

Cotswold Airport (Kemble) Airspace Change Proposal for a Defined Approach Procedure



Final Options Appraisal
CAP 1616 - Step 4a

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Key References:

- A. Stage 3 Consultation Document.
<https://airpacechange.caa.co.uk/umbraco/Surface/PublicSurface/DownloadDocument/1541>
- B. Stage 3 Collation and Review of Consultation Responses.
<https://airpacechange.caa.co.uk/umbraco/Surface/PublicSurface/DownloadDocument/1872>
- D. Stage 3, Step 3b – Options Appraisal (Phase 2 Full)
<https://airpacechange.caa.co.uk/umbraco/Surface/PublicSurface/DownloadDocument/1645>
- E. Civil Aviation Authority CAP 1616, 2nd Edition– Airspace Design dated Nov 2018.
- F. Department for Transport - Air Navigation Guidance 2017 dated Oct 2017.
- G. Department for Transport – TAG Unit A3 – Environmental Impact Appraisal dated Dec 2015.
- H. Summary of Stage 2a Engagement Feedback.
- I. Cotswold Area of Outstanding Natural Beauty Management Plan 2018-2023.
- J. Civil Aviation Authority CAP 1524 - Information on aviation’s environmental impact dated 2017.
- K. Stage 3, Step 3b – Consultation Strategy

STEP 4A – FINAL OPTIONS APPRAISAL

INTRODUCTION

1. This document forms part of the document set created in accordance with the requirements of the CAP1616 Airspace Change Process (ACP). It aims to provide enough evidence to satisfy the Final Options Appraisal output for Step 4a. For both brevity and clarity, only a summary of the analysis and outcomes of previous stages is repeated in this document, where appropriate, to aid understanding or provide context. To understand the option appraisal work conducted prior to this Step, the primary reference is the Full Appraisal document (Step 3b) and the Consultation Response Document (Step 3d).
2. **Scope.** The scope of this ACP is to develop a defined approach for use by approved Performance Based Navigation (PBN) operators that currently use Cotswold Airport (Kemble). The aircraft in-scope, in order of movements/anticipated usage are:
 - a. Corporate/business jets ranging in size from a Pilatus PC12 or Eclipse Jet sized aircraft to Gulfstream 650 sized aircraft.
 - b. Commercial private/business helicopter operators, such as the Queens Helicopter Flight.
 - c. CAT B-D (A320/B737 to A340/B747) aircraft currently arriving at Kemble for a Maintenance and Repair Organisation (MRO).
3. It is worth highlighting that this ACP seeks to formalise activity that already takes place; this is not new traffic, although a published approach will allow these operators to increase movements where weather or operational safety limitations would otherwise preclude. There are no current plans for this ACP to allow a noticeable increase in overall movements, use for general instrument training, nor to expand on our current aerodrome licence into public use.¹

¹As in CAT use beyond the current MRO usage.

BACKGROUND

4. The sole aim of this proposal is to develop and publish a suitable PBN instrument approach to support existing planned arrivals, as described in the scope at paragraph 3. Although they comprise only 1.4%² of Cotswold Airport's annual movements, these aircraft have a disproportionate positive economic impact on the airport and surrounding area of Gloucestershire and Wiltshire. Within this figure, whilst revenue for the larger airliners is relatively small, the revenue generated from business jets equates to around one third of Kemble's revenue, based on 2019 financial data (not included); Jet A1 fuel sales alone account for 27%³ of all revenue. They are essential to the continued economic viability of the Airport and MRO businesses.

5. This proposal aims to formalise activity that already takes place at Cotswold Airport. These aircraft currently arrive at Cotswold Airport by determining their own approach route visually, with no instrument approach or GPS positioning, onto a straight in visual approach to land at the airport. They have done so for at least the past 10 years. It is anticipated that for those aircraft arriving in Instrument Meteorological Conditions or unable to approach the Airport due to their own operational limitations, which may preclude a non-defined approach, this proposed PBN approach will marginally increase the Airports annual movements by 0.36%⁴; it is suggested, that any analysis of this very small magnitude of change is meaningless.

6. The main aims of this proposal are:

a. To increase the Airport's operational capacity by allowing in-scope aircraft to land at the airport in bad weather and/or when their own operational procedures would otherwise preclude a landing at an airport without a defined approach. This is an economic benefit to both the airport and the local councils⁵ own economic development plans.

7. The associated effect of these changes is to:

a. Increase operational safety by reducing the potential risk of a mid-air collision by placing arriving in-scope aircraft onto a defined (and thus published) arrival route, which other aircraft will be aware of (through air chart markings) and thus should avoid the area, when active.

b. Provide an obstacle cleared instrument approach to the runway, which can be flown by suitably equipped in-scope aircraft.

c. Reduce the scatter effect, and thereby the distribution of any environmental impacts, of in-scope aircraft arrivals to those areas overflowed by the aircraft on this procedure.

8. From the original high-level requirement identified and articulated in the Statement of Need, the Design Principles (DPs) were developed and tested through engagement with identified local and aviation stakeholders during Stage 1 of the CAP 1616 process, which was agreed by the CAA at the Define gateway on the 26 Oct 2018. Continued engagement with stakeholders during Step 2a, allowed four options to be identified that met the Statement of Need and DPs. These were then analysed as part of an Initial Options Appraisal in Step 2b and then again in the Full Options Appraisal in Step 3b and tested through consultation.

²Based on 2019 data of 28,598 movements of which 396 were in-scope movements: 1.384%.

³The bulk of which is in-scope aircraft.

⁴See Final Appraisal details at Page 8.

⁵Cotswold District, Wiltshire, Swindon Borough and Gloucestershire.

