Bristol Airport ACP Stage 2 'Develop & Assess' Step 2A – Options development

Aviation stakeholder engagement (workshop 1)
25th February 2020

Attendees:

[redacted] – NATS, Bristol ACP Airspace Design Lead
[redacted] – NATS, Airspace Change Specialist
[redacted] – NATS, LAMP ATC Lead
[redacted] – NATS, LAMP Lead
[redacted] – NATS, Airport Engagement Lead
[redacted] – Bristol Ops
[redacted] – Bristol GM
[redacted] – Light Aircraft Association
[redacted] – Exeter Airport
[redacted] – Brize Norton
[redacted] – Gloucester Airport
[redacted] – Ryanair
[redacted] – Bristol and Gloucester Gliding Club
[redacted] – Osprey, Exeter Airport
[redacted] – TUI Airways

Introductions

Presentation given on CAP1616 process and work completed so far.

Q - has a typical Bristol traffic fleet mix been looked at? i.e. turboprops/ jet mix
Yes; the performance of different aircraft types has been discussed in regard to the gradient of possible routes. This will form part of the more detailed design work and supporting analytics.

Discussion on design elements

Q - what is the optimal number of Holds for Bristol?
Detailed analysis on future growth needs to be conducted but two Holds is anticipated to be sufficient. A high level en-route Hold could also be considered. Although a reduction in airborne Holding is desired in environmental terms, it is anticipated that a need for tactical Holding in the vicinity of the airport will continue due to both the volatility of inbound demand peaks and also the unpredictability of weather related disruption.
It is therefore unlikely that the need for Holding would completely disappear in the future.
Bristol will continue to engage on and analyse the best location for Holds. Several factors will be considered such as any known restrictions on the number of available levels different Holds locations might provide, and the needs of integration with the network.

Suggestion that Hold location A would be used a lot more than Hold B e.g. anticipated diversions in Low-vis conditions may favour aircraft holding to the North-East.

Holds require a large amount of CAS as Hold containment is typically based on protected airspace defined for obstacle clearance, rather than RNAV specifications (unlike routes). Studies conducted by NATS and dialogue with CAA has currently concluded that the current method of defining RNAV holding (i.e. designating an RNAV fix and describing the intended radial) is not adequate to produce a predictable footprint from which other routes or holds can be more closely spaced. This project will continue to investigate this issue but is mindful of CAS needs associated with any new Holding facilities.

Q - would the Holds serve both Runway ends?
Confirmed.

Point-merge system discussed – this has been assessed as part of the early design options work, but due to the very large amount of CAS required to contain both the arcs and associated Holds this option is not currently being pursued for the Bristol ACP.

Q - is it most environmentally friendly to prioritise efficient climbs rather than descents?
Surprisingly analysis from Eurocontrol shows that it is environmentally better to prioritise descents without levelling off (rather than climbing).
Ideal design would have continuous climbs and descents; but the above advice will be prioritised.
See "FLIMSY CCO CDO" notes:

Post meeting note: Advice is being sought from ACOG, however for airspace change below 7000ft the UK guidance which prioritises minimising adverse impact due to noise is clearly stated.

The initial illustrations completed by NATS Procedure Design Group assumed a 250kts maximum speed; a lower speed could potentially assist in a tighter turn (if possible).

Transition altitude is assumed to be 6,000ft so a Hold min stack level is anticipated to be the Flight Level equivalent of between 7,000-8,000ft. Descent to touchdown from this height should ideally be around 22 miles from touchdown to allow a continuous descent.

Current procedures used elsewhere

Spanish Canary Islands – long, protracted RNAV arrivals with well-defined shortcuts available. Benefit is when traffic levels are high, crew are aware where they should be flying.

Example shown in workshop – RNAV STAR to Lanzarote. RNAV arrival to Runway 03 – constraints included on waypoints but in reality, shortcuts are usually given. Sharp RH turn shown which is often shortcut. Controller workload is kept relatively low as the route can be easily followed. Described as an alternative to a point-merge system. Designs such as this are flexible, but this example has the benefit of a large over-sea area.

Q – do flights have to fuel for the entire route? Yes.
Challenge from the CAA will be extra mileage which has to be fuelled for (point-merge also has this

issue).
Pilots can carry discretionary fuel based on their understanding of a route but CAA would not take this into consideration when assessing the environmental impact of a design.

Action: update slide 44 – note on 3% climb

Q - terrain clearance has been mentioned – why is this a problem?
Not a problem, just that policy for containment of Holds is that the PANS-Ops obstacle clearance protected airspace is used as a proxy for CAS containment of Holds.

