Proposed changes to

London Luton Airport Arrivals

CAP1616 Stage 4

Step 4A(i) Consultation Response Document

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NATS-LLA Public

Roles

Action	Role	Date
Produced	Airspace Change Expert NATS Airspace and Future Operations	23/06/2021
Reviewed Approved	Airspace and Noise Performance Manager London Luton Airport	23/06/2021
Reviewed Approved	ATC Lead NATS Swanwick Development	23/06/2021
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Drafting and Publication History

Issue	Month/Year	Changes this issue
Issue 1.0	06/21	Published to CAA portal

References

Ref No	Description	Hyperlinks
1	SAIP AD6 CAA web page – progress through CAP1616	Link to CAA portal Link to consultation site
2	Stage 1 Statement of Need	Link to document
3	Stage 1 Assessment Meeting Minutes	Link to document
4	Stage 1 Design Principles	Link to document
5	Stage 2 Design Options	Link to document
6	Stage 2 Design Principle Evaluation	Link to document
7	Stage 2 Initial Options Appraisal and Safety Assessment	Link to document
8	Stage 3 Consultation Document	Link to document
9	Stage 3 Full Options Appraisal	Link to document
10	Stage 3 Consultation Strategy	Link to document
10A	Stage 3 Step 3D Consultation Feedback Report and Technical Compliance Supplement	Link to report Link to CAA portal
10B	Stage 4 Step 4A(ii) The Final Airspace Design (layered map PDF)	Link to CAA portal
10C	Stage 4 Step 4A(iii) Final Options Appraisal	Link to CAA portal
11	Airspace change: Guidance on the regulatory process for changing the notified airspace design and planned and permanent redistribution of air traffic, & on providing airspace information CAP1616	Link to document (Edition 4, March 2021)
12	Environmental requirements technical annex CAP1616A	Link to document
13	Definition of Overflight CAP1498	Link to document
14	Airspace Modernisation Strategy AMS CAP1711	Link to document
15	UK Government Department for Transport's 2017 Guidance to the CAA on its environmental objectives when carrying out its air navigation functions, and to the CAA and wider industry on airspace and noise management (abbreviated to ANG2017)	Link to document

Contents

1. Introduction

1.1. This public consultation was about a proposed change to the flightpaths of aircraft arriving at London Luton Airport (LLA). The proposal is sponsored jointly by NATS and LLA.

1.2. During periods where the workload of air traffic controllers is predicted to become too intense, safety dictates that temporary limits (known as flow restrictions) are applied to the numbers of aircraft that a controller can manage, before safe limits are exceeded. This causes delay to the travelling public (at both LLA and Stansted), and is a short-term, temporary solution to the underlying problem.

1.3. We have identified that, unless we do something now, the intensity of air traffic control workload in this region may become unsustainable for air traffic controllers in the longer term.

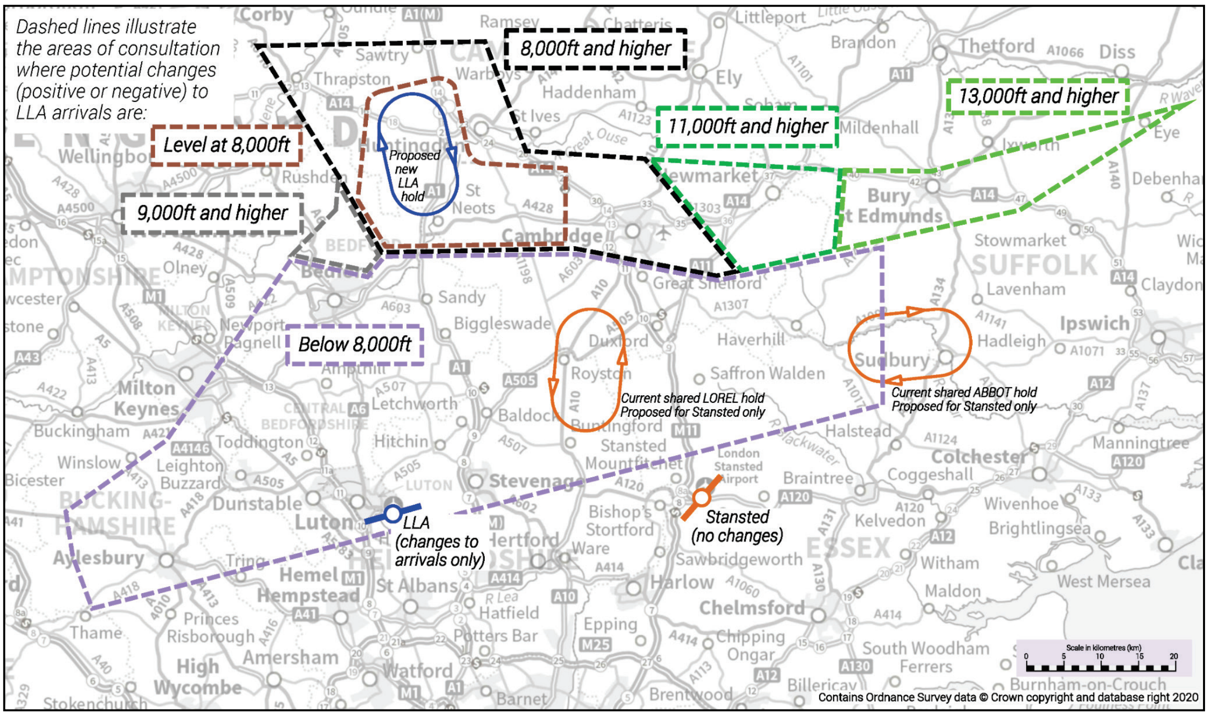


Figure 1 Consultation Areas

1.4. The coloured regions in Figure 1 above illustrate the scope of this consultation, at different altitudes. We propose to reduce complexity by moving LLA's arrival flightpaths (to a new holding pattern in blue), leaving Stansted's arrival flows unchanged (current shared holding patterns, in orange).

1.5. This would reduce air traffic controller workload because the arrival flows to each airport would be separated further out and higher up, assuring a safe and efficient operation for the future.

1.6. We are not proposing any change to the way aircraft depart from LLA, nor would there be changes to the way Stansted arrivals and departures fly under this proposal.

1.7. The foundation of a good consultation is adherence to the four 'Gunning Principles', long-established in the UK, which set out the legal expectations for what constitutes an appropriate consultation. They are integrated into the Civil Aviation Authority (CAA)'s airspace change process document CAP1616 (Ref 11).

1.8. The Gunning Principles are:

- Consultation should occur when proposals are at a formative stage
- Consultation should give sufficient reasons for any proposal to permit intelligent consideration
- Consultation should allow adequate time for consideration and response
- The product[1] of consultation must be conscientiously taken into account

1.9. The airspace consultation opened early morning of Monday 19th October 2020 and ended in the late evening of Friday 5th February 2021, a period of 15 weeks 5 days.

[1] The 'product' of consultation, in this context, is the summary of emerging themes extracted from the feedback analysis.

2. Where are we in the airspace change process?

2.1. This document is associated with Step 4A as per the airspace change process chart in Figure 2 below:

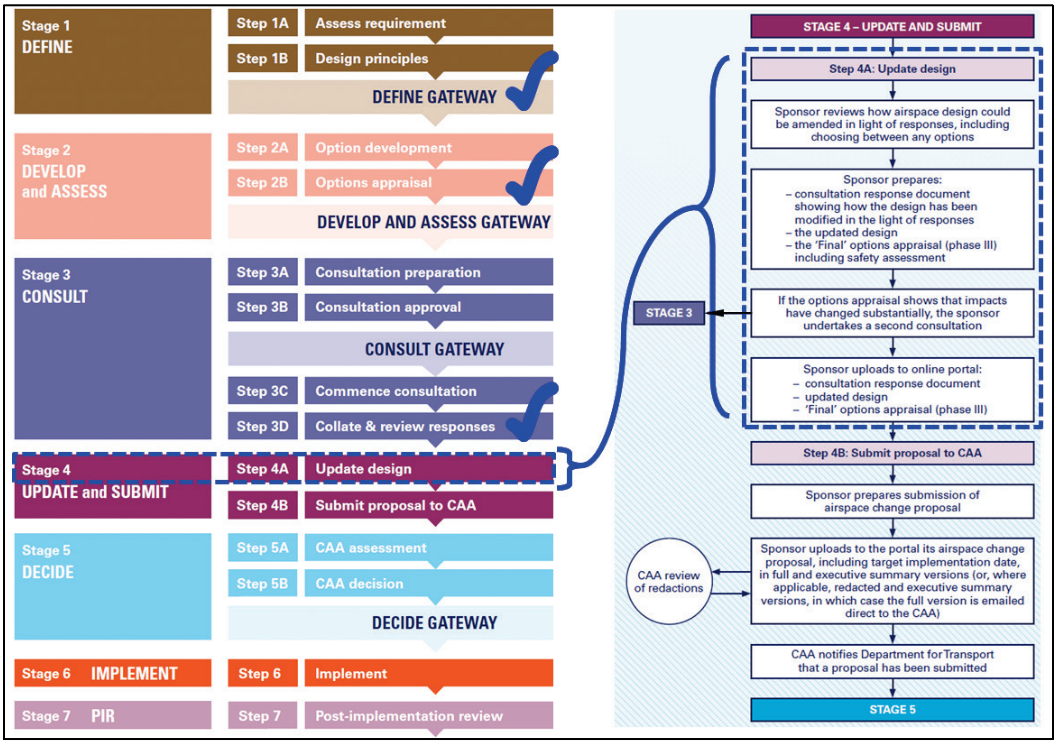


Figure 2 Airspace Change Process – Overview (left) and Stage 4 Update and Submit (right)

