D CAS which considered changes to UK procedures and to reduce the RTF challenge. We saw a need for RTF policy changes as well as an effective training, advertising and monitoring campaign, coordinated across the sector. It could be a candidate for the FAS Facilitation Fund. Such changes and campaign

would be essential to maintain airspace safety following the establishment of CAS at Farnborough and would need to be in place before any airspace change. We considered that to make any new controlled airspace efficient, Farnborough Radar would need to be Mode 'S' compliant and process VFR flight plans filed automatically from flight planning devices.

With those prerequisites we considered that the needs of powered aircraft could be met.

5.2.3 However, we noted that in TAG Farnborough's appeal to the Secretary of State for an increase in permitted movements it committed to introducing controlled airspace with the benefit of excluding extraneous aircraft. This commitment to government appears to contradict its present position and presupposes that a sponsor can restrict controlled airspace to its own traffic. Further details are provided later in the analysis in Section 6.5.2.

5.3 Gliding Airspace Requirements Generally

5.3.1 FASVIG sought to understand the nature of the operational requirement for airspace for gliding in this area. Height is the energy store for gliders and we looked at the situations of local soaring including ab-initio and early solo training and cross-country soaring:

Much training and early solo gliding is carried out in gliders with a glide angle of 1:25 or more practically 1:20 and this activity is usually expected to remain within gliding range of the airfield and to be back in the circuit area by 1000ft aal. Range is therefore limited by any height limit imposed by CAS at 300ft per nm above 1000ft aal at the launch site.

Prior to setting off on cross-country flights gliders need to gain sufficient height locally to reach the next area of lift. The soaring band is normally from about 2000ft aal to the base of any overlying CAS. Returning gliders need to be able to achieve sufficient height for a final glide with a glide angle varying by type and conditions from 1:25 to about 1:60.

5.3.2 Energy for gliding is not uniform nor wholly predictable and varies with meteorology, geology, terrain and surface and also varies with time of day and season. As a result, gliding needs the option to utilise different areas depending on conditions and constraining operations laterally will reduce operational opportunity. The nature of the operation is quite different from powered flying in that gliders cannot usually hold and cannot necessarily follow an imposed track so the impact of vertical and lateral limits is significant.

5.3.3 Gliders from both Lasham and Parham use the South Downs and access the South of England through the London/Farnborough to Southampton/Boscombe Down gap so the route between the two airfields is an important national route asset. During summer any sea breeze front can move inland from the South coast and commonly settles along a line through Haselmere. There is no useful thermal lift south of this front and that dominates operational routing and height required to complete a task or return to base.

We applied these considerations to Lasham and Southdown gliding.

5.4 Lasham Gliding

5.4.1 The Lasham Gliding Society needs airspace for both the local flying and cross country scenarios but the proposal would limit its airspace laterally and vertically.

5.4.2 With an elevation of 618ft its local flying and training area would be limited to 2nm to the East by CTA 3 because with a base of 2000ft alt (1382ft aal) aircraft below it would be outside gliding range. Similarly, the airspace below CTA 6 to the South-East would also be outside gliding range when below its base of 2500ft alt (1882ft aal). Thus the lateral boundaries of these CTAs exclude most gliders at all altitudes.

5.4.3 Whilst the area to the North-West of Lasham would be unchanged, ceilings to the North would be lowered by 500ft and to the South lowered by between 1000ft and 3000ft. Cross country routing is already limited by existing CAS and the proposal would reduce the lateral space available.

5.4.4 The potential height gain using thermals to fly further away from the airfield is a useful measure of the value of the site so we considered the impact on selected CTA. The height Δ from 2000ft aal (2618 amsl) to the base of CAS today and post-ACP is depicted in Figure 1 together with an assessment of the percentage loss of soaring potential.

CTA	Old CAS Base amsl	Old Available Soaring Band	New CAS Base amsl	New Available Soaring Band	Loss Height Range		Area nm ² approx	Soaring Detriment (%)
2	5500	2880	1500	0	4000	13	12	100
3	5500	2880	2000	0	3500	12	8	100
4	3500	880	2500	0	1000	3	52	100
5	4500	1880	2500	0	2000	6	6	100
6	5500	2880	2500	0	3000	10	16	100
7	4500	1880	3500	882	1000	3	3	53
8	5500	2880	4500	1880	1000	3	140	35
9	5000	2380	4500	1880	500	2	14	21
	Total						251	

Figure 1 – Assessment of Loss of Soaring Opportunity

We concluded that even though TAG Farnborough had changed the airspace design to better accommodate gliding, the loss of local flying and soaring opportunity for Lasham remained significant and FASVIG needed to consider what other options might be available to redress this.

5.6.2 The proposed CTA structure would establish an additional layer of Class D and some Class A airspace below the London TMA. We considered that the additional traffic could largely be contained within the existing TMA but because it is a significant and wider FAS issue we discuss it separately in Paragraph 6.3.2

5.6.3 TAG Farnborough proposed that they would provide glider access to Class D CTAs on request by RT subject to traffic but they would be unable to clear gliders to within 500ft of the upper level where it coincided with overlaying Class A airspace unless they were transponder equipped. This restriction was said to result from a CAA policy*. Whilst that proposal is helpfully meant, in practice altitude and routing restrictions to avoid Farnborough traffic are likely to make it of limited use. Where even modest numbers of gliders follow a task or line of energy, clearance management is likely to be challenging.

(*The CAA have now clarified that this is not the case)

5.6.4 Class E airspace might meet the CAS requirement and provide soaring freedom for VFR although gliders without a clearance would be limited to 1000ft below cloud when above 3000ft amsl. Moreover, the 500ft below Class A airspace policy would be unhelpful if it were applied in that case. Nonetheless Class E would provide less restrictions for gliders whilst satisfying the TAG Farnborough requirement for CAS.

5.6.5 Surveillance Mandatory Zones in place of CTAs would satisfy most gliding requirements but would not meet the TAG Farnborough requirement for CAS although it should satisfy the core requirement for airspace management. We noted that Farnborough radar was said to be able to display glider tracks even without electronic conspicuity but FASVIG is of the view that the modern ADS-B based conspicuity technology now emerging should be adopted for airspace challenges such as this. There would be glider equipment and pilot licensing costs but we believe that would be acceptable and some cost sharing might be possible.

5.7 Parham Gliding

The Southdown Gliding Club is based at Parham Airfield close to the South Downs

5.7.1 Local Training Area

The very small CTA-9 that overlays Parham overhead would be lowered from 5000ft to 4500ft reducing soaring opportunities on some conditions but it is not critical to the overall operation. The TAG Farnborough proposal to provide access on RT request may be useful here but would be negated by the CAA policy noted in paragraph 5.6.3

5.7.2 Parham Soaring Area

Southdown gliders operate along the South Downs and through the gap towards Lasham, limited by the existing CAS. A principle concern relates to gliders returning from the North-West when the sea breeze front has moved inland, commonly laying East-West in the vicinity of Haselmere. There is no lift

available south of that front so aircraft must have sufficient height north of it to reach Parham. The present base of CAS is just sufficient to achieve that and although the proposed airspace has been revised to take account of this, aircraft would have to route further West which increases track distance demanding greater height which would not be available. The Bases of CTAs-4,-5,-7 and -8 all reduce the height available to return to Parham in the same way that they limit Lasham soaring. Moreover, the available route is narrowed by the proposal reducing soaring options and increasing risk. This has the potential to isolate Southdown gliders from the rest of UK airspace in some circumstances.

Similar considerations on alternatives to Class D apply here as they do for Lasham but in the case of Parham they are very specific because of the sea breeze front.