9. Any options developed, must also be coherent with other localised changes of strategies. Geographically, this will include, engagement with the local Cotswolds Area of Outstanding Natural Beauty (AONB), the Cotswold District and Wiltshire Councils other relevant airfield and airspace users and effected ground stakeholders. Although within SW England it is not anticipated that either Bristol or Gloucestershire Airport will be affected by this airspace change. However, they will remain engaged. Similarly, the local GA community, local glider sites and RAF Brize Norton remain key stakeholders for continued engagement. As options matured throughout the process, so did the engagement list; consequently, the list of engaged and informed stakeholders also changed throughout this CAP 1616 process.

10. The previous appraisal document, the Full Options Appraisal, was accepted by the CAA through the Stage 3 CONSULT gateway on the 31 January 2020. The appraisal and analysis concluded that two options remained viable. These options (1 and 2) met the statement of need, conformed to the design principles, and addressed the concerns and risks highlighted through engagement with all stakeholders. Option 1 is a PBN approach with an extended centreline projecting out westwards from runway 08 and east from runway 26. Option 2 has the same approach to runway 08 and an extended centreline with a T-Bar (north and south projecting joins onto the extended centreline) onto runway 26. Both options were developed be compliant with international standards and norms for approved PBN approaches and suitable for small corporate jets up to commercial airliners for maintenance or recycling and both options were presented during consultation.

SCALE OF THIS PROPOSAL

11. As the table at Fig 1.0 shows, the in-scope movement numbers for aircraft that will use the proposed approach is very low, compared to the current baseline, noting that these in-scope aircraft already fly a visual approach into Kemble. In the spirit of CAP 1616, this ACP has been developed proportionally to match the circumstances; although a relatively high number of movements, the proposal will be of low utilisation by in-scope aircraft only.

Aircraft Classification	2018		2019	
	Movements	%	Movements	%
Total Movements	31562	100	28442	100
GA (Rotary and Fixed Wing) Out of Scope	31180	98.8	28046	98.6
In-Scope Corporate/Business Jets and Helicopters	360	1.1	376	1.3
In-Scope CAT B-D MRO Aircraft	22	0.1	20	0.1
Total In-Scope Movements	382	1.2	396	1.4

Fig 1.0 – Table Showing In-Scope movements Measured Against Total Annual Movements

12. Using the latest airport annual movement statistics, before the impact of COVID-19, extracted from system-generated reports of the Airport's Red Atlas system, the Airport recorded 28,442 movements in the period 1 Jan to 16 Dec 2019, which is an unusually low year. 2018 recorded 31,562 movements over the same period. Over the past 10 years, annual movements have been consistently between 31,000 and 34,000.

13. Since both a take-off, circuit and landing is logged as a movement, this change proposal is concerned with defining an approach for arrivals (landings), the baseline of in-scope aircraft of 191 movements in 2018 and 198 in 2019 (0.6 and 0.7% of total movements respectively).

DESCRIPTION OF THE BASELINE

14. Although the baseline was discounted as an option during Stage 2, it is worth a narrative description of the current operations baseline for the in-scope aircraft arriving at Cotswold Airport. These aircraft, articulated in paragraph 2, already arrive at Cotswold Airport now and have done so for at least the past 10 years. This ACP proposes to formally define instrument approach procedures to support activity that already happens now; it is an enhancement to safety rather than new introduction of airspace or activity.

15. These in-scope aircraft currently arrive from either the national airways system (mostly international flights) or they can arrive at lower level under Visual Flight Rules (VFR), usually national and/or regional flights. From the national airways system, they are generally released by the sector (23) controllers through MALBY (Cotswold Airport's designated join and departure point in the national Standard Routing Document) and into uncontrolled airspace (Class G airspace). To date, these aircraft have been handed across from Sector 23 when departing the airways to RAF Brize Norton, under a Lower Airspace Radar Service (LARS) where both appropriate and capacity allows. This is enshrined with the extant Letter of Agreement (LOA) between Cotswold Airport and RAF Brize Norton.

16. Once clear of their own Controlled Airspace and/or own arrivals, RAF Brize Norton releases the aircraft to Cotswold Airports AFISOs and to fly under their own navigation, thus routing into Cotswold Airport. This is done in both Visual Meteorological Conditions (VMC) and during Instrument Meteorological Conditions (IMC), although IMC does require a visual identification with Cotswold Airport, essential a change to VMC to allow a non-instrument landing. At this point there is no radar or radio navigational aids nor is there a (old terminology) discrete approach available to the pilot; the pilot flies the aircraft both manually and visually in accordance with Standard European Rules of the Air (SERA). VFR aircraft, usually business jets, follow the same operational methodology, but in many cases are flying VFR, mostly in Class G and may elect for a LARS from RAF Brize Norton.

17. Furthermore, approaches to RW08 from the West, maybe under furthest reach of a LARS from RAF Brize Norton, but on many occasions the aircraft (up to Boeing 747) have been flown at low level visually through busy Class G airspace without any radar service. In all instances, the aircraft's tracks have varied considerably due to both weather and visibility as the pilot attempts to visually identify Cotswold Airport, then within the aircraft's performance limitations, establish the aircraft onto a safe approach to the runway in use. This method of flying the larger airliners is contrary to many of the operator's manuals for safe operation and many aircraft have either diverted after several attempts to find the Airport or have simply cancelled the flight until the weather is better.

18. Cotswold Airport's operational procedures and Safety Management System (SMS) already supports the safe integration of these in-scope aircraft within circuit operations/light aircraft activity. To date, there have been no reportable incidents between in-scope arriving aircraft and other light aircraft in the vicinity or within the circuit, in either VMC or IMC. In VMC, all in-scope aircraft, when the aircraft has notified it is established on an approach, the AFISOs manage the circuit and local aircraft within the limitations of a FISO Information service licence. Departing aircraft are held on the ground and aircraft within the circuit or locally in receipt of a

Cotswold Airport Basic Service are asked to remain clear of the circuit and warned of a heavy jet on final approach to the runway in use. This works well. In IMC, there is no VFR light aircraft traffic and those flying IMC are in receipt of a service from either RAF Brize Norton or another radar service provider and are flying in accordance with a pre-notified flight plan. Those arrivals, mostly business jets, fly IMC to the airport before 'a cloud break' into a visual approach, should the weather conditions and cloud base allow.