2.2. Supporting documentation for all stages of this proposal (Stages 1, 2 and 3) can be found on the CAA's airspace change portal at the following link: https://airspacechange.caa.co.uk/PublicProposalArea?pID=51

3. What is this document?

3.1. The full consultation process accords with the simple concept 'we asked, you said, we did'. The consultation itself was the 'we asked…' part.

3.2. Step 3D in the Figure 2 flowchart above, provides a summary of how we conducted the consultation. It also provides detail on how we collated, reviewed, and categorised the responses generated by this consultation. Step 3D was the 'you said…' part, meaning that facts and data about the consultation feedback were analysed and explained., .

3.3. In Step 3D (Ref 10a) we did not draw significant conclusions. However, we summarised a list of actions to be considered in Step 4A .

3.4. This document completes Step 4A and is the second consultation report, detailing the 'we did…' part.

3.5. The airspace change process CAP1616 Table C2 describes how consultation responses should be generally categorised:

Table C2: Categorisation of consultation responses

	Type	Responses which may impact final proposals	Responses which do not impact final proposals
First feedback report Step 3D	Description	Responses which have been categorised as having the potential to impact on the proposal would include new information or ideas that the change sponsor believes could lead to an adaptation in a lead design option or a new design option.	The content of this response would not include new information or ideas that could lead to an adaptation in a lead design option or a new design option but may include other information that should be logged and considered. For example responses which criticise the consultation format should give sponsors insight to improve future engagement; sentiments identified around trust will help to identify areas where additional future engagement may improve relationships; and criticism of historic activity may help to avoid similar situations in future. The change sponsor must be able to show how it has heard, understood and classified responses which do not impact its final proposal, and set out clearly why.

	Sub type	Responses which have impacted the final proposal	Responses which have not impacted the final proposal
Second feedback report Step 4A	Description	The change sponsor must show how the response has been acted on and what changes have occurred to their proposal.	The change sponsor must show why the response has not been acted on and explain why the proposal cannot be modified to meet the recommendation.

Figure 3 Response categorisation: CAP1616 Edition 4 Table C2 p.185

3.6. This list is from the Step 3D document (Ref 10a Section 16). It is the product of the consultation, distilled into four major actions for us to consider, and one way to help us consider them:

3.6.1. Action 1 Consider how the design may be adapted to minimise noise impacts at & above 8,000ft, with attention given to the hold.

3.6.2. Action 2 Consider how the design may be adapted to minimise noise impacts below 8,000ft, including choosing between Option 1 and Option 2.

3.6.3. Action 3 Consider how the design may be adapted to minimise any increase in the use of aviation fuel as part of the complexity-reducing, safety-enhancing primary aim of this proposal, consequently minimising increases in greenhouse gas emissions and costs for aircraft operators.

3.6.4. Action 4 Consider how the design may be adapted to minimise impacts on other airspace users, by reducing the requirement for controlled airspace while still enhancing safety, and by agreeing operational practices to mitigate airspace access impacts.

3.6.5. Action 5 Consider the specific design change suggestions and recommendations received, decide to what extent those recommendations could be acted upon (from fully to partially) and explain why.

3.7. In this document Step 4A:

3.7.1. We take Action 5 and perform a new, separate, more detailed analysis on all the responses tagged 'Design Change'. This analysis will be themed using the first four Actions so that design suggestions and recommendations can be allocated and analysed accordingly. The data behind the analysis will be made available to the CAA.

3.7.2. We use this analysis to address each item, making decisions whether to change the airspace design or not:

- We explain the air traffic control (ATC) constraints and design opportunities for each item. These can be technical, but will be summarised using plain English and supported by simple diagrams
- If a design change can occur, decide to what extent it could be applied within those constraints, and provide an explanation of the resulting design change
- If a design change cannot occur, we explain why

3.7.3. We describe the predicted impact of that change.

3.7.4. We will use the Final Options Appraisal document (Ref 10C) to monetise and compare this final design against the original design upon which we consulted.

3.8. Where we refer to 'design opportunities' we have considered consultation feedback and explored ways to address them, within the ATC constraints.

3.9. We illustrate changes to the airspace design using maps and charts, and provide a summary log of all the design changes made due to the consultation feedback received.

3.10. We must strike a balance between the aims of this proposal, consultation feedback (Ref 10A), compliance with the airspace change process CAP1616 (Ref 11) and recognising the Government's environmental guidance (ANG2017, Ref 15).

4. Why are we still progressing this proposal now?

4.1. Our Statement of Need for this proposal (link) reads:

Current Situation: Inbound traffic to Luton and Stansted share Standard Arrival Routes and holding capacity at LOREL and ABBOT and is largely managed by a single Terminal Control sector, Essex Radar. As traffic levels at both airports have significantly increased, the complexity (number of interactions within the sector) has also significantly increased. Continued growth is anticipated at both airports.

Issue or opportunity to be addressed, and the cause: NATS have conducted an internal safety survey on TC Essex sector, which has identified some latent risk within the sector. This report has been shared with the CAA. NATS would like to look at options to address the safety issues identified, and also work with co-sponsor Luton Airport to improve capacity within the TC Essex sector.

Desired outcome: A reduction in complexity, workload and delays in relation to arriving traffic at Luton and, as a consequence, Stansted.

Specific challenges: Safety imperative identified within NATS safety reports makes adherence to minimum timeline achievable under CAP1616 process highly desirable.

This is a joint application sponsored by NATS and London Luton Airport meaning that all portions of the application require coordination, agreement and resource commitment by both parties.

4.2. Safety is always the first priority. As stated in the Consultation Document (Ref 8), we must prepare for air traffic to return to pre-pandemic levels, and to allow for safe potential future growth.

4.3. We have already acknowledged the temporary impacts of the Covid-19 pandemic on aviation, but we have also made clear that the air traffic complexity of the shared LLA-Stansted arrival routes and holds must be resolved. Doing nothing would increase the potential for a reduction in safety as a result of increased controller workload intensity and arrival delays.

4.4. During the air traffic recovery period, temporary limits to the numbers of aircraft that air traffic controllers (ATCOs) can safely handle may not be required as often as pre-pandemic. Our assumptions for stabilisation and recovery stand, and the analysis provided in the Final Options Appraisal is consistent with Stage 3's Full Options Appraisal (Ref 9), enabling an effective comparison.

4.5. As we made clear in the Consultation Document, changes to this region cannot wait for the bigger, further-reaching changes to the wider area. Its scope is necessarily limited to LLA arrivals alone; changes to Stansted, Heathrow, London City or any other airport's traffic flows are outside this scope.

4.6. The Airspace Modernisation Strategy (Ref 14) is a much larger scale project, part of which involves making coordinated changes to many airports in the south. Work on this project continues, although it has also been delayed temporarily due to the Covid-19 pandemic.

4.7. We received responses suggesting that this proposal needs to be restarted, is not needed at all, or could be delayed by years to wait for a bigger future change. These are common responses to airspace change consultations. We cannot, however, wait for the AMS; this proposal was launched to address a specific need – to solve, in the short-term and fully aware of the Covid-19 impacts, the airspace design latent safety issue of entwined arrival flows serving two of the five busiest airports in the UK.

4.8. We contend that we have already made the case that change is necessary. This document therefore continues to focus on design change suggestions and recommendations for the airspace and flightpaths serving LLA arrivals.

5. How did we re-analyse the responses tagged 'Design Change'?

5.1. Each of the 2,426 consultation responses contained text answers for up to 10 questions. We are interested in any response containing at least one Design Change tag.

5.2. We found 845 'Design Change' tags in the analysis for Step 3D (Ref 10A), spread amongst 245 individual responses. We decided, rather than just look at the answer to the question that led to a Design Change tag, that we would get better context for the suggestion by extracting and then re-analysing each respondent's entire set of answers.