5.8 Impact Assessment

5.8.1 In our concluding assessment of the impact of new controlled airspace, we have tabulated in colour code the scale of that impact on the various classes of airspace users that currently operate in the subject areas. This assessment forms the basis of our suggested means of mitigation in the Analysis and Recommendations sections.

Proposed Airspace	Height		LTMA Base	Power	Lasham	Southdown
	SFC	3500				
CTR-1	SFC	3500	3500			
CTR-2	SFC	2500	2500			
CTA-1	2000	2500	2500			
CTA-2	1500	5500	5500			
CTA-3	2000	5500	5500			
CTA-4	2500	3500	3500			
CTA-5	2500	4500	4500			
CTA-6	2500	3500	3500			
CTA-7	3500	4500	4500			
CTA-8	4500	5500	5500			
CTA-9	4500	5000	5000			
CTA-10	4500	FL65	4500			
CTA-11	5500	FL65	5500			

Key

	No restriction to current operations*
	Some restrictions – need for upgrade**
	Major restrictions / infringements
	Severe impact – operationally critical
	Of no specific interest

- assumes pilot currency with zone transit, radio and transponder code
- **carriage of radio equipment

Figure 2 – Impact Analysis for Newly Proposed Controlled Airspace

6.0 Analysis

6.1 FASVIG considered the need for CAS as proposed by TAG Farnborough, how the management of air traffic could best deal with the airport's anticipated growth in the future and what would be required to enable its impact on VFR operations to be mitigated in the event that new controlled airspace remains the only option.

6.2 Farnborough Airport Movements

6.2.1 Farnborough Airports' aircraft movements for 2015 reached approximately 26,259, some 275 more than 2014 or under 1% growth. This level of movement has been more or less static over the previous eight years, indeed the 2015 total was less than the 2007 total by 250. It was readily accepted during the liaison meetings with TAG Farnborough representatives that although planning approval existed for 50,000 movements per year by 2019 that current growth rates meant that the limit would not be reached for many years. Even to reach its previous planning limit of 28,000 movements would take over 6 years at present growth rates. This also assumes that no market shocks nor major developments would take place in the meantime, indeed although the total movements fell after the 2008 economic crisis by 2500 movements in 2009, the numbers picked up for 2010 to 25,000 and have remained around that figure ever since. Even during the Olympic year of 2012, the movement rate remained static at a time when demand for access to London might have been anticipated to rise sharply. It is appreciated however that the Business Aviation sector generally was severely impacted by the events of 2008 and will take a long time to recover. Future airspace planning must take account of this, not just at Farnborough but across the whole of S.E. England. More detailed movement information has been included in Appendix B.

6.2.3 Given the approval by the Secretary of State to increase Farnborough's permitted movements in 2011 it is difficult to see some five years later, with a presumed growth to 47,000 movements per annum but an actual of just over half of that figure, what the basis for delegating new controlled airspace to Farnborough actually is in the short to medium term.

6.2.4 In addition, Business aviation across the South East may well be changed by the final outcome of the Airports Commission work to be announced in summer 2016. Further discussion is included in Appendix C.

6.3 Airspace Design

6.3.1 In examining the design for the proposed Farnborough airspace, it is apparent that no benefit has been derived from improving the level of coordination of air traffic as a way of mitigating the need for new controlled airspace. Rather the old fashioned air traffic management principles have been adopted in the way that has been done for decades. Indeed, the design takes no lead from the Future Airspace Strategy deployment programme, negating the benefits that lie at the heart of modernizing airspace structures and the processes used to operate them.

6.3.2 For example, although at the TMA level, the same ANSP operates Heathrow, Gatwick and Farnborough, departing air traffic continues to be uncoordinated between the airports until much further en route when the streams of traffic are merged by area control at Swanwick. It is disappointing that when new ATM practices² are not only available but also funded by the European Commission that expansion of new controlled airspace is seen as the first option rather than a matter of last resort. It is quite possible that the evolution and separation of ATC tower services from the regulated en route environment has led to such an approach to airspace design with the consequence that the founding principle of the Future Airspace Strategy, that of balancing the needs of all airspace users is failing. Commercial Air Traffic now appears to be consuming more controlled airspace than needed for FAS to succeed and modernisation of ATM lacks the investment and drive from industry required.

6.4 Interaction with Departures from Heathrow, Gatwick and the LTMA

6.4.1 FASVIG understand that the initial airspace design for TAG Farnborough operations proposed to use the lower level of the existing LTMA with Gatwick and Heathrow procedures raised by 1000ft to accommodate. However, we were told that although the airspace to enable these changes was available, both airports declined to change their procedures.

6.4.2 It appears that although the FAS proposes that modernised airspace will allow aircraft to climb higher and more quickly, this is not being implemented. We note from a brief at FASIIG 21 that the introduction of RNAV SIDs has resulted in an 85% reduction in controller intervention but that aircraft are climbing more slowly. This suggests that aircraft are now following climb constraints rather than being given early climb clearance and this, of itself, may trigger a need to raise the published profiles which would realise the benefits of FAS and clear the way to integrate Farnborough traffic within the existing controlled airspace.

6.4.3 Meanwhile the presence of such traffic has been reflected in the overall design for Farnborough's proposed controlled airspace in that departures and arrivals are given their own discreet airspace in which to operate, separate to that delegated to Heathrow and Gatwick, with all of the separation criteria required of independent ATSUs by the regulator. This approach to airspace design means that inevitably, bases of controlled airspace become lower, squeezing out VFR operations and in the particular case of Farnborough, the gliding community that has had established operations in the vicinity of the airport over many decades. In addition, lowering the base of airspace in this fashion also brings the impact of aircraft noise lower without the mitigating attenuation that altitude can bring to the community.

6.4.4 This approach to airspace design could be made radically different if the ANSP took advantage of both departure and arrival management tools in use at Heathrow and Gatwick. Both airports operate Airport Collaborative Decision

² Appendix A

Making (A-CDM) tools that would allow NATS to coordinate Farnborough departures directly into the LTMA as the ANSP can receive real time traffic information simultaneously. This information contains data concerning the departure and arrival of all aircraft using the airports and utilises predictive tools to provide a high degree of accuracy of the traffic situation in the TMA. This enables tactical management of the aircraft flows. For example, critical information about every departure from the two airports is known in advance. The departure information includes:-

- Aircraft Call Sign
- Aircraft Type (and therefore wake vortex category)
- The time the aircraft pushes back from stand
- The time the aircraft takes to taxi to the runway holding point
- The time the aircraft will take off
- The aircraft's departure routing
- The destination airport
- And much more

The same data set is available for arrivals and with the latest developments in 'metering' inbound traffic by speed control rather than orbiting in stacks, far less airborne holding is experienced refining yet further the accuracy and predictability of arrival tracks.

All of this information is freely available to NATS and its use to offset the need for additional controlled airspace is essential. It would not seem difficult to amend the algorithms within A-CDM to include Farnborough traffic which at its maximum permitted movements averages less than 5 departures in any hour.

In addition to this, European funding of up to €3.0bn has been made available to airports, airspace users and ANSPs to deploy air traffic management functionalities such as those mentioned in this paper, all of which is designed to modernise the way in which traffic will be managed in future in situations exactly like Farnborough.