Noise Abatement Procedures
Q – are NADP1 (Noise Abatement Departure Procedure – 1) departures operated?
Noise Preferential Routes are published but NADPs are more of an important consideration for airlines than ATC/ ANSPs.

Noise abatement operational procedures are employed today to provide noise relief to communities around airports from both arriving and departing aircraft. PANS-OPS (Vol 1) contains guidance for the development of a maximum of two noise abatement departure procedures (NADPs). They are not currently published for Bristol SIDs, however they may offer the potential to mitigate noise as part of the SID re-design work.

NADP1 – designed to mitigate noise closer to the airport which can be achieved by a very steep climb up to 1,000-1,500ft initially before a less steep climb onwards. NADP1 procedures are typically less fuel efficient than NADP2.
NADP2 – designed to mitigate noise further out from the airport along the departure path, and use a less steep initial climb. Manchester Runway 05 departures was a specific example given where NADP2 is mandated due to known noise issues.

Examples of noise abatement procedures:

- Continuous Descent Arrival (CDA)
- Noise Abatement Departure Procedures (NADP) – covered above
- Modified approach angles, staggered, or displaced landing thresholds
- Low power/ low drag approach profiles
- Minimum use of reverse thrust after landing

Noise abatement procedure profiles are based on different aircraft types and specific aerodrome information; they allow airlines to plan the most efficient route. Different aircraft criteria meeting requirements will get dispensations.

In the UK, aircraft normally climb to around 1,000ft before retracting flaps. This is quieter than the use of an NADP1, whereby the flaps would not be retracted until later. Another option for noise mitigation is to specify a maximum speed on departure (e.g. 200kts) which would require the flaps to be left out for longer; achieving a steeper climb and similar benefits to the use of a noise abatement procedure.

If a route was positioned over/ close to Bristol, the use of a noise abatement procedure (or an alternative operating technique) could help to reduce the impact on overflying the city.

Slide 15 – showing current departures and arrivals

Q – looking at this image of current traffic, what change do we want in the future?

One of the objectives of Bristol's airspace change is to make better use of improved technology which would lead to more focussed and defined RNAV routes with less controller intervention required. Benefits will include greater predictability, reduced ATC and cockpit workload and lower environmental impact.

A lot of the traffic shown is high-level. The network design will be much more defined than what is currently flown – a much more predictable network. Currently, as shown on this visual depiction, flights very rarely fly the full SID e.g. all the way to WOTAN.

Suggestion received that other traffic surrounding Bristol and Cardiff would be useful to see on a similar diagram. This will be pursued by examining data sources.

LAMP V1 prototype shown

Airports provided a "wish list" of letterbox locations to the LAMP design team which have been fed into the prototype.

Q - which airfields fed into this?

15 airports including Biggin Hill, London City, Manston, Bournemouth, Bristol, Cardiff, Heathrow, Gatwick...

Q - what will be delivered first – upper or lower level changes?

Currently as part of LD1 (LAMP Deployment 1), airports and LAMP (NERL) are targeting the same implementation date and will need to work collaboratively throughout i.e. airports should provide the en-route design team with their proposed designs.

The design highlights the need for collaboration between low- and high-level design work. Difficult to avoid impacting the lower level design by making changes above, and vice versa.

Q – could the change sponsors base their designs on a similar concept to how American procedures are operated? i.e. prescribed level restrictions and a much more systemised design.

Current systems unfortunately do not support automatic in-built level restrictions – this will continue to be a manual instruction for the foreseeable future (out of scope of this deployment/ associated ACPs).

The integration of military activities around Salisbury Plain is quite difficult as it is not managed similarly to other military bases; more autonomous and can get left "live" unintentionally when not actually active.

Current known issue – interactions of Bristol/ Cardiff departures with Manchester arrivals.

Q - long-haul operations may require fuel dumping in emergency; has this been considered?

Out of scope of this proposal. Currently this is completed via tactical instruction from ATC e.g. over water and this is not expected to change.

Consideration of emergency procedures and the type of aircraft which may have to perform these.