5.3. The main feedback data from this part of the analysis (including sub-themes) has already been captured in Step 3D. However, in order to better understand the specific suggestions and recommendations, we undertook a new, separate, more detailed analysis of each extracted response.

5.4. We determined the main themes, considering Actions 1 to 4, and derived Recommendations.

5.5. We summarised each Recommendation, and gave each one a tag reference number – for example, recommendations relating to Action 1 have reference numbers 1.xx, and those relating to Action 2 have reference numbers 2.xx.

5.6. We analysed all 245 responses to tag each[2] with one or more reference numbers. This analysis was peer-reviewed and is available for the CAA to audit.

5.7. The following Sections provide the outcome of this analysis, explain the decisions we made based on the constraints within which we must work, and how it has influenced the final airspace design.

5.8. This analysis led to the amalgamation of individual comments from multiple separate responses into broader Recommendations. In accordance with CAP1616 (Ref 11) Table C2 (copy at Figure 3 on p.6),

[2] One of the responses, upon further consideration, cannot be definitively tagged with a design-change suggestion or recommendation.

each Recommendation will either impact the final proposal by being acted upon, or will not. Explanations will be supplied for both cases.

6. Action 1: Noise At & Above 8,000ft (including Hold)

Consider how the design may be adapted to minimise noise impacts at & above 8,000ft, with attention given to the hold.

6.1. This section will explain the ATC constraints in this region, followed by the results of the additional analysis from Action 5 (paragraph 6.34 on p. 21), how we will or will not act on that analysis, and why.

Recap of Previous Constraints – the choice of a separate, LLA-dedicated, racetrack-type holding pattern.

6.2. At Stage 2 (Ref 5 p.8-21) we explored the basic geographical constraints in the region at & above 8,000ft and created 6 broad concept options. They were referred to as:

- Do Nothing
- Delay Absorption via Point Merge
- Delay Absorption via Hold to the West
- Delay Absorption via Hold to the North
- Delay Absorption via Advanced Technology
- Delay Absorption via Low Level Tactical Vectoring.

6.3. Only one of these upper concepts, Delay Absorption via Hold to the North, successfully progressed through the Stage 2 Design Principles Evaluation (Ref 6) and Initial Options Appraisal (Ref 7) for further development into Stage 3 Consultation.

6.4. We did not consult on the rejected concept options because they had been considered, examined, and failed to progress through Stage 2 for the reasons given in that documentation.

6.5. We could not consult on design concepts that would fail to achieve the aims of this proposal as they would not be fit for purpose. This included Do Nothing which, while not a 'design concept' *per se*, was considered, examined and failed to progress in exactly the same way using the same accept/reject criteria as the others.

6.6. The following pages explain the specific constraints to the consulted-upon design.

ATC Constraints – Holding Location

The maps on the following pages illustrate the technical and procedural constraints on where the holding pattern could go.

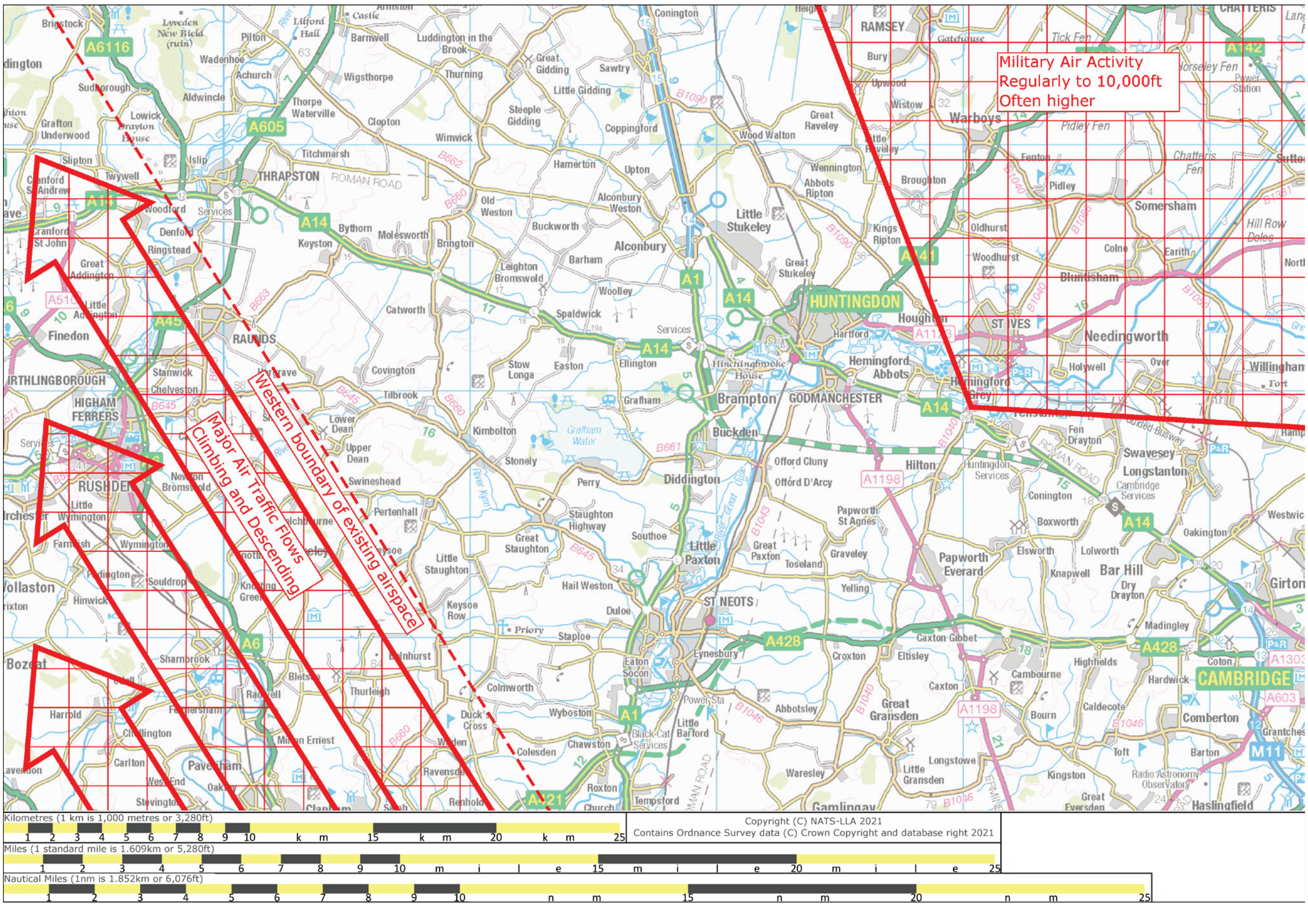


Figure 4 First constraint: (L) Northwestbound major air traffic flows (R) East Anglian military air activity

6.7. Figure 4 First Constraint

6.7.1. To the west of the region is a complex flow of civil air traffic departure and arrival routes, mixed with traffic climbing into the en route phase of flight. This proposal cannot change or interrupt these flows.

6.7.2. It also illustrates a region to the northeast, where military air activity occurs daily, at all altitudes. The United States Air Force in Europe (USAFE) operates two bases nearby in Suffolk; RAF Lakenheath and RAF Mildenhall.

6.7.3. They operate as a combined air traffic unit and their aircraft include air combat jets, refuelling tankers and heavy transporters which regularly operate in this area. British military aircraft also have a significant presence in this region. We are required to consider the impacts on military aviation, and to minimise those impacts.

6.7.4. The two areas illustrate the first set of constraints. These were highlighted at Stage 2 of the airspace change process (see Ref 5) and were also discussed during the consultation.