6.4.5 Performance based navigation (PBN) has much to offer in assisting with the coordination of the complex airspace of the south east especially in the case of Farnborough where typically, lightly loaded but high performance aircraft could be fully utilised to reduce the capacity needs of a TMA originally designed for poor performing heavy commercial air transport. As well as PBN, other initiatives hold promise; Ground Based Augmentation Systems used for landings can offer non-linear precision approaches, designed to optimise available controlled airspace and avoid noise sensitive areas; the adoption of the 5.5° approach used at London City, itself a base for business aviation, instead of the more conventional 3° approach, could do much to reduce the need for controlled airspace. London City has an LDA of 1319m whilst Farnborough's LDA is 1800m. The rationale for the former's angle of approach is due to the cityscape's

obstructions – the same could be said for Farnborough where the “obstruction” is other airspace users’ activities. Many options are available to implement the steeper approach whilst offering a much longer LDA. At 5 miles to touchdown, a change in approach angle could raise the height of approaching aircraft by over 1000’ with all the ensuing noise attenuation benefits.

6.5 Crossing Service to Powered Aircraft

6.5.1 During the two meetings that FASVIG conducted with representatives of TAG Farnborough and NATS, it was made clear that the provision of the current Lower Airspace Radar Service (LARS) and the new CTR crossing service by the radar unit at Farnborough would continue and that it was intended that little or no disruption to such traffic would result. It was reported that a simulation had taken place designed to trial how 20 zone transits an hour could be accommodated by the unit at the same time as commercial movements into and out of Farnborough were reaching the peak of 50,000 aircraft movements per annum. The results of the simulation showed that only one of the 20 VFR aircraft was given an orbit, ie a delay of 5 minutes or so. In addition to this, a discreet listening transponder code would be allocated along with changes to the VRPs to facilitate easier recognition of the zone boundary. Finally, it was also stated that close attention to the performance of the service would be given to ensure it met the needs of that group of airspace users. It would be useful if these commitments were documented and available in the public domain for, as yet, no evidence of these commitments to accommodate the needs of all users could be found in the TAG Farnborough documentation.

6.5.2 Unfortunately, these intentions are counteracted by a simple but very clear statement made in TAG Farnborough’s appeal to the Secretary of State for their permitted movements to increase to 50,000 per annum. Clause 53 of the TAG submission says:

*The proposal brings with it the continuation and extension of stringent noise controls,, a commitment to pursue an airspace change to introduce controlled airspace with the benefits of Standard Instrument Departures (SIDs), Standard Arrival Routes (STARs), Continuous Descent Approaches (CDAs) and **the exclusion of extraneous aircraft** and contourings for helicopters and aircraft in accordance with Noise Preferential Routes (NPRs) published in the Air Pilot.³*

This statement is all about Farnborough traffic and therefore by inference, all other airspace users would be subject to this ‘exclusion’. This statement on its own undermines the entire case for delegating controlled airspace to Farnborough as it presupposes that access to controlled airspace is in the gift of the operator when in fact the operator is responsible for managing the airspace for all users.

³ <http://www.rushmoor.gov.uk/CHttpHandler.ashx?id=5675&p=0>

7. Recommendations

The following recommendations result from the series of meetings with key stakeholders and are considered to be critical for the success of any new proposed controlled airspace that the CAA decides to delegate to Farnborough airport. FASVIGs recommendations are ordered in terms of short and medium/long term.

Short term recommendations

7.1 TAG Farnborough should write formally to the Secretary of State for Transport, withdrawing Paragraph 53 of its appeal for an increase in permitted movements, specifically the words...’ the exclusion of extraneous aircraft ` and include a new paragraph which outlines the commitment to the provisions enabling full access to all general aviation airspace users subject to current and future CAA equipage requirements for operations within Class `D` airspace. Furthermore, the FASVIG team recommend that the CAA do not countenance this airspace change proposal, nor that of any other proposer with the same or similar restrictive intent.

7.2 The General Aviation users impacted by any new controlled airspace in the vicinity of Farnborough should find the means to collaborate together and form an effective consultative forum with whom TAG Farnborough could negotiate. FASVIG would be prepared to facilitate such a forum, agreeing terms of reference within a timebound design programme.

7.3 TAG Farnborough, in conjunction with NATS, should withdraw the current ACP and airspace design and organise minuted meetings with the GA consultative forum with a view to agreeing the way forward for a revised ACP on which compromise and agreement could be founded.

7.4 The CAA should delay any decision on any newly proposed controlled airspace until after a decision is made on new runway capacity in the South East of England and in any case should recognise in any ACP approval the evolution of the raising of transition altitude, forecast in the near term.

7.5 The FAS Deployment Steering Group should approve a project for the design and roll out of communications to GA pilots regarding operations within Class `D` airspace and to mitigate against zone infringements.

7.6 The General Aviation community, including gliders, should plan for the equipage of radios in all aircraft, recognising that the airspace between the LTMA and Solent is amongst the busiest in the South East of England to improve situational awareness and mitigate against the possibility of airspace infringements.

Medium/Long Term Recommendations

7.7 TAG Farnborough should revise the proposal for new controlled airspace to eliminate, through ATM modernisation, coordination and collaboration, any CTA where opportunity exists to raise the base of the LTMA to take full advantage of the PBN mandate and a more realistic assessment of aircraft

performance capability of the fleets operating out of the airport, Heathrow and Gatwick. Where controlled airspace is inevitable, NATS should expedite the deployment of ADS-B, long recognised as the future for conspicuity.

7.8 TAG Farnborough should therefore sponsor the development of a CONOPS document (Concept of Operations) by NATS with an explicit requirement to ensure that only modern ATM practices are utilised and, where necessary, apply for European Commission funding to deploy them. The CONOPS itself would provide a clear, unambiguous plan against which all of the stakeholders could come to an agreement.

7.9 TAG Farnborough should therefore consider a staged approach to their ACP as the currently proposed CAS is designed to handle double the present Farnborough traffic but that growth is in the order of 1%. We think this may provide an opportunity to develop the TAG Farnborough requirement such that mitigations and options which are not available today, can be developed and deployed when mature

7.10 TAG Farnborough should review the requirement of CTA -2,-3,-4,-5,-6, and -7 to offer better mitigation for the users identified in FASVIG's assessment in paragraph 4.5. Of particular value would be the raising of the base of controlled airspace generally and the elimination of CTA-2, CTA-3 (up to 4000' altitude) in particular. TAG Farnborough should review the need for CTA-8 in its entirety with a view to removing it altogether from any future ACP.

In addition, any revised proposals for new controlled airspace should ensure that boundaries, wherever possible, should follow obvious landscape features such as major roads, railways and bodies of water to further avoid zone infringements.

7.11 TAG Farnborough should consider the classification of any proposed controlled airspace other than Class 'D' to ease the operability of the gliding community.

7.12 The CAA should consider a policy on the flexible use of airspace by gliders who need access without the need for a detailed clearance and who need the rules of Class G airspace to maximise the benefit of delegated CAS.

7.13 The CAA, in conjunction with others, should expedite the development of emerging technology such as ADS-B to enable safe and coordinated airspace sharing arrangements highlighted by this review. It is clear that effective and flexible airspace sharing cannot be implemented efficiently without a means of conspicuity. This is straightforward for most powered aircraft but gliders are unable to utilise Mode S transponders because of the power requirement. The emerging ADSB devices and technology are suitable and are, in any case, the future. NATS already operates an ADSB-in system in the south-east UK FIR although the resulting data is not presented or used operationally. ADSB and FLARM systems are already deployed and widely used by sports and recreational aviation and have the potential to increase airspace safety and utilisation.