Summary of discussion points (most to be picked up in the later stages of CAP1616, Stage 3 onwards):

- Look at track data up to 7,000ft – examine how/ where CAS is being currently used
- Look at track and height data of a/c outside CAS to understand where traffic flies and what the constraints are
- Analysis needed for climb and descent profiles and consideration of whether CAS bases/boundaries can be modified
- Coordinated procedures where possible; cognisant of neighbouring airports and airspace usage
- Examine external track data around Bristol Airport e.g. around Cotswolds
- Consideration of Noise Abatement Departure Procedures (feedback to Analytics & PDG)
- Speed restrictions for better climb profiles
- Ryanair to send some sample aircraft performance data to Bristol

Aviation stakeholder engagement (workshop 2)
26th February 2020

Attendees:
[redacted] – NATS, Airspace Change Specialist
[redacted] – Bristol Ops
[redacted] – Bristol GM
[redacted] Western Region British Balloon & Airship Club
[redacted] – Bristol and Wessex Aeroplane Club
[redacted] – MoD
[redacted] – Bath and North Wilts GC
[redacted] – Bath and North Wilts GC
[redacted] – NATS, Cardiff Airport
[redacted] – Mendip Gliding Club
[redacted] - Stobartair
[redacted] – Cardiff Airport

Q - radar tracks have been shown – what is the ideal future picture for Bristol Airport? More defined swathes?
Difficult to answer; Bristol want to best achieve Design Principles which do not dictate a specific design. However, the use of improved technology may introduce more defined tracks in the future, which can be used to mitigate noise impact.

Design Concepts

Q - how many of the proposed routes may require new CAS?
This hasn't been fully explored but it is likely that some – such as Runway 27 Departure Route 6 – will require new CAS (although temporary). This will have to be discussed with stakeholders e.g. if a design may impact MoD operations.

Q – is Bristol Airport open to flexible use of airspace (FUA)?
Something that we have to consider as part of our designs.
Q - FUA not Bristol's top choice?
It completely depends on circumstance – a compromise may have to be made with other airspace users. MoD operations specifically noted such as the flexible timings used in the SAIP AD5 proposal.

Noise abatement procedures currently exist although Bristol itself is flown over – suggestion that an earlier turn could potentially be used to mitigate this and avoid Bristol.

Airline feedback that wrap-around options would create a much higher fuel burn for airlines.

The diagrams show routes broadly heading towards current airways. A complete "blank sheet of paper" approach is likely not feasible as there will always be a known east-west flow of traffic e.g. EGLL departures & arrivals. Similarly there will always be known north-south routings, from ScTMA/ MTMA linking with the network through Brest.
However, it should be noted that some historic airway/ route locations are based around traditional navaids (e.g. DVOR) locations which aircraft will not need to fly "point to point" in the future.
Also, above FL305 will be FRA in the future which will yield a lot of future network benefits.

Holding

All current arrival routes end in the overhead (Hold) but realistically this does not often occur. Arrivals are typically given vectored shortcuts which current traffic levels frequently allow, unless demand peaks or adverse weather dictate.

Going forward, traffic will be presented from the network at known Hold locations. A prime Hold location for a Hold would be equidistant from both Runway ends and easily accessible from the network.

Q - why would you not hold over the Severn, between Bristol and Cardiff?
Bristol are working towards a more systemised airspace where Holds should benefit both Runway ends. Therefore, Bristol Airport want to allow continuous climbs which are not held down by the Hold location (e.g. overhead), affects some of the London traffic. A Hold in this location would require a high level of tactical coordination for all traffic with Cardiff.

Changes in Holding procedure at Bristol Airport is of significant interest to Cardiff Airport, alongside any other delay mechanisms. Cardiff Airport are about to embark on Stage 2 presuming approval of Stage 1B Design Principles – the Design Principles are expected to be similar to Bristol Airport's.

Q - in regard to the indicative elliptical Holds, would aircraft enter them towards the end of them?
Yes, they would ideally be aligned to the arrival routes. The orientation will definitely be a design factor to consider.

Q - is containment less when using RNAV specification, as opposed to traditional technology?
Currently, there is no other guidance from the CAA asides from containment being based on PANS Ops obstacle clearance protection. PDG initial work showed that the Hold containment area is thus likely to be significant in size.

The current Hold is in a very difficult location from a workload/ operational perspective with garbling and radar issues being experienced frequently. Any location other than the overhead would be better.
From a "layman's" perspective, the overhead feels ideal with aircraft Holding overhead and being separated from departures. In reality the departures are not separated as the climb performance of modern aircraft has to be curtailed.

Q – why is the current Hold not used a lot?
It is used tactically – often based on adverse weather – but there can be periods of time when it is not used at all.