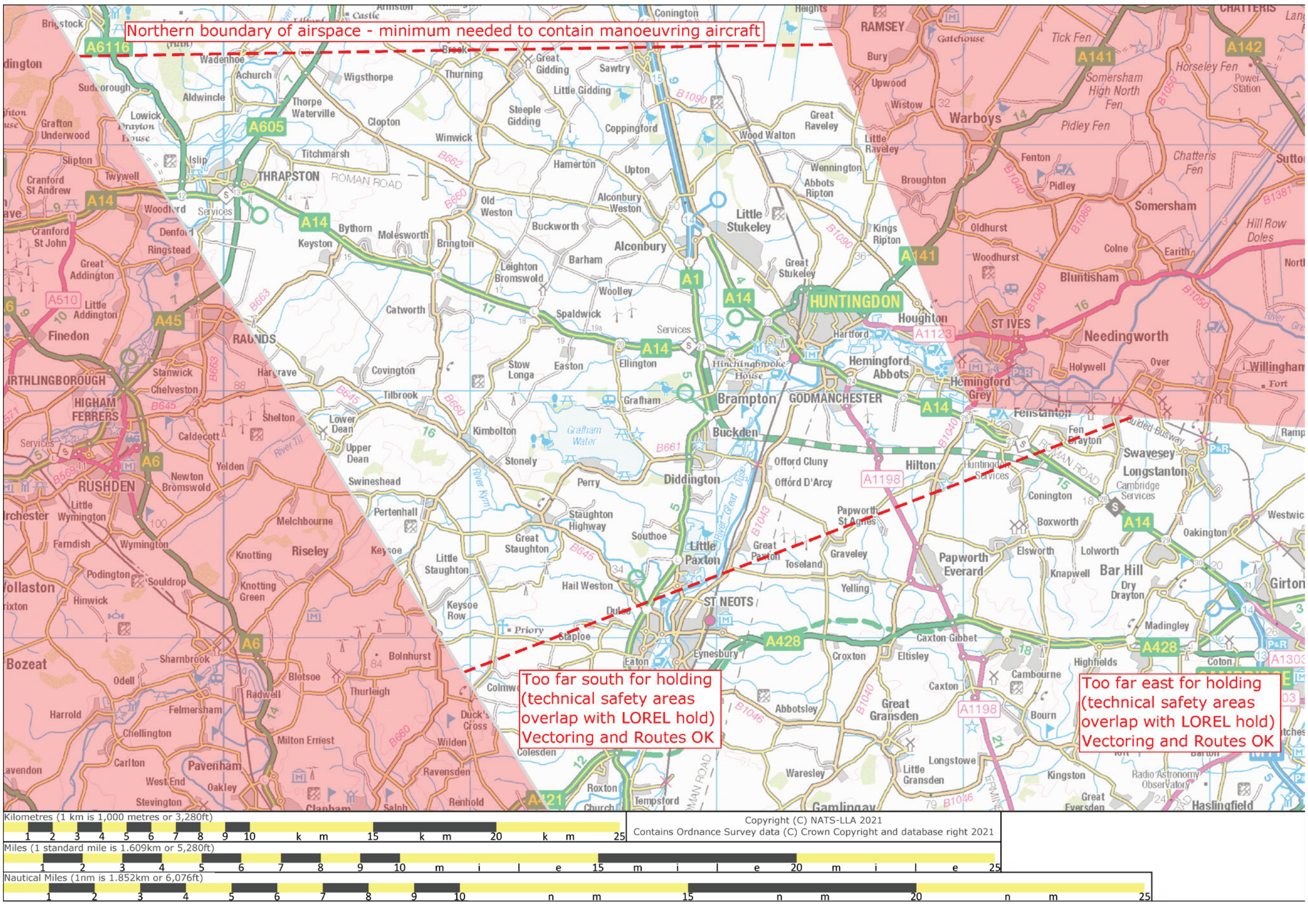


Figure 5 Second constraint: Northern airspace boundary, southern limit for holding pattern, eastern limit for holding pattern

6.8. Figure 5 shades out the areas where we cannot place a holding pattern due to the first set of constraints.

6.8.1. It also introduces a second set of constraints, illustrating how far north, south and southeast the hold could go.

6.8.2. We are required to minimise the amount of controlled airspace (CAS) needed to contain manoeuvring aircraft and, where possible, use existing CAS boundaries.

6.8.3. The further north the hold, the greater the additional amount of CAS would be required. Also, the further north the hold, the greater the additional distance an aircraft would need to flightplan from the south, east and southwest – this distance would double, because it would need to fly further to get to the hold, and then retrace its path to head to the runway, overflying the same areas twice.

6.8.4. The northern red dashed line illustrates an existing CAS boundary to the north, within which we could safely contain aircraft holding manoeuvres, and is not excessively far north to reduce unnecessary flying distance.

6.8.5. We are also required to consider how technical safety elements of holding patterns overlap with equivalent elements of adjacent holding patterns. The current (unchanging) holding pattern over Royston (called LOREL) is the nearest hold, which influences how far south and east the proposed holding pattern could be. We can accept some overlap, and have drawn another red dashed line to indicate that south eastern limit.

6.8.6. These two dashed red lines illustrate the second set of technical constraints.

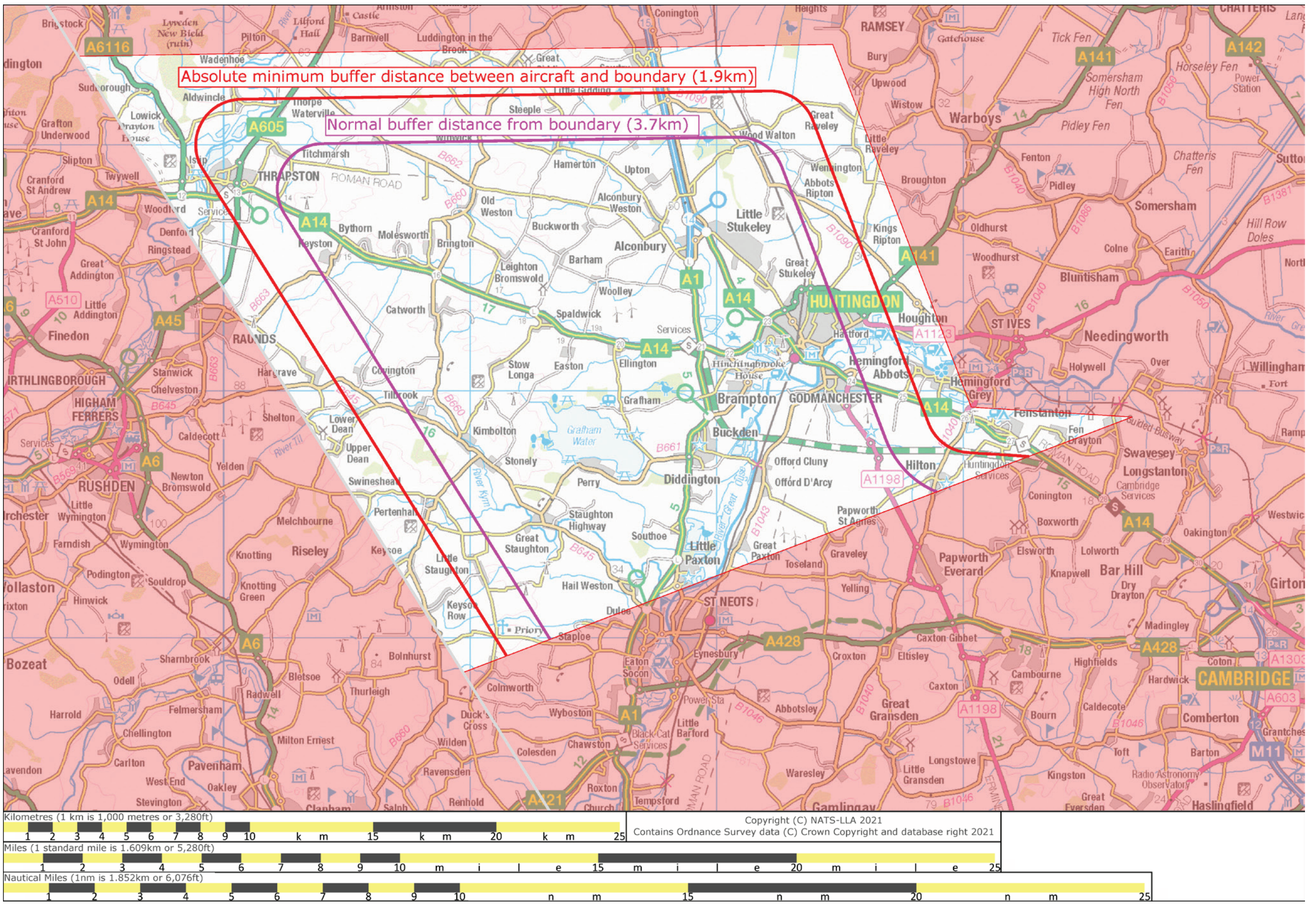


Figure 6 Third constraint: Airspace internal buffers

6.9. Figure 6 shades out the combined constraints so far, illustrating the raw CAS volume within which the hold would need to be positioned.

6.9.1. It also shows the third and final set of placement constraints. It would be unsafe to place a holding pattern close to the edge of CAS, to reduce the risk of infringements by other aircraft.

6.9.2. ATCOs need to maintain at least a 1nm (1.9km) distance from the red shaded CAS boundary under tactical vectoring conditions. Vectoring is where ATCOs manually instruct aircraft to fly compass headings, using their radar to judge speed, relative distances, and turn radii. Under these tactical vectoring conditions, aircraft could be directed anywhere inside the red line.