8.0 Summary

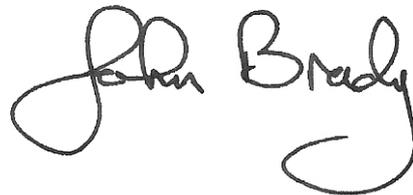
8.1 The ACP submitted to the CAA by TAG Farnborough seeks to establish a structure of Class 'D' controlled airspace within which their current movements could be safely and expeditiously operated. This will also allow sufficient capacity within which to grow their business as demand develops. Unfortunately, the current proposed design will substantially impact other airspace users, most notably the gliding community and the Lasham and Southdown Gliders in particular.

8.2 The economic and air traffic environment is such that the anticipated growth at Farnborough has yet to materialise. Whilst regrettable commercially, this pause is the opportunity to refine the design to balance the needs of all users of airspace in the vicinity of Farnborough using more sophisticated ATM principles and tools.

8.3 Farnborough is located in close proximity to both Heathrow and Gatwick. Given the magnitude of any direction the Government will take on new runway capacity and its subsequent impacts, any decision taken on new controlled airspace in the short to medium term will lack important considerations whether they be the impact of the decision on airline movement between airports, mature ATM development from the SESAR development or other, as yet unseen factors.

A handwritten signature in black ink, appearing to read 'Tim Hardy'.

Tim Hardy
For FASVIG Ltd

A handwritten signature in black ink, appearing to read 'John Brady'.

John Brady

Appendix A

Examples Of Modern ATM Techniques Relevant To Farnborough Airspace

We list two examples of where modern ATM techniques could be brought to bear on the issue of addressing TAG Farnborough's future needs without resorting to additional controlled airspace. In both cases, the tools described have already been acquired by NATS.

1) iTEC

The iTEC suite incorporates the results from ongoing research and development performed by Indra ATM within the context of SESAR and provides a highly modular and configurable solution for the needs of the global air traffic market.

The Flight Data Processing Function of the iTEC suite is the critical function for enabling trajectory based operations to facilitate iTEC products. It provides real time flight information and processed ATM data (e.g. surveillance, meteorological etc) to other functions, in addition to providing correlation and flight path monitoring.

Furthermore, it enables automated coordination between internal sectors and with adjacent air traffic control centres, dynamic sectorisation with internal and external sectors and a flexible use of airspace. It also manages the air-ground data link communications.

The most significant capability, however, is the 4D trajectory calculation, which allows the free routing concept implementation, and utilizes flight plan, meteorological, surveillance and aircraft performance data combined with airspace data, supported by ATC procedures, to calculate the expected trajectory of a flight in four dimensions.

(Source: Eurocontrol)

2) iFACTS

"How technology is transforming air traffic management"

26 July 2013

"Air traffic control is all about getting as many aircraft through your airspace as efficiently and safely as possible. If you can successfully do that day in day out, passengers, airports and airlines will all be happy – sounds simple!

But for years that formula has been dependent on the skill and ability of the

person doing the controlling, and even then an individual can only ever do so much. It is only relatively recently that that expertise has become increasingly married to better and better technological tools.

Technology isn't replacing the need for air traffic controllers, but it is changing the nature of their job. From a mainly manual operation, where the controller used paper strips and held a mental picture of the aircraft under their guidance, controlling is now much more about making planned decisions supported by technological tools.

At the end of 2011, at NATS we introduced something called iFACTS to the area control room at Swanwick and it has revolutionised our operation, freeing up capacity and improving safety, while at the same time reducing delays and cutting carbon emissions.

Born out of our own original research and development, iFACTS has given our controllers a set of support tools that allows them to handle more traffic comfortably and safely. These tools, based on trajectory prediction and medium term conflict detection, provide them with decision making support while highlighting potential future aircraft conflicts.

Essentially, iFACTS enables our controllers to look up to 18 minutes into the future, with this 'look-ahead' capability enabling them to test the viability of various options available for manoeuvring aircraft, as well as providing more time to make decisions.

From an operational point of view, this provides the area control operation at Swanwick to enhance air safety through early detection of conflicts between flights and reduce aircraft fuel burn and emissions by giving more precise routes. Last year it delivered an average 15% increase in airspace capacity in the UK, with some airspace sectors growing as high as 40% without increasing the number of operational staff or redesigning the air routes.

iFACTS has also made a major contribution to our best ever delay performance, with NATS-attributable delay in 2012 averaging 1.4 seconds per flight, the lowest since records began in the mid-1990s.

It is a very exciting time to be involved in air traffic management, and I think we are just seeing the start of a real revolution in technology; a revolution that maximises the ability of our controllers to make the most of our limited physical airspace, while still providing our customers with the safe direct routings and fuel savings that they need to survive in a tough economic climate.

iFACTS is a great example of technology for a purpose, not technology for the sake of it."

(Source: NATS Blog)

Appendix B

Schedule of Annual Movements at Farnborough Airport

The following table shows the planning approval figure together with the forecast contained within the TAG Farnborough Masterplan and the actual number of movements:

Year	Total Permitted Movements	Total Forecast Movements	Total Actual Movements ⁴
2007	28,000	-	26,507
2008	28,000	-	27,061
2009	28,000	23,000	24,262
2010	28,000	25,500	23,511
2011	31,000	31,000	22,977
2012	37,000	37,000	23,016
2013	41,000	41,000	22,754
2014	43,000	43,000	23,944
2015	45,000	45,000	24,248
2016	47,000	47,000	-
2017	48,000	48,000	-
2018	49,000	49,000	-
2019	50,000	50,000	-

⁴ Source : Annual Monitoring Report / NATS / Rushmoor D C

Appendix C

Discussion on the outcome of the Airport Commission work on runway capacity in the South East of England.

It has been announced by the UK Government that a decision would be made on the content of the work of the Airports' Commission on new runway capacity.

A decision to allow Heathrow to develop a new runway:

Once completed and upon opening, a third runway will increase capacity by approximately 240,000 ATMs. It is highly unlikely that the existing airline operators at Heathrow will either have the demand or budget to increase aircraft numbers in their fleets to absorb all of the newly available capacity even in the medium term. Any spare capacity would be made available to new entrants and ad hoc operators, ie business aviation, according to UK and European slot legislation. Even if a number of acquisitive airline operators saw merit in transferring to or consolidating aircraft assets at Heathrow, it is not difficult to see a substantial movement of GA flights from Farnborough to Heathrow under these circumstances.

A decision to allow Gatwick to develop a new runway:

The outcome of this would be broadly the same although it is likely that the Government might seed the newly developed runway capacity at Gatwick by persuading current Heathrow based carriers to move leading to spare capacity at Heathrow and more ad hoc availability. The outcome would therefore be the same.

Either of these two outcomes could weaken Farnborough's position, let alone the available capacity at competitor business aviation airports such as Biggin Hill and Luton, the latter having both an H24 Aerodrome Licence and CAT IIIb ILS capability.

Appendix D

Stakeholder comments made to initial circulation of the draft report

The draft version of this report was circulated to TAG Farnborough, The Lasham Gliding Society, the Southdown Gliding Club and the British Gliding Association (BGA). This appendix lists comments received from each organisation.

TAG Farnborough

Future Airspace Strategy Report

Airspace Sharing Around Farnborough Airport

Draft 9.0

Thank you for giving me the opportunity to comment on your final draft report.

As discussed at our initial meeting, this ACP is a result of a condition that forms part of the planning permission granted in Feb 2011 which states that TAG

... shall use reasonable endeavours to promote and support airspace changes in order to benefit local residents through the creation of greater amount of controlled airspace around the Site.

which built on previous work with local residents to mitigate disturbance particularly caused by the cancellation of noise abatement procedures due to the unpredictable environment created by Class G airspace.