Technology

Technical discussion on radar coverage such as whether Bristol Airport could use a primary/ secondary back-up at Cardiff i.e. during a primary failure. However, this may not provide Bristol Airport traffic with the same coverage.

Discussion on whether Bristol Airport could use a remote radar for better resolution over the top of Bristol i.e. 5 miles away. Topography of the surrounding area could make this difficult.

Comment received that the design considerations seem to be based on today's technology (primary/ secondary) rather than looking ahead.

Conclusion of this discussion was that changes to technology/ infrastructure – such as radar coverage – is out of scope for this Airspace Change Proposal. However, technology will definitely play a factor in what is possible.

Data Inputs

Bristol Airport made a request for operators to provide climb performance data to assist in design work e.g. determining whether departures can achieve FL230 by reporting point KENET (request made by LAMP).

3.3% is a minimum climb gradient used in Procedure Design for obstacle clearance purposes – in reality most aircraft are better performing than this. However, we can base calculations on specified restrictions/ climb gradients provided they are agreed and published.

Runway 09 LTO Routes are typically flown by Stobart.

Q - what percentage of flights achieve 3.3% - 8%?
Reality is that easyJet/ Ryanair/ TUI would be happy and capable of flying a much higher gradient – however, awaiting airline feedback to support this.

Q – can you explain what the heatmap is actually showing?
Shows most flights off Runway 27 being at or above 7,000ft by the Severn so this may not be wholly useful as a noise mitigation technique. Explanation on different density colours provided.

GA Considerations

Concern raised by GA representatives – new CAS may be required to encompass new routes. Will you plan for the worst case possible?
Operators need to provide climb and descent gradient information to feed into this; which will impact how much current/ new CAS is required.

Q - what altitude to gliders operate up to?
On an optimal summer's day, it could be up to 7,000ft. There are days in Spring when they can operate up to 10,000ft. The heights shown of the potential routes are definitely of interest to GA communities. It is very dependent on topography and where the lift takes place.

From a GA perspective, it is likely that the proposed Holds would require lowering of current CAS. However, this is not fully known at the moment.

Q – will you consider classification and volume? Yes – timings, volume and geographical placement.
Cardiff Airport confirmed they will also focus on minimum CAS classification/ volume required.

Any potential change to ATS provision/ ownership will also be acknowledged and reviewed.

Q - why are the LAMP routes shown to be 7 miles apart?
Based on formally published separation criteria resulting from detailed analysis of track keeping accuracy and navigation performance, where routes are completely independent from each other and fully systemised.

Query raised as to why, at times, civil flights require so much space where they can "run on rails" unlike the vast majority of GA flights. GA community will challenge where it is felt that less CAS could be stipulated i.e. why route couldn't be 5/6 miles apart?

Flights which are currently laterally on the same level, will be following controller heading instruction (5 miles lateral separation for the network). A more autonomous system requires larger separation standards derived from above analysis, and based upon international Required Navigation Performance standards of the a/c Flight Management Systems.

Q – why are arrival routes not currently shown? The airspace change seems to be entirely focussed on the departure routes.
STARs from the network, Holds and transitions will form part of the overall design.

There is lots of gliding activity in the area South-East of Bristol Airport e.g. Salisbury Plain.

The gliding community has vast information on current usage and track data. Offered to provide this to Bristol Airport as it would definitely be useful for the design work.

Plates would be included for any aircraft that cannot comply with technical specification or potentially, dependent on numbers, alternative/ modified routes.

Interest in the base around Halesland for GA users, specifically whether Bristol's proposed designs would allow this to be lowered.

Follow-up feedback received after the design workshops:

[redacted]
Sent: 26 February 2020 15:53
To: Airspace <airspace@bristolairport.com>
Subject: Airspace Change Workshop

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear [redacted]

Thank you for inviting me to participate in yesterday's workshop. It certainly helped give me some shape to what you are doing to tackle your Statement of Need and address some of the conflicting aspects of Design Principles. I realise that what you showed us is 'work in progress' and look forward to hearing more.

I found the pictures of your traffic flow above 10Kft interesting, and support [redacted] interest in similar pictures under 7000', including passing traffic.

One point from [redacted] presentation that on reflection I would like to raise now: he mentioned that Bristol CTA bases to the N and E were largely historic, derived from when Filton and Lyneham were operational, and were under review. As they have presumably proved adequate over the years and aircraft performance has since increased significantly, I would hope that there would be no need to consider lowering them - rather the opposite.

Kind regards,

[redacted]
Chairman, Light Aircraft Association Bristol Strut

Airspace