6.9.3. Airspace designers build in at least twice this distance from the boundary of CAS, for instrument flight procedures. Instrument flight procedures are where pilots follow defined flight procedures using their own navigation, with ATCOs monitoring the flight position using radar. This is the inside of the pink line, which is 2nm (3.7km) inside the red shaded area and 1nm (1.9km) inside the red line.

6.9.4. These buffers apply to the northern and eastern boundaries which would be ‘exposed’ to adjacent uncontrolled airspace.

6.9.5. To the west, the buffer would also apply, but this time to the air traffic in the northbound flows from Figure 4.

6.9.6. To the south, there would be CAS at the same altitude, so no buffer is needed which is why the shapes are open ended, however the previous constraint against the LOREL hold applies instead (red shading).

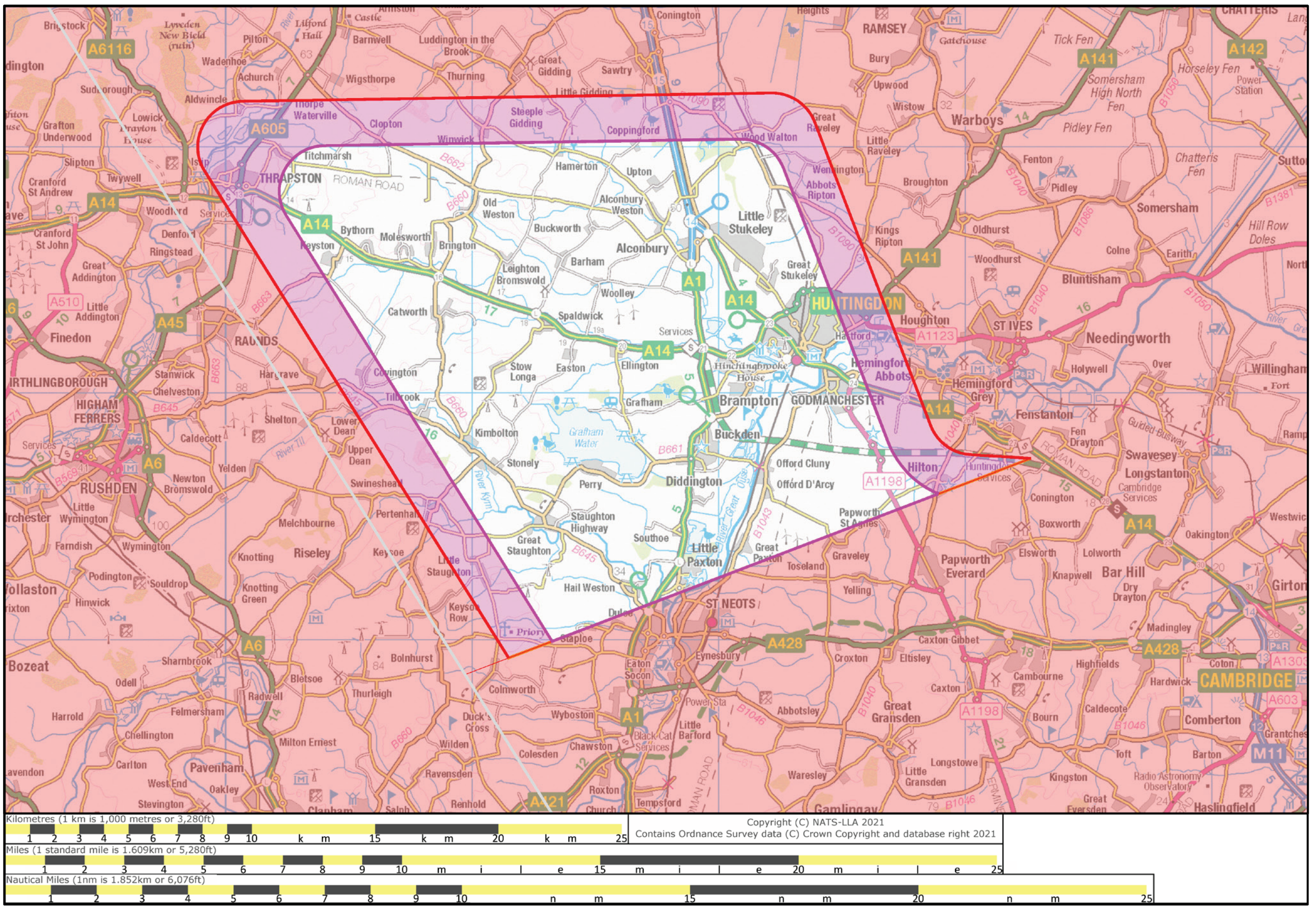


Figure 7 All constraints combined, the unshaded area illustrates the scope of the holding region

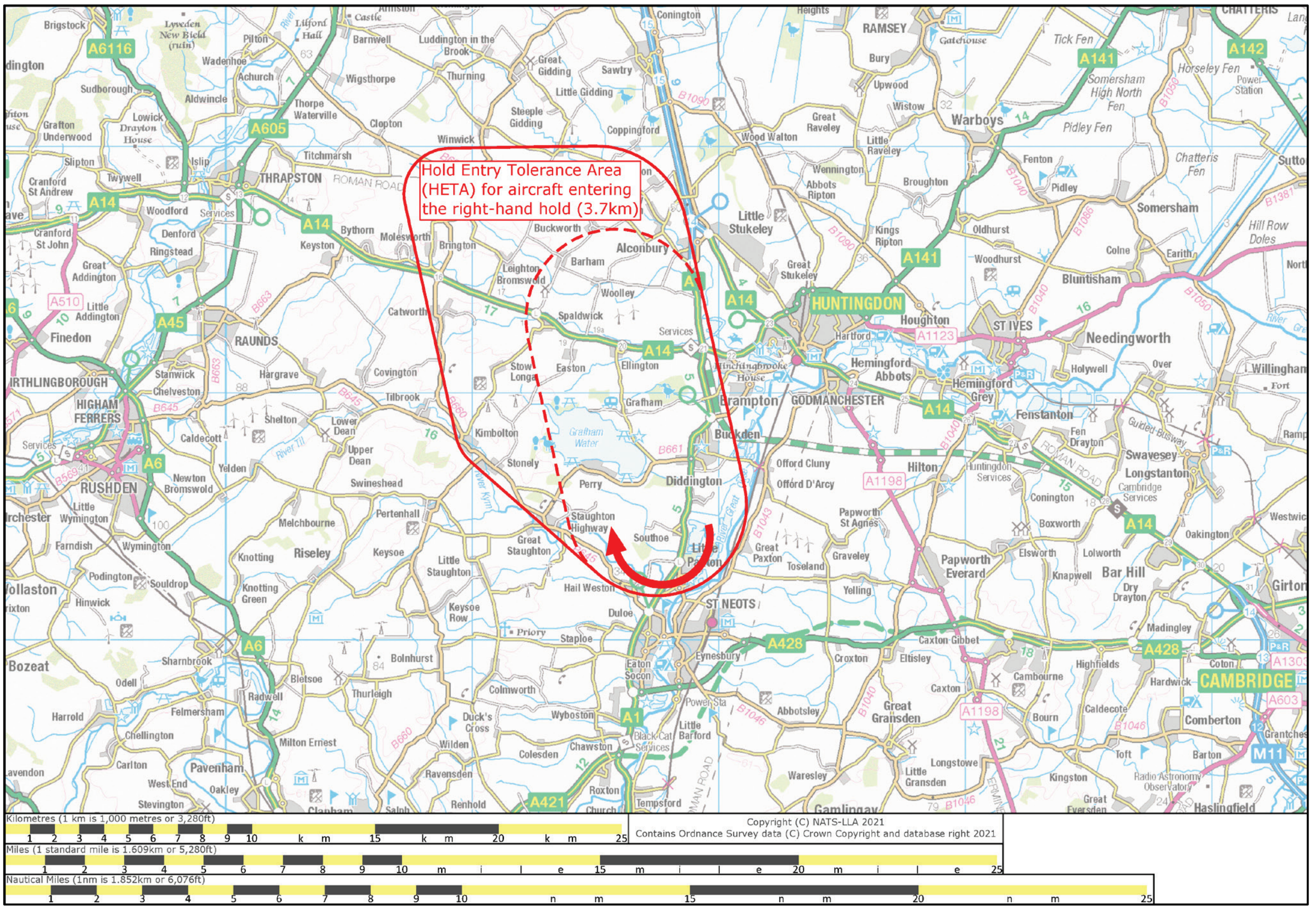


Figure 8 Typical holding pattern size for aircraft in the hold, plus a Hold Entry Tolerance Area HETA for aircraft entering the hold but not yet established. This is the location of the consulted-upon hold.

6.10. Figure 7 summarises the combined location constraints - the hold must be within the unshaded area.

6.11. Figure 8 illustrates a typical holding pattern size flown by aircraft established in the standard racetrack shape. These sizes are designed to internationally accepted standard criteria based on speeds and altitudes.