REVIEW OF STAGE 3 OUTPUTS

19. **Consultation.** The overwhelming response theme during consultation was very supportive of our proposals, across all stakeholder groups. All responses to the consultation are included in Reference B, along with Change Sponsor comments and/or justification where there is no impact on the final proposal and/or any action required by the sponsor. Analysis identified that only one response may impact the final proposal, a suggestion to increase the missed approach Altitude (2300 feet) considering the track miles of the circuit. This idea prompted a review of the missed approach altitude and thus to the Initial Approach Fix (IAF) altitude. The Approved Procedure Design Organisation (APDO) has computed and amended the designs to incorporate this response and the updated designs with a missed approach and IAF altitude now set at 2500ft, are included in this document and in the supporting Consultation Review and APDO Updated Designs Document; all three documents form the document set for Step 4A and are also available on the CAA's ACP portal.

20. **Full Options Appraisal.** The full Options appraisal was accepted by the CAA on the 31 January 2020. The outcome of analysis demonstrated the two remaining options to remain viable and recommended Option 1 as the preferred option. An option preference question was included within the Consultation Survey Form; Reference A refers. Although most responses support was agnostic of option, the consultation did show a slight preference for Option 2. Feedback from the CAA also highlighted that the transition from Full to Final Options Appraisal could be simplified and the arguments reduced, with clarity and a particular focus on the small magnitude of change, which translates into very marginal differences between options; most areas of analysis and feedback from consultation demonstrated the change is polarised between the baseline and a defined solution; options variance is agnostic to all communities and impacts, less other airspace users (GA) and ANSPs.

21. The Full Appraisal and Consultation Strategy both highlighted that those most affected by this proposal was likely to be GA and other airspace users. More than half (31) of all responses received were from the GA and glider pilot community, including the British Microlight Aircraft Association (BMAA), General Aviation Alliance (GAA), British Gliding Association (BGA) and business jet operators. All these responses provided strong support for the proposal, particularly the BGA, offering some very useful comments.

APPRAISAL OF OPTIONS

22. The remaining Options, which were consulted on during Stage 3, are described below. It should be noted that these have been updated following consultation to incorporate the increase in missed approach and IAF altitudes to 2500ft. Both options were supported and remain viable, post consultation.

Option 1 – Symmetrical Straight-In PBN Approach to both Runways

23. **Description.** Following refinement through the Full Appraisal and consultation, this option proposes a symmetrical straight in approach design, comprising Initial and Final approach fixes, onto either runway 08 approaching from the west (Fig 2.0), or runway 26 approaching from the east (Fig 3.0), depending upon the runway in use.

24. The aircraft would follow an ICAO standard 3-degree glide slope, using minimum power settings to arrive onto final approach and touchdown. By design, this means the aircraft would be flown visually under own navigation, or under a radar service, to the Initial Approach Fix. Depending upon the headwind, an in-scope aircraft would take between 3 ½ and 7 minutes to fly the entire approach. The dotted line shows the designed missed approach track, should the aircraft be unable to successfully land on the first attempt.

08 Straight-in Approach over VFR chart



Fig 2.0 –Common to both Options - Approach to Runway 08

26 Straight-in Approach over VFR chart



Fig 3.0 – Option 1 Approach to Runway 26

Option 2 – Non-Symmetrical PBN Straight-in approach to Runway 08 and a T-Bar approach to Runway 26

25. **Description.** Following refinement through the Full Appraisal and consultation, this option proposes a non-symmetrical approach design, which is a result of engagement and design development in Stage 2, where local airspace usage developed this as the optimal design development into a non-symmetrical approach; a product of successfully following the clear guidance in CAP 1616. Aircraft arriving to Runway 08, will follow the same approach as shown in Option 1 and at Fig 2.0. Aircraft arriving from the east onto runway 26 will join the approach from a northern or southern link to them line them up on the runway 26 centreline (Fig 4.0), which enables them to remain clear of RAF Brize Norton’s airspace for southern arrivals, including those from the national airways system. The option of a northern T join requires a zone transit through a portion of RAF Brize Norton’s controlled airspace.

26. The same ICAO compliant design methodology has been used by the APDO as option 1. The dotted line shows the designed missed approach track, should the aircraft be unable to successful land on the first attempt. This option was the marginally favoured option from consultation.

26 T-bar Approach over VFR chart



Fig 4.0 – Option 2 Approach to Runway 26

FINAL OPTIONS APPRIASAL - STEP 4A

27. Step 4A of CAP 1616 requires the change sponsor to update the designs (if required) and submit a Final Options Appraisal, stating this must be carried out with ‘more rigorous evidence for its chosen option(s)’ than was the case for Step 3B.

28. Less the very minor 200ft altitude design change in one segment of the proposed IAP, the outputs from Stage 3 have not necessitated any change to the appraisal of options since the Full Appraisal in Stage 3, confirming that for most stakeholders the impact is assessed as negligible. However, for other airspace users, it is worth highlighting that the Full Appraisal in Stage 3 recommended Option 1 as the most viable, taking a conservative view of the effect on GA and other ANSPs, particularly RAF Brize Norton, based on previous analysis and engagement, which resulted in our recommendation of Option 1, at that stage. Consultation developed a contrary argument; both GA and RAF Brize Norton stated a preference for Option 2, to focus aircraft away from RAF Brize Norton’s controlled airspace and to add more certainty for GA in a complex piece of local airspace.

Despite, there is little is separate the remaining two options, incorporating these views into the appraisal of options, the following analysis will show, we have changed our recommendation from Option 1 to Option 2, identifying that those communities have been more open to this change, than previously assessed; now only Option 2 will be developed.