Work on the application started in mid 2012 and it has not been possible to fully brief FASVIG on all the vast number of options and scenarios that have been considered in the 3 years leading up to our ACP application in July 2015. This is reflected in some of the inaccuracies in the report such as para 6.4.1 (Heathrow have co-operated; the requirement for Gatwick procedure changes was removed due to an improvement in our design, not due to any lack of interest by Gatwick) & 6.4.5 (Farnborough already has a 3.5° GP and steeper approaches were considered).

The document also does not currently take into account military operations from Odiham (both VFR and IFR), although operations at Odiham by the Kestrel gliding club are specifically mentioned. Significant effort was made in engaging with the MOD resulting in a robust draft LOA which will be adhered to subject to ACP approval. This a good example of the productive negotiations with a receptive stakeholder that TAG was prepared to undertake in order to facilitate continuation of their current operation.

In assessing the impact on airspace users from the GA community, the report assumes that no access will be available in various areas of the proposed Controlled Airspace. It has always been the intention to provide a known traffic environment whilst affording continued access to other airspace users in order to combine neighbouring operations. The Farnborough ACP does require differing methods of operation by all stakeholders however TAG contend that it does not preclude operations taking place.

It has always been the intention of the Farnborough ACP team to engage with the stakeholders to ensure maximum ability to operate recognising the changing environment. TAG again extend this invitation in order to engage further with local airspace users.

I also welcome the use of developing technologies in order to enhance airspace utilisation. The report makes reference to certain technologies however the ability to interface with such technologies is not yet available but future developments will enhance ability to accommodate airspace users.

With regard to the recommendations, I have the following comments;

7.1 In my email of 20/04/16 I gave a full explanation of this issue and request that this is removed from the report. The quoted words are from the report written by the Planning Inspector to the Secretaries of State following the Inquiry in May 2010 and do not form part of any legal agreement that regulates the airport. TAG has never written or spoken about exclusion of aircraft as part of this ACP – indeed, quite the opposite - and will continue to work with the GA community to allow access.

7.2 & 3 TAG agree to participate in any forum that will aim to mitigate the impact of the proposed design. However, the current proposal cannot be withdrawn due to the impact it will have for other stakeholders (NERL/NSL Southampton and other local airfields) in terms of the proposed implementation date of March 2017. We contend that the design has already been significantly changed in favour of GA requirements due to the consultation responses from aviation stakeholders, all of which is described in the Consultation Feedback Reports.

7.4 & 5 Outside of TAG's control.

7.6 TAG agrees with this proposal and will actively work with the main GA stakeholders to seek solutions for situational awareness and reduction of infringements.

7.7 The current proposal has been developed over a significant period, utilising RNAV 1 arrival and departure procedures. The airspace has been designed with input from and consultation with multiple stakeholders. The majority of benefits identified in the Eurocontrol PBN mandate are scheduled for the period 2020 to 2025, and will form part of NATS' bigger strategy for airspace efficiency.

With regard to aircraft performance capability this ACP has taken into account aircraft performance, particularly with regard to Heathrow departures and also the climb profile mandated for Farnborough traffic. Whilst the Farnborough traffic is capable of rapid climb rates the LTMA is currently not set up to take maximum benefit of this capability.

Further enhancements due to ADS-B deployment in the future may well be possible and TAG would welcome any progress that could be made with this, however TAG has limited direct influence in ADS-B deployment.

7.8 Subject to the permission of FASVIG, the report will be shared with relevant NATS departments to identify any potential utilisation of “more modern ATM practices” in the future.

7.9 The implementation of a staged approach is for the CAA to decide. TAG will work closely with them regarding any conditions that may be included as part of the decision. Although forecasts have failed to materialise to the extent predicted, short term daily peaks are a consequence of the unscheduled nature of the Farnborough operation which could prove valuable in providing evidence of how the proposed design works in reality which will allow review and reconsideration as part of the CAP725 process.

7.10 All proposed airspace volumes are Class D, which provides ability to be accessed by all varieties of airspace users, VFR and IFR, subject to suitable clearance.

CTA 2 and CTA 3 exist within the proposal to provide a known traffic environment and regulatory airspace containment requirement for Runway 24 departures and Runway 06 arrivals. It is recognised that there are opportunities for sharing CTA 2 and 3, and to some extent this has already been achieved in respect of RAF Odiham and Kestrel gliding club.

CTA 4, 5 and 6 exist within the proposal to provide a known traffic environment and regulatory airspace containment requirement for Runway 06 and 24 arrivals and departures.

CTA 7 exists within the proposal to provide a known traffic environment and regulatory airspace containment requirement for Runway 06 arrivals.

CTA 8 exists within the proposal to provide a known traffic environment and regulatory airspace containment requirement for departures from both Runways at Farnborough, and is the lateral area where the interface between Farnborough and the en route sectors takes place. Negotiations with Southdown gliding club have identified opportunities to provide greater access, subject to aircraft equipage.

The ACP design process included assessment of proposed boundaries, and where possible provided ground features to aid recognition by airspace users. Examples include the Western boundary of CTA 6, with Alton VRP just outside, and CTA 1 with Guildford outside of it. If more boundaries were tailored to ground features, the overall design may have additional impact on stakeholders due to an increase in size.

7.11 The design team took into account various classifications of airspace, and considered the benefits of each to the various stakeholders. Class D airspace was selected based upon its ability to afford access to VFR flights integrated with IFR operations whilst ensuring a predictable environment for all airspace users.

The team also considered Class E airspace however this was not pursued. Class E is not available for use as a Control Zone (CTR). The rationale for

not pursuing CTA designs based on Class E airspace was due to a previous introduction resulting in fast tracked changes to Class D. A Class E CTA environment is not predictable. The reclassification from E to D was brought about due to safety events involving GA activity including gliding operations.

7.12 & 13 Outside of TAG's control

I thank you for the helpful work that you and John have provided during this process and would like to reiterate TAG's wish to continue to work with the stakeholders particularly the local airspaces users.

Yours sincerely

A handwritten signature in black ink, appearing to read 'R Walker', with a long horizontal flourish extending to the right.

Roger Walker

Director Airport Operations

Lasham Gliding Society

Please find attached below our revised comments on your draft report and also attached a copy of the draft with the comments inserted in the text. We understand that you intend to supply these comments to the CAA, plus those of all the other parties that you contacted for your report, providing that TAG also agrees to its comments being attached. Although we had not expected your report generation process to take this tack, we understand that it is for the purpose of being open and transparent.

Please excuse the formality of the following but our participation in this FASVIG initiative has not and does not imply that we have waived our formal objections to the process that the CAA has followed in the Farnborough airspace change proposal procedure.

Finally, on a lighter note, we do sincerely hope that our input has been useful and helpful.

With best wishes
Colin

1.5

Please see comments regarding sections 5.2.2 and 5.2.1.

2.3

The claimed passenger numbers cited are circa 250,000 pa. This inflated figure seems wrong by a factor of 10. We can justify around 31,000. Others have comparable figures. Section 3.3 of our Consultation Response explains the calculation, which was at the time $22,000 \times 0.55 \times 2.6 = 31,460$ passengers per year, using TAG's 2013 reported number of business movements of 21,835 (approximately 45% of the movements were empty positioning flights, TAG Farnborough stated that the average number of passengers carried by its bizjets was 2.6 per movement).

4.

Your statement of TAG's claim is correct. You should note, however, that there is no evidence that Farnborough aircraft ever have to hold except due to weather or arrival before the airport is open. TAG/NATS have been asked to quantify this, but have consistently failed to do so.