6.12. It also illustrates a minimum-sized Hold Entry Tolerance Area (HETA) requested by ATCOs. This is an additional allowance of 2 nautical miles (2nm, 3.7km) on the opposite (west) side of the racetrack, for aircraft entering the hold from the east.

6.13. Aircraft arriving from the west would also use part of the HETA as they execute their hold entry manoeuvre.

6.14. The combined shape of the racetrack with the HETA illustrates the size of airspace structure we need to place within the pink holding region.

The consulted-upon hold, illustrated in context

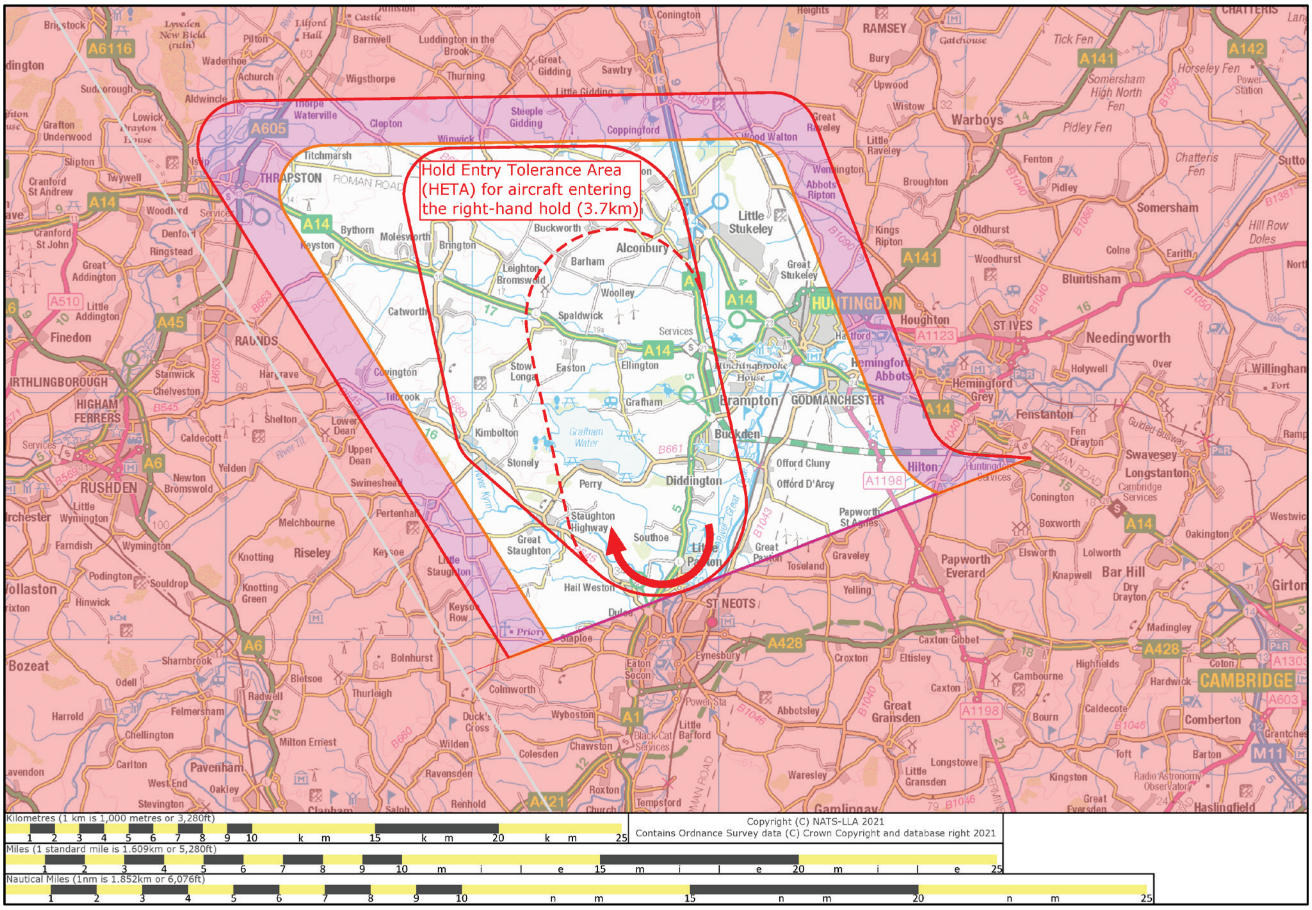


Figure 9 The consulted-upon hold in context with airspace constraints (must be within unshaded area)

6.15. From these paragraphs and maps you can understand why we needed to place the hold in this area.

6.16. Design suggestions and recommendations placing the holding pattern outside the unshaded area cannot be accommodated, for the reasons above.

6.17. However, localised adjustments are possible within the unshaded area.

ATC Constraints: Hold Orientation and Exit

The maps on the following pages illustrate constraints on the orientation of the holding pattern, and how ATC would ensure aircraft leave the pattern to approach the runway.

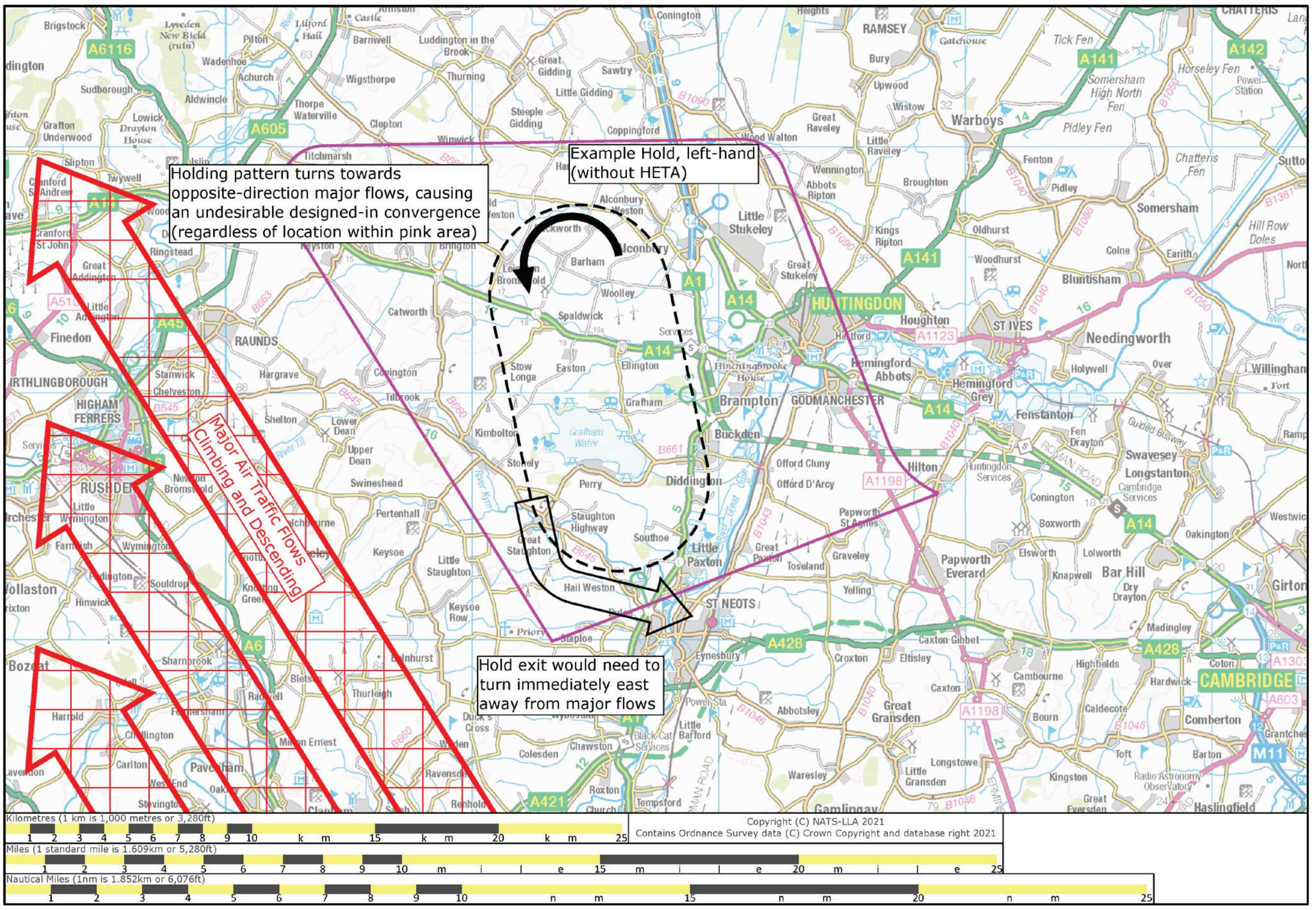


Figure 10 Hold Orientation Constraint – Left-hand pattern example, with poor exit placement

6.18. Figure 10 illustrates an example of a hold rotating left-hand, in the opposite direction to the consulted-upon right-hand hold (without a HETA).