29 Whilst considering the scalability and proportionality, as articulated in Appendix E to CAP 1616, analysis of these publications offers little guidance on quantitative analysis of this magnitude of change from the baseline, in this case 0.7% of current movements. The nature of this proposal (very small number of in-scope traffic and formalisation of current activity) indicates there is limited scope for a more detailed appraisal than was conducted in Stage 3; that said, where this has been possible it has been completed.

30. For the final options appraisal, it is worth highlighting up front:

a. **This proposal formalises activity that already takes place**, it is not introducing any new operations.

b. For both options, the approach design proposal to Runway 08 is the same.

c. For option approaches to Runway 26, the difference is marginal, a 5Nm difference within the defined approach track (which will be flown anyway for the straight in option, but perhaps not on the same track). Moreover, due to the small relative numbers of aircraft in scope for this proposal (0.7% of current movements) the **difference between options is immeasurable** for all but other airspace users, where traffic distribution may be different. For most impacts/effects, such as cost benefit, it is polarised between having a defined approach and current activity (the baseline); it is options agnostic.

d. Standard government analysis tools, such as WebTag A3 used to understand and assess differences in CO² emissions, local air quality and tranquillity cannot be manipulated to derive any meaningful outputs due to the negligible measurable change between either Options or the baseline.

31. The above points have been developed through the Initial, Full, and now Final Options Appraisal. It is the change sponsors view that there is negligible effect on ground stakeholders; the predominate effect, however small, will be to other airspace users, which is where analysis by option can be qualitatively separated.

32. The following community effects (noise, over flight, tranquillity and air quality), fuel burn, training and operational costs and infrastructure and wider society (greenhouse gasses) are therefore considered agnostic to options; an qualitative assessment is between the baseline and a defined PBN approach and thus will be assessed up front once rather than stated twice for each option. Where options effect on other airspace users can be assessed against each other, they have been subsequently assessed by option.

ANALYSIS OF IMPACTS AGNOSTIC OF OPTION

Cost Benefits

33. As previously described, this proposal seeks to formalise activity which already takes place. The **cost benefit appraisal is agnostic to proposed option**; the bi-polar benefit of delivering a defined approach will deliver a net financial benefit to the Airport, when measured against the baseline.

34. If the proposal is not approved and the variance of pilot-defined approaches remain extant, commercial operators are obliged to operate VFR on final approach, without any of the safeguards developed through this proposal. This may increase the number of aircraft who will be forced to divert in poor weather conditions. This would generate additional costs for these

operators, for example, fuel, handling fees, hotels, transport as well as crew scheduling. Furthermore, in a highly competitive business jet and MRO market, both the airport and on site MROs have major concerns that an airport without a defined IAP will have a significant long term negative impact on the attractiveness of the airport and the MRO businesses.

35. With no infrastructure costs, the implementation cost is the same for both options. The only costs associated with an option agnostic RNP approach are design and implementation costs. These include Design, Validation, Consultation, Certification, Own ANSP training and AIP Publication (including GPS coding). No quantitative estimate is provided for each component, as these are commercially sensitive. Overall, it is expected to be in the region of £100k cost to the Airport.

36. This combined with the very small magnitude of change (0.7% of current movements) does preclude a worked cost-benefit model to assess the differences between options, as defined in the Government Green Book and as per Appendix E to CAP 1616; the scale of change is considered negligible, particularly when accounting for the current levels of in-scope aircraft cancellations and missed approaches due to weather or operational limitations not allowing the aircraft to land. For transparency, it is worth presenting the forecasted growth over the next 10 years based on historical data of cancellations, as shown in the table below:

Description	Baseline			Implementation			Initial Growth			See Note 2		
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Total Number of Airport Annual Movements	31562	28442	20000 (Note 1)	31000	32000	32000	33000	33000	34000	34000	34000	34000
Total No of in-scope IAP Landings Per Annum (This Proposal)	191	198	100	251	251	251	396	396	487	487	487	487
Estimated Value to the Airport of this Proposal (£M)	0.283	0.283	TBC (Note1)	0.348	0.348	0.348	0.567	0.567	0.635	0.635	0.635	0.635

Note 1: COVID-19. The Airport has been closed since 26 March 2020. It remains closed and forecast for 2020 remains pessimistic

Note 2: The increase will only be enabled by basing business jet aircraft at Costwold Airport, which requires a new hangar build (under consideration)

37. Based on the paucity of similar sized GA aerodromes in the UK SW and the business demand within the Cotswolds area, it is estimated that a shift in growth will not occur until 2023 with 396 planned IAP arrivals, just over one per day. It is difficult to predict the scale of increase beyond 2025, particularly considering the COVID19 implications on the aviation industry. The limiting factor is a current lack of hangar availability at the Airport, which means any in-scope aircraft in simply transiting through the airport, rather than based. In general, the revenue from based in-scope aircraft far exceeds that of transiting visiting aircraft. Any New hangar build (which is currently in the initial planning/consideration stages) requires significant capital investment; and investment that will not be made until implementation of this proposal has demonstrated a financial return.

38. Although the small scale proportional nature of this proposal, precludes any measurable cost benefit or impact on the local communities, engagement with Swindon Borough Council and Gloucestershire Council has suggested a strong opportunity link can be made between the successful implementation of this proposal and their local council economic development plans (LEIP). Although an indirect consequence, this proposal will enable the attraction and development of national and international business into the region. These are synergistic benefits to Gloucestershire, Wiltshire, and Swindon Borough Councils of Cotswold Airport developing as a business aviation hub. However, this is yet uncoded as the benefit is indirectly linked to this proposal and not led by the Airport.

39. **Training Costs.** There are no training costs required for commercial operators to participate in the RNP approach as regulation No.539/2016 Performance Based Navigation (PBN) requires all pilots who fly PBN routes or procedures to have PBN endorsement on their

licences from 25 August 2018 and instrument approach training for commercial pilots (both helicopter and fixed wing) is a mandated requirement. It is therefore expected that all commercial operators using the Instrument Approach Procedure will have trained aircrew. Equally, the recent publication of Regulation (EU) No 1048/2018 it is expected that commercial operators will introduce LPV capabilities into their fleets; there may be small number so legacy aircraft arriving for the MRO, but this is likely to be single figures as most aircraft come straight from service. Given these assumptions, no quantitative assessment is made.