5.1.1

The argument currently articulated by TAG that they are mandated to put in RNAV procedures by the AIC of December 2014 has been omitted. We do not understand why this significant issue has not been included.

5.2.1

You should state who witnessed this VFR Access simulation. After attending one simulation (we sent along a well-qualified ex TC controller), about which we were critical, TAG has subsequently declined either to inform us or has refused to permit us to attend such, even when we learnt of such events. There appears to be no external audit.

5.2.2

Regarding the changing of attitude of VFR pilots to crossing controlled airspace, this will take several years. It is not a short-term solution.

The implementation of TAG's claimed airspace will result in the immediate generation of choke points and a significant decrease in safety. By contrast, TAG claims that its proposed crossing service will immediately resolve this issue. There is a significant omission in your report concerning this important safety issue.

5.3.1

Although the block colour tables do reflect a sensible conclusion, the logic understates the problem regarding glider range and altitude. For example it omits that gliders in training do not just come back in a straight line from their highest point. They do exercises which could mean gaining height in thermals (or being directly aerotowed higher) and then losing height rapidly through other exercises.

5.5.1

We do not fully understand the logic of this statement regarding LOAs, given what was stated at the meeting and what you agreed with us then: it would mean CAS being applied along with an LOA. The proposed TAG airspace penetrates significantly into the immediate training and cross-country airspace. There would be inevitable infringements given the volume of traffic from Lasham and transits from other aerodromes, resulting in the LOA being ultimately withdrawn but leaving the CAS behind, the very CAS which was highly contested in the first place.

5.5.1

Is it possible to delegate controlled airspace to become Class G? The report refers to CAA mechanisms for this. What are the details of the provisions to delegate Class D to Class G?

5.6.3

Transponders are not required for Class D, in whatever mode. The claim that a transponder is needed to be within 500' of Class A as a matter of CAA policy is a "rule" that we are unaware of, and the originator of this claimed restriction should be asked to define it.

5.6.5

The report specifically omits referring to FLARM being now frequently used for controller situational awareness. This should be inserted.

6.4.5

Steeper glide paths will have the benefit of moving the final approach fix towards the runway and so reduce the lateral extent of CAS. It will also reduce the power on final approach and so noise.

However, 5.5 degree glide-paths would be restrictive. In section 11.5 of our Consultation Response we proposed using a "circling with prescribed RNAV tracks" procedure. This was dismissed by TAG as it was not an ICAO Procedure. However "circling with prescribed tracks" is an ICAO procedure and could have equally been adopted; we only "proposed circling with prescribed RNAV tracks" as TAG were applying for RNAV SIDs and STARs, and it is an enhancement on the procedure without RNAV tracks. In any event, it would have been possible to file a difference, and "circling with prescribed RNAV tracks" is now being trialled at Nice, one of airports listed in the EU Regulation 716/2014. This provides a similar reduction of the lateral extent of CAS. This is why we proposed this solution.

7.4

A higher transition altitude would have the effect of making more stop altitudes available. However, in this case, it is the required climb gradient that is limiting, and the departures from 06 would still be constrained by the London Heathrow Midhurst departures irrespective of any change to transition altitude. The issue is that Farnborough is too close to Heathrow and any change to the Transition Altitude will not change that.

7.10

Regarding reviewing or eliminating CTAs, the report's coloured block diagrams and accompanying logic demonstrate that CTA6 is also a major problem, as well as CTAs 2, 3 and 8. The report should therefore recommend removing CTA6.

We very much agree with the removal of CTAs 2, 3 and 8. It may not be realised, but the reduction of CAS over Parham to 4500ft can never be used (Gatwick southbounds climbing to 5/6000ft). A former TC controller states that the CAS over Parham could not be used due to conflict with Gatwick departures.

Appendix C

A reference to this conclusion needs to be made in the body of the report where TAG Farnborough's traffic is discussed.

British Gliding Association

Thanks for this helpful report. As discussed this week with John Brady, we agree with the summary and proposed way forward. We note that the report does not make reference to the safety case, which I'd like to focus on here. There may be a number of points of details within the body of the report that need building on or perhaps correcting to ensure a critical reader fully appreciates the point. We understand that Lasham will be providing relevant notes and therefore we have not commented here.

The BGA has of course previously demonstrated to TAG/Farnborough that the proposed CAS would have very serious adverse consequences for the safety of airspace users *outside* the proposed CAS, ie within what will become significant choke points.

The Airspace Safety Initiative commissioned QinetiQ to model traffic flows in order to enhance safety of airspace users operating outside controlled airspace. The resulting report noted that "*... any changes to the size and shape of controlled airspace will result in an equal and opposite change to the size and shape of uncontrolled airspace...*", and "*To properly assess such changes, the level of traffic in both controlled and uncontrolled (i.e. Class G) airspace needs to be understood*". The study assumed that all gliders, >80% of microlights, and 70% of light single aircraft would route around CAS rather than transit it.

During the consultation process data was submitted to TAG/Farnborough that showed current airspace traffic flows from aircraft using a Farnborough LARS, and flight recorder data from gliding, hang-gliding and paragliding. It was noted by BGA that quantitative data is required in order to assess the rate at which aircraft would come into close proximity to each other. A CAA/Industry Olympic Airspace working group looked at transit traffic flow levels in the area and concluded that it would be reasonable to expect about 70 aircraft movements per hour - 35 in each direction - during an active aviation day. After mathematically processing the numbers of transit aircraft affected by the CAS proposed by TAG/Farnborough, we found that conflict risk in one particular area for transit traffic alone can be summarised as;

- approximately 35 instances per hour of aircraft coming to within 1500m horizontally, or 300m vertically of each other
- approximately 9 instances per hour of aircraft coming within 750m horizontally, or 150m vertically of each other

This would lead to a potential increase in the risk of collisions to transit traffic by a factor of between 2 and 2.5 depending on the particular area.

The basic quantitative assessment confirms our initial impression that the proposed airspace would create *at least* one very severe choke point in airspace that is already a busy and strategically vital area for transit and general GA use. Clearly there will be other significant unaddressed funneling of traffic around the proposed CAS and therefore a comprehensive study of all traffic flows and congestion around the area must be made. We estimate that

any properly carried out analysis that included all (rather than solely transit) traffic is likely to predict a totally unacceptable order of magnitude increase in potential collisions.

There is one further point that I think it is important to make about the report. The TAG/Farnborough CAS proposal is a significant issue for all of GA and air sport. While it would clearly be a potentially catastrophic development for Lasham, Southdown and gliding in the round, the CAS would also represent a significant problem for the wider GA community, all of whom have engaged at some point in related discussion. In general airspace terms it appears that 'if it works for gliding, it works for most others in GA'. Therefore the wider community is content in this case to let gliding get on with taking the lion's share of effort to deal with the problem. I don't think that is the same as this being a Gliding/Lasham/Parham issue – it's much wider than that.

We recommend that the FASVIG report recognises the issue of unassessed risk in airspace surrounding the TAG/Farnborough proposed CAS.

Southdown Gliding Club

Apart from the correction to the table that I already sent, I am fairly comfortable with the report.

The only other comment I have relates to the conclusions section and point 8.1.

I would prefer that point 8.1 was as follows :-

"...most notably the gliding community and the Lasham and Southdown Gliders in particular"

Whilst Lasham is in close proximity to Farnborough and is clearly impacted in ways detailed in your report,

I would say that Southdown Gliders are impacted to a similar degree but in a different way. Your report captures

the details well. I would just request that the report identifies the significant impact to both clubs in the conclusions section to be consistent.

Otherwise... Excellent work and many thanks.

Appendix 'E' - FASVIG responses to Stakeholder comments.