6.18.1. Regardless of the location within the pink region (representing the unshaded area from Figure 9), traffic in the hold would turn towards the existing major flows and would be exposed head-on.

6.18.2. This would cause a traffic-flow convergence by design, because any internal buffers would be eroded far more quickly head-on, should any aircraft in the hold make a slow left turn, or should any traffic in the northbound flow stray too far east.

6.18.3. ATCOs would need to issue more instructions, and pay far greater attention, to aircraft leaving the holding pattern and would need to tactically vector them away from the converging existing major flows.

6.18.4. This would be detrimental to the complexity of the task, contrary to the primary aim of this proposal – reduce designed-in complexity.

6.18.5. It is good airspace design practice to 'design out' any potential traffic convergence like this.

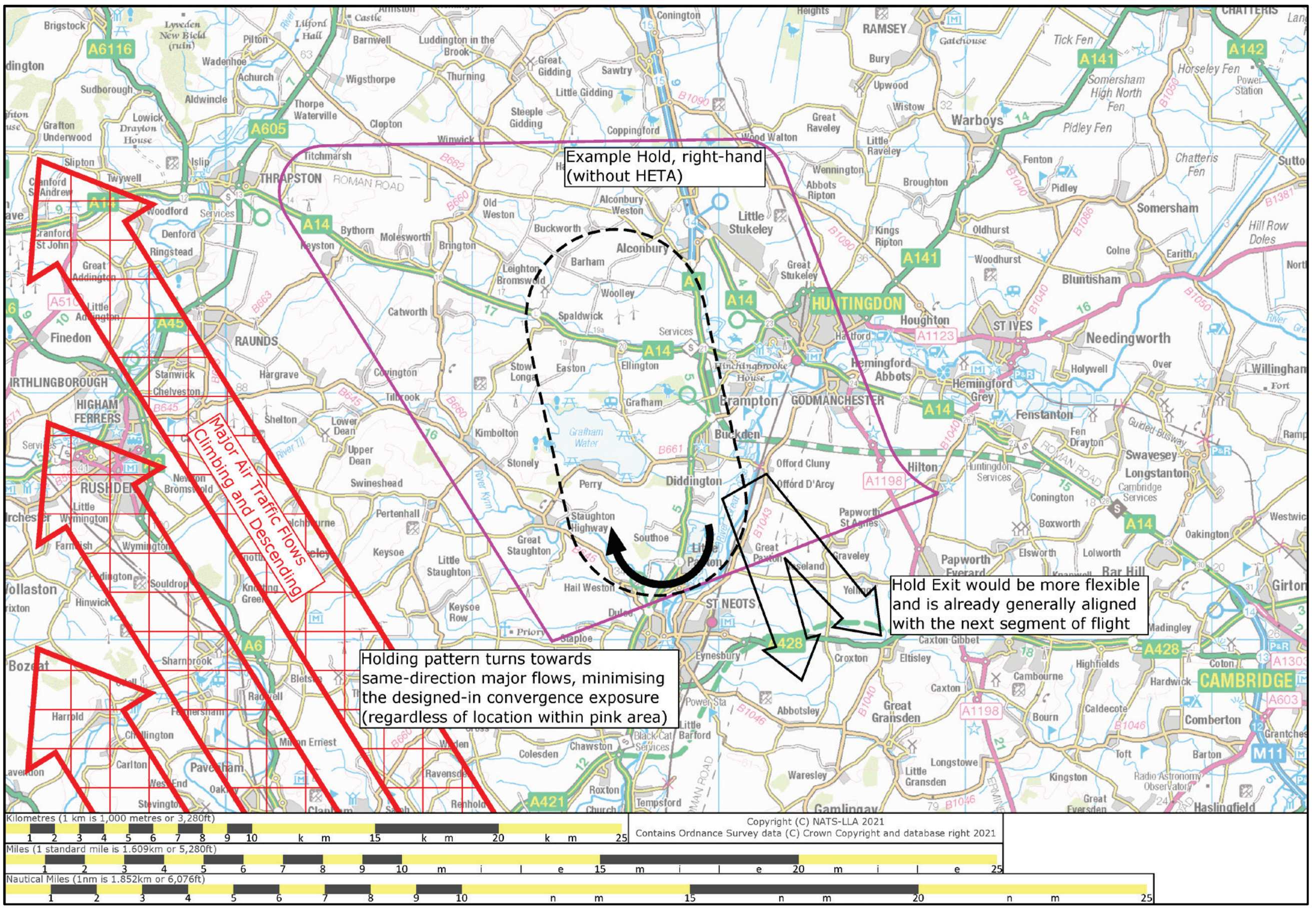


Figure 11 Hold Orientation Constraint – Right-hand pattern example

6.19. Figure 11 illustrates why a right-hand hold rotation is better in the pink holding region (representing the unshaded area from Figure 9).

6.19.1. When the holding traffic heads in the opposite direction to the existing major flows, by design it is on the furthest side of the pattern away from those flows.

6.19.2. As the holding traffic turns right towards the existing major flows, the convergence is in the same direction of travel.

6.19.3. This means that, should any buffer erosion occur due to either aircraft straying from their expected path, there is more time for corrective action to be taken.

6.19.4. This scenario 'designs in' a less-complex traffic convergence in the unlikely event that either traffic flow behaves imperfectly.

6.19.5. The hold exit is also more flexible. The aircraft is generally aligned with the direction of travel of the next segment of flight, with small adjustments much simpler and more predictable to manage than large turns.

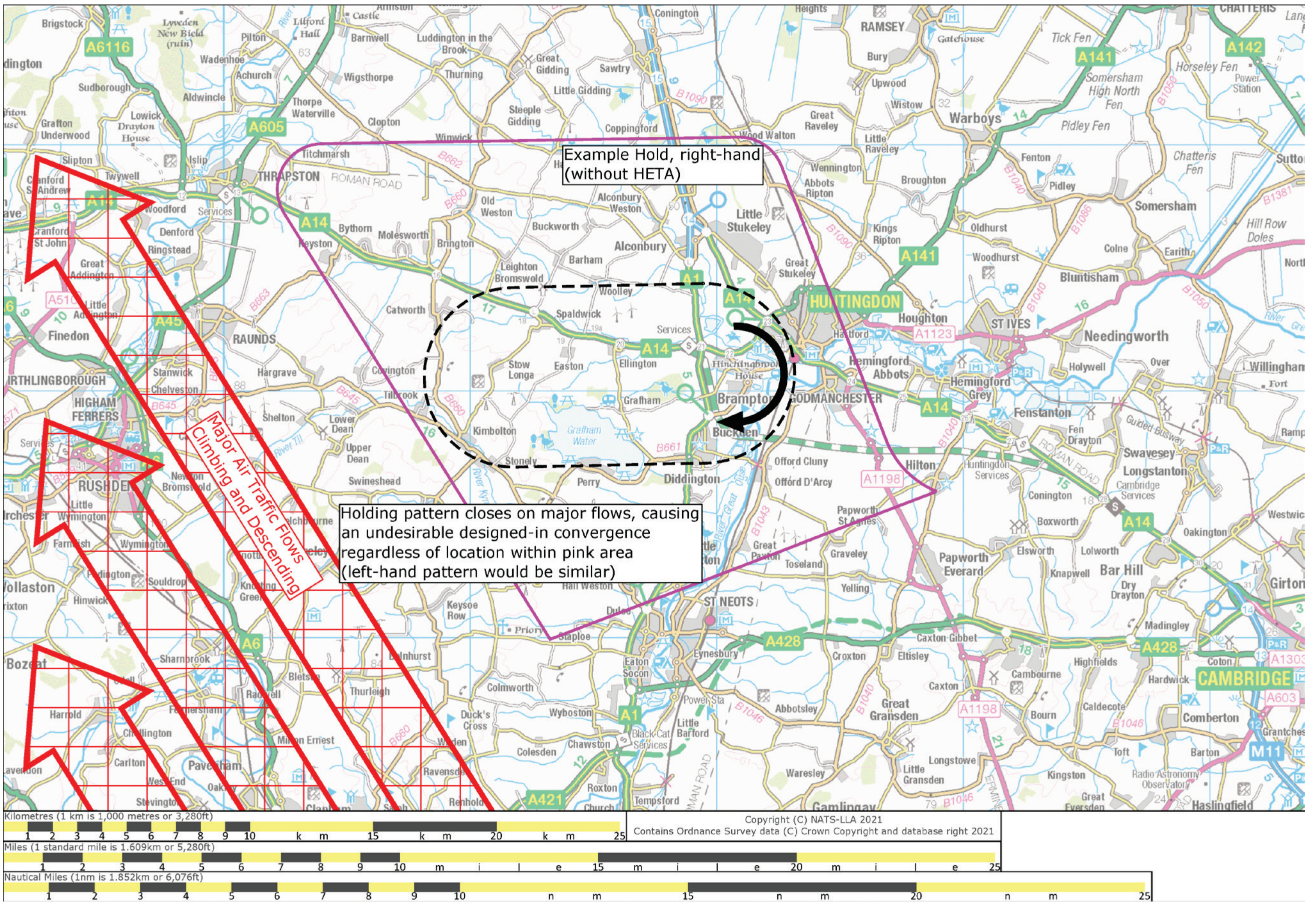


Figure 12 Hold Orientation Constraint – East-West pattern example

6.20. Figure 12 illustrates an example of a hold oriented approximately east-west.

6.20.1. Regardless of the rotation of the hold or the location within the pink region (representing the unshaded area from Figure 9), aircraft in the hold would turn towards, and close in on, the existing major flows.