40. **Fuel Burn.** It is not proportionate to attempt to monetise any commercial aircraft fuel burn reductions created by this proposal, although it should be noted that the benefits of a defined approach with a constant low power descent decrease fuel burn whilst on the GPS approach, as reported by a CAA Paper. Equally, it is not proportionate, nor realistically possible to quantify or monetise any changes to GA fuel burn.

41. **Impact of Increased Capacity Costs.** There are no air transport movements, passenger numbers or cargo carried as an outcome of this proposal. The Flight Plan options this proposal would introduce could allow other Commercial Air Transport (CAT) to avoid capacity constrained areas and avoid consequential delay and cost. However, this is not quantifiable, and no specific capacity increase is assumed by this proposal.

Communities - Noise Impact on health and quality of life

42. As a General Aviation airport, no noise data exists to provide a numerical baseline for in-scope aircraft arrivals. It is suggested that to attempt to measure the noise baseline of the 0.7% annually of current in scope aircraft arrivals, against the significant levels of background noise of light aircraft, both Kemble's other 99.3% of its movements and other local GA and military aircraft, operating continually in uncontrolled airspace on any self-defined routing would present significant challenges and it would be neither proportionate or provide any statistically meaningful data. Equally, the variance of in-scope arrivals is between 1 and 3 per day from a monthly average of 21 in-scope arrivals, on implementation of this proposal.

43. Within this context, particularly below 4000ft, it is suggested (with a high degree of confidence) that any noise readings, measuring dBA over a duration of 16hrs when the airport is closed for half of that period, will not change and any measurement would not deliver any statistically viable data that can then be used in WebTag analysis. Furthermore, the cost benefit of contracting an external company to do this would far outweigh any benefit of doing so. The latter has far reaching consequences; for GA, non-commercial airports, most of which are just economically sustainable.

44. Without any viable quantitative data, a qualitative assessment of noise has been used to aid analysis; two factors have been considered: using local annoyance as an indicator of impact and the published noise benefits of a low power continuous descents. No complaints for aircraft noise related to in-scope aircraft in this proposal have ever been received.

Communities – Overflight

45. There is no assessed effect on the local communities. The local Cotswold area which is -scope for potential change in this ACP is sparsely populated. Narrowing the focus from the local Class G airspace and onto the defined approach, the bulk of the overflight between 4000 ft and down to 1000ft is over open countryside or sparsely populated hamlets/single dwellings.

46. Under the aircraft tracks this proposal's IAP routing would create, there are no significant populations larger than a hamlet until after the final approach fix. The local villages (Kemble and Ewen to the east of Runway 26 and Ashley and Culkerton to the west of Runway

08) are within the final approach segment and within 2Nm from the end runway threshold. In both instances, there is assessed to be negligible changes [from the baseline of current in-scope operations] to the vertical and horizontal final approach segment from the Final Approach Fix 4.8Nm from the Airport. This is further supported by the low numbers of in-scope aircraft on final approach (0.7%) in comparison to the remainder of the Airport's movements and wider transiting traffic within the surrounding Class G airspace.

Communities – Tranquillity

47. The Cotswold Area of Outstanding Natural Beauty (AONB) is to the west of Kemble. The AONB authority were engaged during Step 1b, Stage 2 and through consultation. During Stage 2 analysis was made against their published Management Plan, namely Tranquillity and Dark Skies. It is estimated that there will be no change in the levels of tranquillity and no quantitative assessment is made.

48. Kemble is not planning to operate the approach at night, thus mitigating the Dark Skies consideration. Both options, following a straight in approach to runway 08, take the shortest route across the AONB at between 2000 and 2500ft. In contrast to the current baseline, with pilots on in-scope aircraft flying their self-determined visual approach, this is an improvement to scatter.

49. Furthermore, the lower airspace (below 7000ft) above the Cotswold AONB is Class G airspace. A significantly higher number, by at least a factor of 100, of other aircraft will fly over the AONB, with perhaps as many as 2500 per month, based on Kemble's light aircraft movement. When accounting for all the smaller airfield and grass strips in the area and the two glider sites within the AONB, the number is significantly higher. All these movements contribute to overall aviation noise, overflight (visual intrusion) and air quality.

Communities – Air Quality

50. Below 1800ft and at 4.8Nm from touchdown, there is no discernible difference concerning air quality in terms of the traffic distribution of in-scope aircraft between the baseline and this proposal. This is driven by required aircraft performance to fly a safe approach during the final approach segment. And whilst a defined approach with a low power continuous descent will reduce noise and emissions, the low utilisation of the small percentage of Kemble's movements will not deliver any measurable benefit at this altitude and distance; some benefit maybe realised above 1800ft in provide more efficient routing from the initial approach fix and from any transitional routing, although this is outside this ACP.

51. In terms of Greenhouse gas impacts, WebTag A3 could not provide any useful data for so few aircraft that this proposal aims to address. Using 2019's movement data, it is assessed that greenhouse gas metrics are not possible to measure given this scenario and there would be no discernible change in impact.

52. However, although unquantifiable, this concept would likely yield a positive Net Present Value which reflects a benefit i.e. a CO2 emissions reduction against the current baseline. Observation and ADS-B tracking of aircraft have shown many approaching aircraft fly a stepped down visual approach at varying airspeeds and, in many instances, have flown lower than they would if an ICAO compliant GPS approach were followed.