Table of Comments and FASVIG Replies

Stakeholder	Ref.	Comment	FASVIG Reply
TAG Farnborough			
	7.1	In my email of 20/04/16 I gave a full explanation of this issue and request that this is removed from the report. The quoted words are from the report written by the Planning Inspector to the Secretaries of State following the Inquiry in May 2010 and do not form part of any legal agreement that regulates the airport. TAG has never written or spoken about exclusion of aircraft as part of this ACP – indeed, quite the opposite - and will continue to work with the GA community to allow access.	FASVIG acknowledges receipt of TAG's email however we consider it important that TAG sets the record straight publicly on the issue of exclusion of aircraft irrespective of who was responsible for raising it in the first instance.
	7.2&3	TAG agree to participate in any forum that will aim to mitigate the impact of the proposed design. However, the current proposal cannot be withdrawn due to the impact it will have for other stakeholders (NERL/NSL Southampton and other local airfields) in terms of the proposed implementation date of March 2017. We contend that the design has already been significantly changed in favour of GA requirements due to the consultation responses from aviation stakeholders, all of which is described in the Consultation Feedback Reports.	FASVIG welcomes TAG's willingness to participate in face to face meetings with its GA community representatives. We recognise that TAG changed the airspace design following consultation but the impact on other airspace users remains significant. FASVIG believes that it is within the gift of TAG as the proposer to withdraw the current ACP as its design continues to be unacceptable for local airspace users whose operational activities would be seriously curtailed.
	7.4&5	Outside of TAG's control	These recommendations are offered to the CAA. To approve a new and cumbersome ACP design in advance of more sweeping changes elsewhere in the London TMA would be counterproductive to efficiency and stakeholder impact.
	7.6	TAG agrees with this proposal and will actively work with the main GA stakeholders to seek solutions for situational awareness and reduction of infringements.	
	7.7	The current proposal has been developed over a significant period, utilising RNAV 1 arrival and departure procedures. The airspace has been designed with input from and consultation with multiple stakeholders. The majority of benefits identified in the Eurocontrol PBN mandate are scheduled for the period 2020 to 2025, and will form part of NATS' bigger strategy for airspace efficiency. With regard to aircraft performance capability this ACP has taken into account aircraft performance, particularly with regard to Heathrow departures and also the climb profile mandated for Farnborough traffic. Whilst the	FASVIG welcomes the adoption of PBN at Farnborough; this should provide greater predictability and more accurate track keeping enabling, where absolutely necessary, controlled airspace that is fit for purpose and no more. This means that it should consist of minimal lateral area and bases raised accordingly. FASVIG would make a further recommendation to TAG to demonstrate how traffic integration within the LTMA has

		<p>Farnborough traffic is capable of rapid climb rates the LTMA is currently not set up to take maximum benefit of this capability.</p> <p>Further enhancements due to ADS-B deployment in the future may well be possible and TAG would welcome any progress that could be made with this, however TAG has limited direct influence in ADS-B deployment.</p>	<p>been forecast and modelled for without the evidence, it is not clear that enough work has been done to examine ATM possibilities before proposing new controlled airspace as a last resort.</p>
	7.8	<p>Subject to the permission of FASVIG, the report will be shared with relevant NATS departments to identify any potential utilisation of "more modern ATM practices" in the future.</p>	<p>The final report, once completed, will be sent to all stakeholders and thereafter be in the public domain. There are more modern ATM practices than those proposed by TAG, available now and mature enough for immediate deployment.</p>
	7.9	<p>The implementation of a staged approach is for the CAA to decide. TAG will work closely with them regarding any conditions that may be included as part of the decision. Although forecasts have failed to materialise to the extent predicted, short term daily peaks are a consequence of the unscheduled nature of the Farnborough operation which could prove valuable in providing evidence of how the proposed design works in reality which will allow review and reconsideration as part of the CAP725 process.</p>	<p>FASVIG believe that a staged approach could be suggested by TAG in recognition of their slow growth and to create the opportunity for constructive engagement with all stakeholders. FASVIG would further recommend that TAG review the creation of short term peaks in demand as these have the potential to falsely exacerbate the demand for CAS.</p>
	7.10	<p>All proposed airspace volumes are Class D, which provides ability to be accessed by all varieties of airspace users, VFR and IFR, subject to suitable clearance.</p> <p>CTA 2 and CTA 3 exist within the proposal to provide a known traffic environment and regulatory airspace containment requirement for Runway 24 departures and Runway 06 arrivals. It is recognised that there are opportunities for sharing CTA 2 and 3, and to some extent this has already been achieved in respect of RAF Odiham and Kestrel gliding club.</p> <p>CTA 4, 5 and 6 exist within the proposal to provide a known traffic environment and regulatory airspace containment requirement for Runway 06 and 24 arrivals and departures.</p> <p>CTA 7 exists within the proposal to provide a known traffic environment and regulatory airspace containment requirement for Runway 06 arrivals.</p> <p>CTA 8 exists within the proposal to provide a known traffic environment and regulatory airspace containment requirement for departures from both Runways at Farnborough, and is the lateral area where the interface between Farnborough and the en route sectors takes place. Negotiations with Southdown gliding club have identified opportunities to provide greater access, subject to aircraft equipage.</p>	<p>Whilst Class D airspace allows access by all aircraft types, aircraft which cannot maintain a level or follow a prescribed track are generally unable to accept a clearance. Of the 20,000 aircraft on the UK register and the 7000 or so unregistered UK aircraft, about 10,000 fall into this category.</p> <p>FASVIG can only reiterate the recommendation for full, transparent and open engagement with the GA community to examine in detail every CTA in order to determine its expressed need vs impact for GA stakeholders.</p>

		The ACP design process included assessment of proposed boundaries, and where possible provided ground features to aid recognition by airspace users. Examples include the Western boundary of CTA 6, with Alton VRP just outside, and CTA 1 with Guildford outside of it. If more boundaries were tailored to ground features, the overall design may have additional impact on stakeholders due to an increase in size.	
	7.11	<p>The design team took into account various classifications of airspace, and considered the benefits of each to the various stakeholders. Class D airspace was selected based upon its ability to afford access to VFR flights integrated with IFR operations whilst ensuring a predictable environment for all airspace users.</p> <p>The team also considered Class E airspace however this was not pursued. Class E is not available for use as a Control Zone (CTR). The rationale for not pursuing CTA designs based on Class E airspace was due to a previous introduction resulting in fast tracked changes to Class D. A Class E CTA environment is not predictable. The reclassification from E to D was brought about due to safety events involving GA activity including gliding operations.</p>	As above
	7.12 & 13	Outside of TAG's Control	
Lasham Gliding Society			
	1.5	Please see comments regarding sections 5.2.2 and 5.2.1.	
	2.3	The claimed passenger numbers cited are circa 250,000 pa. This inflated figure seems wrong by a factor of 10. We can justify around 31,000. Others have comparable figures. Section 3.3 of our Consultation Response explains the calculation, which was at the time $22,000 \times 0.55 \times 2.6 = 31,460$ passengers per year, using TAG's 2013 reported number of business movements of 21,835 (approximately 45% of the movements were empty positioning flights, TAG Farnborough stated that the average number of passengers carried by its bizjets was 2.6 per movement).	At the time of writing, no passenger numbers were sourced and so an estimate was made. Given that Lasham Gliding Society agreed the numbers independently, these have now been included in the text.
	4.0	Your statement of TAG's claim is correct. You should note, however, that there is no evidence that Farnborough aircraft ever have to hold except due to weather or arrival before the airport is open. TAG/NATS have been asked to quantify this, but have consistently failed to do so.	FASVIG notes this point and looks forward to a more comprehensive discussion when the engagement sessions commence.
	5.1.1	The argument currently articulated by TAG that they are mandated to put in RNAV procedures by the AIC of December 2014 has been omitted. We do not understand why this significant issue has not been included.	The AIC was not mentioned during FASVIG's sessions with TAG Farnborough however the implementation of PBN brings about benefits of accurate track keeping and predictability thus requiring less airspace which should accrue benefits to GA overall.