Safety

53. The full safety case supports this application and the wider assessment under CAP 1122 (Applications for Instrument Approach Procedures to Aerodromes without and instrument

runways and/or approach control) is contained within the Final Proposal (Step 4B) and underpinned by previous Bowtie¹ work. These risk mitigations and considerations will assure that all associated risks are as low as reasonably practicable to allow an exemption within CAP 168 and Article 172 of the Air Navigation Order. In respect of safety, this proposal (agnostic of individual option) should satisfy the CAA of the safety in provision of air traffic services maintained the highest standards of safety for the following reasons:

- a. The proposed PBN procedures for both options provide a safe method of landing an aircraft at Cotswold Airport in poor weather conditions, in terms of low cloud ceiling and visibility.
- b. The proposed procedures will be designed in accordance with ICAO and CAA standards, customs, and practices.
- c. The procedure would be operated without a hold, due to a lack of air traffic service capability to safely manage traffic in a hold or in the vicinity of a hold.
- d. It will be used very infrequently compared with the general level of traffic.
- e. It will be used by aircraft types which already operate at the Airport.

ANALYSIS BY OPTION

54. Before analysis and comparison of the remaining impacts, which can be assessed by option, it is worth describing operational airspace consideration which are common to both options.

55. The Change Sponsor identified several activities at the start of this process and engaged with key stakeholders. In terms of GA, these have included the Gliding Communities, in particular BGGC at Nympsfield advised as c10k movements per annum and Cotswold Gliding Club at Aston Down, who advised c20k movements per annum, resulting in a new Letter of Agreement with Aston Down which is c3.5Nm NW of Kemble. This includes a Sailplane Accessible Area (SAA) in the underused NW quadrant of Kemble's ATZ to both assist in National Gliding Competitions and more importantly place all associated glider traffic away into a known area and from our extended centreline to RW08, noting the approach to RW08 is common to both options.

56. Oaksey Park (GA grass unlicensed airfield) is to the SE of Kemble, who advised c15K movements per year. Due to the proximity of both Aston Down and Oaksey Park, we have open lines of communication. There are small grass strips within a 10Nm radius from Kemble, most with less than a handful of based aircraft. Additionally, most based GA aircraft route south from Kemble to a training area south of Lyneham. GA use of this airspace is dependent on weather conditions and seasonality but can be assumed to exist generally throughout the year, although less so in poor weather (IMC). This proposal is expected to cause a relatively low effect on GA users and on the 99.3% of Kemble's annual GA movements.

57. In terms of other commercial airports, analysis of the published approach and departure routes to and from the national airways system and discussion (as part of the ACP engagement, with minutes on the ACP site) with Bristol suggest their routing is south of any Kemble SRD route and both relevant instrument departures routes are above FL60 to join the airways, thereby well above an approach to Kemble; both Bristol instrument departure routes

¹ <https://www.caa.co.uk/Safety-initiatives-and-resources/Working-with-industry/Bowtie/About-Bowtie/Introduction-to-bowtie/>


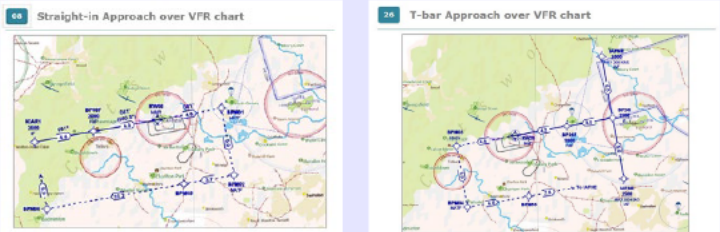
have at least 2500ft vertical separation above any Kemble RW08 IAP traffic, again this is common to both options.


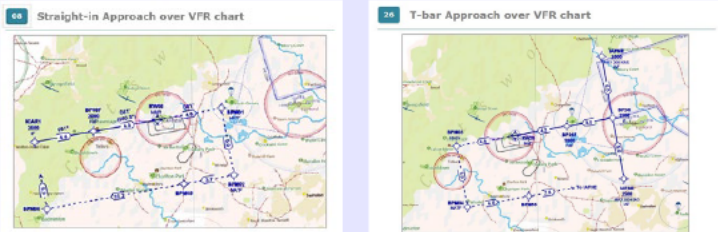
58. For RAF Brize Norton's standard instrument arrivals and departures routing, the only potentially conflicting instrument departure is to MALBY for both RW09 and RW27 as this is the same airways joining point for Kemble traffic. However, in association with our current LOA with RAF Brize Norton, Brize Radar provides a LARS service from Kemble's SRD route to de-conflict with their own traffic and to position for an approach to Kemble; Sector 23 will deconflict any traffic departing the airways at MALBY, in association with the SRD. We anticipate amending the LOA with RAF Brize Norton, with finalised proposed IAP designs during Stage 4 of the ACP to be more specific in the transition from SRD to IAF on the approach, for both RW08 and RW26. This may necessitate an SRD change of SRD to better provide the transition. Any non-airways traffic IFR traffic inbound to Kemble most likely has a LARS service from RAF Brize Norton (within their capacity) and may include an approach radar service through Brize Zone's controlled airspace, if requested by the PIC. Current low-level Cat A and B, such as a PC12, arrives at Kemble VFR, usually entirely within Class G airspace.

59. From the East, common to both options on approach to RW26, we are proactively trying to eradicate an unhelpful chart symbology associated with South Cerney and its former use for parachuting which creates the false impression of a 1.2 Nm wide choke point, funnelling GA traffic between Kemble's ATZ and South Cerney. Both Kemble and Brize have raised this to the relevant authorities. This is of concern, since following approval, the AIRAC publication of the IAP will fly through this area, although IAP and charting symbology will mitigate by showing feathered arrows on the chart, which is associated with an instrument approach. This is 7Nm aligned from each runway; for RW26 this is through the inactive marked paradropping site.

60. The Full Appraisal at Reference C, highlighted General Aviation, including the sport of gliding, and other Air Navigation Service Providers (ANSPs) as those potentially most effected by formalising the current level of in-scope business jet activity. Based on the feedback received through consultation, these groups that were previously considered the most effected, became the most vocalised in supporting this proposal. Importantly, responders were encouraged to articulate a preference for one of the two options and state why they had done so. These comments have also been considered in the comparative analysis between the two options, both measured against the baseline. As highlighted previously in this document, the proposal's formalisation of current activity and application of proportionality, due to the marginal scale of change, has not allowed quantitative assessment. Analysis is therefore qualitative.

61. Comparative Analysis of the impact on GA, other airspace users and ANSPs is in the following tables:

<p style="text-align: center;">Option 1</p> 	<p style="text-align: center;">Group</p>	<p style="text-align: center;">Impact</p>	<p style="text-align: center;">Level of Analysis</p>	<p style="text-align: center;">Option 2</p> 
<p>Option 1 Description/Assessment</p> <p>This option is within Class G airspace; none of the options change access to this airspace, nor seek to establish new areas of controlled airspace. It is acknowledged that a defined approach, even in Class G airspace, will create areas of avoidance, such as approach fans on an air chart and in the Kemble approach AIP plate entry would require careful Air Navigation Service Provider (ANSP) management and signed agreements between Kemble, RAF Brize Norton and RAF Fairford to mitigate against any effect and associated risk of operating close to both, although this activity already exists in this area.</p> <p>In operational terms, the approach tracks flown for Option 1 are similar to the long finals currently flown by in-scope aircraft.</p> <p>Based on this, and the low utilisation rate of the IAP, there is no assessed impact on GA for Option 1.</p>	<p style="text-align: center;">General Aviation (GA)</p>	<p style="text-align: center;">Access</p>	<p style="text-align: center;">Qualitative</p>	<p>Option 2 Description/Assessment</p> <p>This option does ensure transitions for in-scope Kemble traffic to the RWY 26 approach are directed away from RAF Brize Norton, with the northerly leg close to the RAF Brize Norton NAXAT termination from their STARS routing from MALBY and aligning the Southern leg towards MALBY, noting MALBY is the national airways release point in the Standard Routing Document for Kemble arrivals.</p> <p>This option incorporates an option of a northern leg join to RW26 with a zone transit through RAF Brize Norton's (Class D) controlled airspace. This provides an enhanced separation from GA within that segment and keep our in-scope aircraft away from the busy choke point area whilst self navigating to the start of the IAP.</p> <p>Additionally, most based GA aircraft route south from Kemble to a training area south of Lyneham. GA use of this airspace is dependent on weather conditions and seasonality but can be assumed to exist generally throughout the year, although less so in poor weather (MC). This proposal is expected to cause a relatively low effect on GA users and on the 99.3% of Cotswold Airport's annual GA movements.</p> <p>This option reported a slight preference from GA during consultation. This option may increase GA access through a more defined approach track to RW26, by placing all approaching aircraft into a defined track or partially within Class D airspace, compared with both the baseline and Option 1.</p> <p>This option is assessed as delivering a positive access benefit for GA.</p>

<p style="text-align: center;">Option 1</p> 	<p style="text-align: center;">Group</p>	<p style="text-align: center;">Impact</p>	<p style="text-align: center;">Level of Analysis</p>	<p style="text-align: center;">Option 2</p> 
<p>Option 1 Description/Assessment</p> <p>The Change Sponsor identified several activities at the start of this process and engaged with key stakeholders. In terms of GA, these have included the Gliding Communities, in particular BGGC at Nympsfield advised as c10k movements per annum and Cotswold Gliding Club at Aston Down, who advised c20k movements per annum, resulting in a new Letter of Agreement with Aston Down which is c3.5Nm NW of Kemble. This includes a Sailplane Accessible Area (SAA) in the underused NW quadrant of Kemble's ATZ to both assist in National Gliding Competitions and more importantly place all associated glider traffic away into a known area and from our extended centreline to RW08. Oaksey Park (GA grass unlicensed airfield) is to the SE of Kemble, who advised c15K movements per year. Due to the proximity of both Aston Down and Oaksey Park, we have open lines of communication. There are small grass strips within a 10Nm radius from Kemble, most with less than a handful of based aircraft.</p> <p>It is noted that this option is one favoured by the local glider community as it creates minimal impact to the west of Kemble and routes Kemble's in-scope approaching aircraft through an area of low utilisation by gliders. However, in the east of Kemble, it may exacerbate a known choke point between Kemble's ATZ and South Cerney aerodrome's parachute dropping zone</p> <p>Since this is common to both Options, there is little to differentiate glider access impact between the two options.</p>	<p style="text-align: center;">GA Local Gliding</p>	<p style="text-align: center;">Access</p>	<p style="text-align: center;">Qualitative</p>	<p>Option 2 Description/Assessment</p> <p>Access to local gliding is mainly focussed (through engagement and consultation), with activity to the west of Kemble, on approach to RW08.</p> <p>Since this is common to both Options, there is little to differentiate glider access impact between the two options.</p> <p>For both options consideration for known areas of glider operations, and mitigations already established during this CAP 1616 process has not constrained or impacted their movements .</p> <p>Equally, a new LOA has just been signed between Aston Down (3.5 Nm NW of Kemble) and Kemble to allow gliders access to a Sailplane Accessible Area on the NW quadrant of Kemble's ATZ. This supports their operations, particularly for gliding competitions and keep gliders clear of the 08 approach.</p> <p>There is no assessed impact to Glider Access in either Option.</p>