	5.2.1	You should state who witnessed this VFR Access simulation. After attending one simulation (we sent along a well-qualified ex TC controller), about which we were critical, TAG has subsequently declined either to inform us or has refused to permit us to attend such, even when we learnt of such events. There appears to be no external audit.	FASVIG confirms that the simulations were not audited by them and therefore cannot be endorsed. FASVIG therefore recommend that TAG should consider how to communicate the methodology, results and conclusions from the simulation in an open and transparent manner.
	5.2.2	Regarding the changing of attitude of VFR pilots to crossing controlled airspace, this will take several years. It is <u>not</u> a short-term solution. The implementation of TAG's claimed airspace will result in the immediate generation of choke points and a significant decrease in safety. By contrast, TAG claims that its proposed crossing service will immediately resolve this issue. There is a significant omission in your report concerning this important safety issue.	FASVIG acknowledges this likely outcome and that is the rationale for requesting the FAS DSG to support a communications programme to offset GA pilots' propensity to avoid CAS. ANSPs should also acknowledge that requests to transit Class 'D' airspace are sometimes made more difficult than they need to be and much could be done to improve this.
	5.3.1	Although the block colour tables do reflect a sensible conclusion, the logic understates the problem regarding glider range and altitude. For example it omits that gliders in training do not just come back in a straight line from their highest point. They do exercises which could mean gaining height in thermals (or being directly aerotowed higher) and then losing height rapidly through other exercises.	FASVIG notes this point which emphasises the need for sufficient height at distances from the airfield, not just over the airfield, where such exercises are taking place.
	5.5.1	We do not fully understand the logic of this statement regarding LOAs, given what was stated at the meeting and what you agreed with us then: it would mean CAS being applied along with an LOA. The proposed TAG airspace penetrates significantly into the immediate training and cross-country airspace. There would be inevitable infringements given the volume of traffic from Lasham and transits from other aerodromes, resulting in the LOA being ultimately withdrawn but leaving the CAS behind, the very CAS which was highly contested in the first place.	FASVIG's narrative on this subject was intended to unify the interests of the gliding community but accepts that in many cases, LOA's are applied to local users whose knowledge of the area will be necessarily more detailed than that of transit traffic.
	5.5.1	Is it possible to delegate controlled airspace to become Class G? The report refers to CAA mechanisms for this. What are the details of the provisions to delegate Class D to Class G?	As advised by CAA
	5.6.3	Transponders are not required for Class D, in whatever mode. The claim that a transponder is needed to be within 500' of Class A as a matter of CAA policy is a "rule" that we are unaware of, and the originator of this claimed restriction should be asked to define it.	Recent discussions with CAA have invalidated this reasoning and therefore the paragraph has been amended.
	5.6.5	The report specifically omits referring to FLARM being now frequently used for controller situational awareness. This should be inserted.	FLARM is referred to in 7.13 but the point made here is that FLARM is currently and widely available and could form part of an equipage strategy to enhance electronic conspicuity.
	6.4.5	Steeper glide paths will have the benefit of moving the final approach fix towards the runway and so reduce the lateral extent of CAS. It will also reduce the power on final	FASVIG supports the implementation of steeper approach paths conducted at other airports serving business

		<p>approach and so noise.</p> <p>However, 5.5 degree glide-paths would be restrictive. In section 11.5 of our Consultation Response we proposed using a "circling with prescribed RNAV tracks" procedure. This was dismissed by TAG as it was not an ICAO Procedure. However "circling with prescribed tracks" is an ICAO procedure and could have equally been adopted; we only "proposed circling with prescribed RNAV tracks" as TAG were applying for RNAV SIDs and STARs, and it is an enhancement on the procedure without RNAV tracks. In any event, it would have been possible to file a difference, and "circling with prescribed RNAV tracks" is now being trialled at Nice, one of airports listed in the EU Regulation 716/2014. This provides a similar reduction of the lateral extent of CAS. This is why we proposed this solution.</p>	<p>aviation. FASVIG recommends that the differing views of how 'circling with prescribed RNAV tracks' could form a useful discussion at an early engagement meeting.</p>
	7.4	<p>A higher transition altitude would have the effect of making more stop altitudes available. However, in this case, it is the required climb gradient that is limiting, and the departures from 06 would still be constrained by the London Heathrow Midhurst departures irrespective of any change to transition altitude. The issue is that Farnborough is too close to Heathrow and any change to the Transition Altitude will not change that.</p>	Noted
	7.10	<p>Regarding reviewing or eliminating CTAs, the report's coloured block diagrams and accompanying logic demonstrate that CTA6 is also a major problem, as well as CTAs 2, 3 and 8. The report should therefore recommend removing CTA6.</p> <p>We very much agree with the removal of CTAs 2, 3 and 8. It may not be realised, but the reduction of CAS over Parham to 4500ft can never be used (Gatwick southbounds climbing to 5/6000ft). A former TC controller states that the CAS over Parham could not be used due to conflict with Gatwick departures.</p>	Noted
	App C	<p>A reference to this conclusion needs to be made in the body of the report where TAG Farnborough's traffic is discussed.</p>	Included in text at 6.2.4
BGA			
		<p>The Airspace Safety Initiative commissioned QinetiQ to model traffic flows in order to enhance safety of airspace users operating outside controlled airspace. The resulting report noted that "... <i>any changes to the size and shape of controlled airspace will result in an equal and opposite change to the size and shape of uncontrolled airspace...</i> ", and "<i>To properly assess such changes, the level of traffic in both controlled and uncontrolled (i.e. Class G) airspace needs to be understood</i>". The study assumed that all gliders, >80% of microlights, and 70% of light single aircraft would route around CAS rather than transit it.</p> <p>()</p> <p>The basic quantitative assessment confirms our initial impression that the proposed</p>	<p>FASVIG recognises that if any significant portion of powered aircraft route west of a future Farnborough CTR, they will come into conflict with intense Lasham and other traffic. We note your calculations abbreviated here and propose that changes in behaviour should precede the establishment of CAS.</p> <p>It is a basic tenet of airspace change that risk should not increase. As part of its decision process the CAA should review the BGA analysis that suggests a doubling of risk and take it into account</p>

		<p>airspace would create <i>at least</i> one very severe choke point in airspace that is already a busy and strategically vital area for transit and general GA use. Clearly there will be other significant unaddressed funneling of traffic around the proposed CAS and therefore a comprehensive study of all traffic flows and congestion around the area must be made. We estimate that any properly carried out analysis that included all (rather than solely transit) traffic is likely to predict a totally unacceptable order of magnitude increase in potential collisions.</p>	
Southdown			
		<p>I would prefer that point 8.1 was as follows</p> <p>"...most notably the gliding community and the Lasham and Southdown Gliders in particular"</p> <p>Whilst Lasham is in close proximity to Farnborough and is clearly impacted in ways detailed in your report, I would say that Southdown Gliders are impacted to a similar degree but in a different way. You report captures the details well. I would just request that the report identifies the significant impact to both clubs in the conclusions section to be consistent.</p>	Noted and amendment made.