<p style="text-align: center;">Option 1</p>	<p style="text-align: center;">Group</p>	<p style="text-align: center;">Impact</p>	<p style="text-align: center;">Level of Analysis</p>	<p style="text-align: center;">Option 2</p>
<p>Option 1 Description/Assessment</p> <p>The only major commercial airport in this area is Bristol airport. Initial discussions with Bristol Airport during Stage 2 suggested there is no airspace impact of this proposal on Bristol Airport's operations; both options are the same for a 08 approach from the west and remain separated from Bristol's airspace and their arrival and departure routes.</p> <p>Both RAF Fairford and RAF Brize Norton operate in the same airspace. The proposed approach to Runway 26 for Option 1 starts overhead of RAF Fairford's ATZ; this conversely applies to their aircraft approaching Fairford's runway 09 overhead Kemble's ATZ. Aircraft arriving at the Initial Approach Fix (IAF) for Kemble's runway 26 may require a zone transit through RAF Brize Norton's Class D airspace and RAF Fairford's MATZ, when activated by RAF Brize Norton, but will define their own routing prior to this point. Without a requirement for a zone transit (and in particular VFR traffic) could join the IAF overhead RAF Fairford's ATZ from any direction in a similar way they do now onto a self defined long final approach into Cotswold Airport. This is entirely dependent upon the route flown by the aircraft en-route to the IAF. Tactically, this is no different from the current baseline, except that it will focus aircraft onto a defined area/point.</p> <p>Although an improvement against the baseline by providing a defined, repeatable routing from the IAF, it does not improve upon the baseline beyond the IAF.</p> <p>An acceptable option, that based on the low utilisation of the Cotswold Airport IAP is not assessed has impacting these ANSPs.</p>	<p style="text-align: center;">Airport/ANSPs</p>	<p style="text-align: center;">Effect on other ANSPs/Airports</p>	<p style="text-align: center;">Qualitative</p>	<p>Option 2 Description/Assessment</p> <p>For this option, the northerly leg of the RWY 26 RNP approach does interfere with RAF Brize Norton's Class D airspace and will need an amended LOA agreeing to a zone transit to fly the initial to intermediate approach fix. This is subject to RAF Brize Norton's agreement, although with tactical coordination (that is already in place to service Kemble's current own navigation arrivals of in- scope aircraft) this would mitigate any effect on RAF Brize Norton's capacity, noting their relatively low levels of movements in comparison to other Class D airspace ANSP's, such as Bristol.</p> <p>In contrast to Option 1, this option ensures all aircraft either join from the south remaining clear of RAF Brize Norton's airspace, or join on the northern leg under their control within their Class D airspace for that segment. This keeps all aircraft on a focussed track away from RAF Brize Norton, a more predictable and separated ATM option. This is the favoured option from DATM/RAF Brize Norton.</p> <p>Equally, although above RAF Fairford's ATZ, this option provides known tracks north and south to the intermediate fix overhead their ATZ, with 500ft separation. These tracks are at 90degrees from their USAF/UK MI published ILS STARS routes to RW09 and 27, thus providing maximum separation. As with both option, the segment aligned with the extended 26 centreline for Cotswold Airport, will only be used when RAF Fairford is using Runway 27 and RAF Brize Norton using RWY 27; both the latter controlled by RAF Brize Norton.</p> <p>As such, with a draft LOA already developed, this option is assessed as the one which has the least impact to RAF Brize Norton and by association RAF Fairford.</p>

Conclusion and Next Steps

62. Both options in this proposal has been developed following the submission of a Statement of Need, development of Design Principles and open development of the design through engagement during Stages 1 and 2 and during consultation in stage 3. Both options have been assessed through the Initial, Full and now Final Appraisal as suitable and both were supported during consultation, although with a slight preference for Option 2.

63. This proposal, though all the appraisal work, engagement and consultation has assessed a negligible impact on all stakeholders. For all by other airspace users, any assessed effect or benefit is agnostic of option and simply a bipolar assessment of having an IAP versus the current operating baseline. The proposal is for a very small number (0.7% of current traffic) of aircraft to utilise and will be controlled through a PPR slot system limited to a maximum of 5 aircraft per day, once implemented.

64. It is not a proposal that creates new levels of activity, its is simply formalising activity that already takes place; its formalisation will deliver a safer, better understood air picture, with no discernible change to be noticed by any stakeholders. For this reason, the assessment throughout has been proportionated, with the comparatively very low number of in-scope aircraft. Assessment has been difficult; none of the standard government recommended and used analysis tools, such as WebTag A3 and the recommendations within the Government's Green Book for environmental analysis have been suitable for such a small magnitude of change. Equally, a cost benefit analysis, attempted in previous appraisal work has been demonstrated to provide little benefit; the cost benefit is assessed to entirely be focused on its effect to alleviate airport lost revenue under the current method of operation; any indirect benefits will be delivered by success of simply having an IAP, agnostic of option.

65. The specific challenges highlighted in the conclusion at Stage 3 have mostly been addressed; specifically, an updated LOA with RAF Brize Norton (taking into account this proposal and their own ACP), a new LOA with the gliding club at Aston Down and continued and expanded via engagement opportunities with the local councils and RAF Fairford. These will continue to be developed for the submission of the final proposal and supporting safety arguments in Step 4B.

66. Although there is little to differentiate the two options, which have remained viable throughout Stages 2 to 4, both subsequent analysis in this document, supported by both supportive comments and responses during consultation have highlighted Option 2 as the most suitable and favoured option. This is contrary to the change sponsors recommended option (1) in Stage 3; a demonstration of the utility of CAP 1616 and an engaged consultation. This option provides the most certainty to GA/other airspace users, placing our arriving in-scope aircraft into a larger known greater defined track miles routing than option 1. The northern and southern join legs also focus aircraft away from the east west lateral routing of aircraft arriving and departing both RAF Brize Norton and Fairford on their instrument arrival and departure routes (STARS and SIDs) outside their controlled airspace; the northern leg, in particular inside RAF Brize Norton's controlled airspace, will allow RAF Brize Norton to segregate our in-scope aircraft and their (including RAF Fairford's) arrivals and departures during busy periods. This option is the one supported by RAF Brize Norton as the local radar service ANSP and area of controlled airspace. To facilitate development in Step 4B for the final submission and for the APDO, **Option 2 will now be fully developed as the recommended option.** Option 1 will not be developed further.

67. These options have been developed thus far with assistance, input, consultation feedback and effort from senior representatives of the GA and local gliding communities, RAF Brize Norton and RAF Fairford staff and invaluable assistance and support from our local community airport liaison committee. The next step is the submission of the formal proposal and supporting safety arguments on the 17th July 2020 for CAA decision on the proposal.