6.20.2. This is an undesirable situation, detrimental to complexity as described in paragraph 6.18 above, that would again rapidly erode any internal and external CAS buffers should the traffic flows behave imperfectly. For example, should the aircraft fail to make its turn at the holding location, it could 'balloon' close to, or outside, the CAS boundary far more quickly than other orientations.

6.20.3. It is not good airspace design practice to 'design in' such traffic convergences or the potential for CAS excursion.

Hold Orientation

6.21. From these paragraphs and maps you can understand why we needed to orient the hold approximately northwest-southeast, and why we chose a right-hand rotation.

6.22. Design suggestions and recommendations to significantly reorient the holding pattern or to change its direction of rotation cannot be accommodated, for the reasons above.

6.23. However, localised adjustments to its orientation are possible, within the pink region.

ATC Constraint and Design Opportunity: Holding Altitude

This map illustrates constraints on the altitude of the holding pattern, and identifies a potential design opportunity based on consultation feedback.

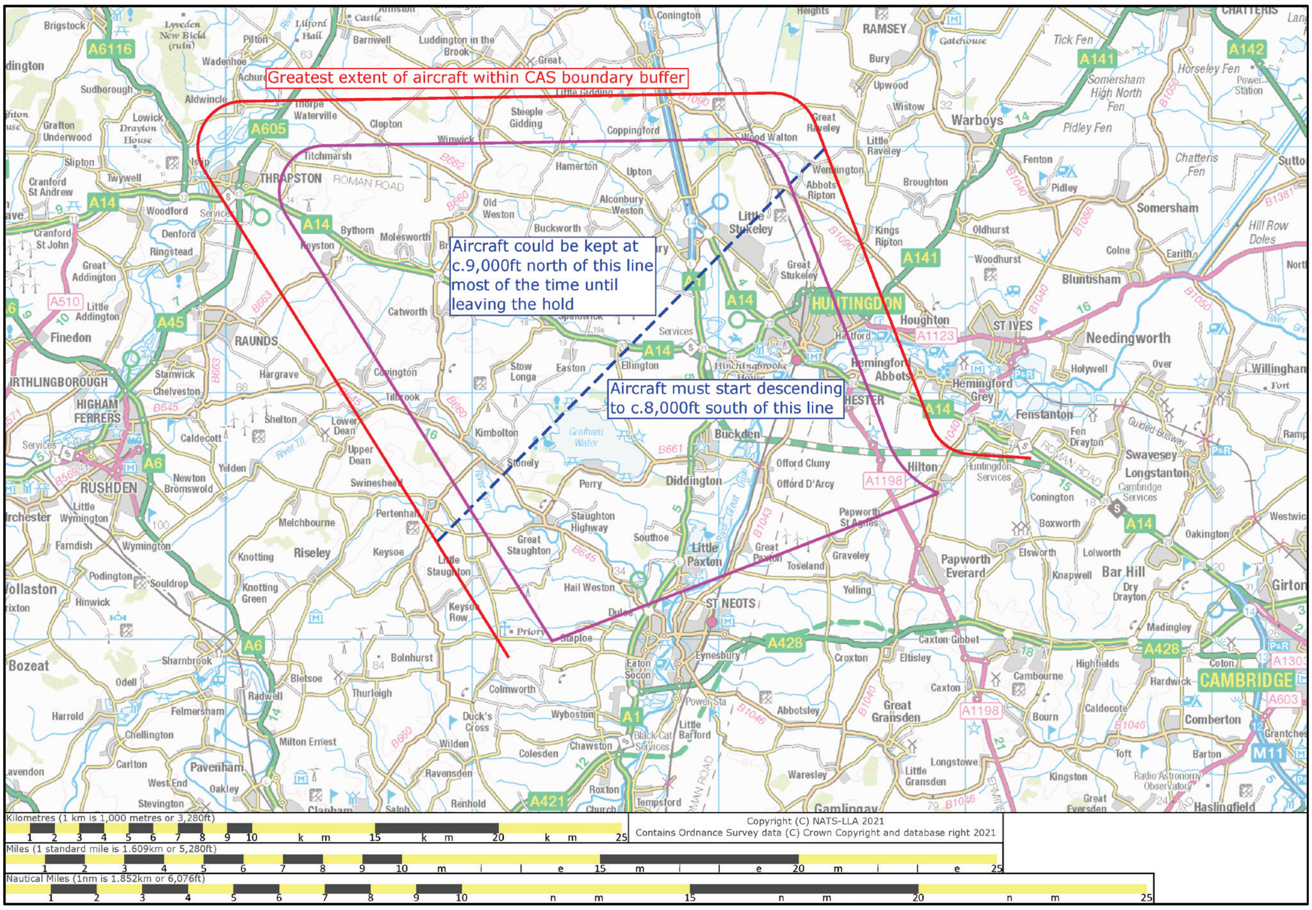


Figure 13 Hold Altitude Constraint and Potential Design Opportunity

6.24. Figure 13 illustrates the greatest extent an aircraft could be expected to fly, if being vectored under full tactical control (red line), and shows the holding region in solid pink (representing the unshaded area from Figure 9). Both these constrained regions were described earlier in this document. The blue dashed line illustrates a potential design opportunity.

6.24.1. We have identified a region to the north of the blue dashed line, where aircraft could be 1,000ft higher (c.9,000ft) and still fly a viable descent profile to land safely. Aircraft would not be below c.8,000ft anywhere in the wider region, as per the consultation document.

6.24.2. This design opportunity is limited because ATCOs must have maximum flexibility for contingency purposes. The hold would need to be immediately available at c.8,000ft 24 hours per day, should there be an unplanned runway closure or similar event[3]. CAS in the region could not have a higher base or that contingency holding altitude would be lost.

6.24.3. Minimum altitudes higher than c.9,000ft would not allow for a viable descent profile due to the distance from the holding region to the next altitude restriction.

6.24.4. Aircraft about to leave the hold would be instructed to start their descent from 9,000ft to 8,000ft on passing the blue line southbound towards LLA. Aircraft south of the blue line would be either descending to c.8,000ft, or could reach c.8,000ft and fly level for a short period, preparing for the next part of their descent to land.

[3] It would not be appropriate to attempt to specify all types of contingency scenarios leading to the use of the lower holding altitude. This altitude is analogous to a motorway hard shoulder, which provides space for safety should an unusual event occur.

6.25. From this paragraph and Figure 13 you can understand the altitude constraint and design opportunity we have identified.

6.26. Design suggestions and recommendations to significantly raise the holding pattern, or to absolutely guarantee a minimum of c.9,000ft in the region, cannot be accommodated, for the reasons above.

6.27. However, an adjustment of the holding pattern's standard altitude to c.9,000ft is possible, provided that controllers retain the flexibility to use the lowest altitude of c.8,000ft when necessary (which should be infrequently). We would not rule out overflight at c.8,000ft either side of the blue dashed line, but this design opportunity would keep aircraft 1,000ft higher to the north. We also expect aircraft to be slightly higher (descending from c.9,000ft-8,000ft) to the south. Aircraft may, however, be observed flying level at c.8,000ft south of the blue line for some distance, depending on the traffic scenario.

6.28. For the avoidance of doubt, this applies only when the region is busy enough for aircraft to use the hold (see paragraph 6.24.4 above). When it is less busy, ATCOs would vector aircraft to bypass the hold entirely (from either arrival direction) and would descend from c.9,000ft-8,000ft; this would happen south of the blue dashed line.

ATC Design Opportunity: Keep Routes Higher

This map illustrates the predicted altitudes aircraft would be at, for the arrival route from the east, and identifies a potential design opportunity.

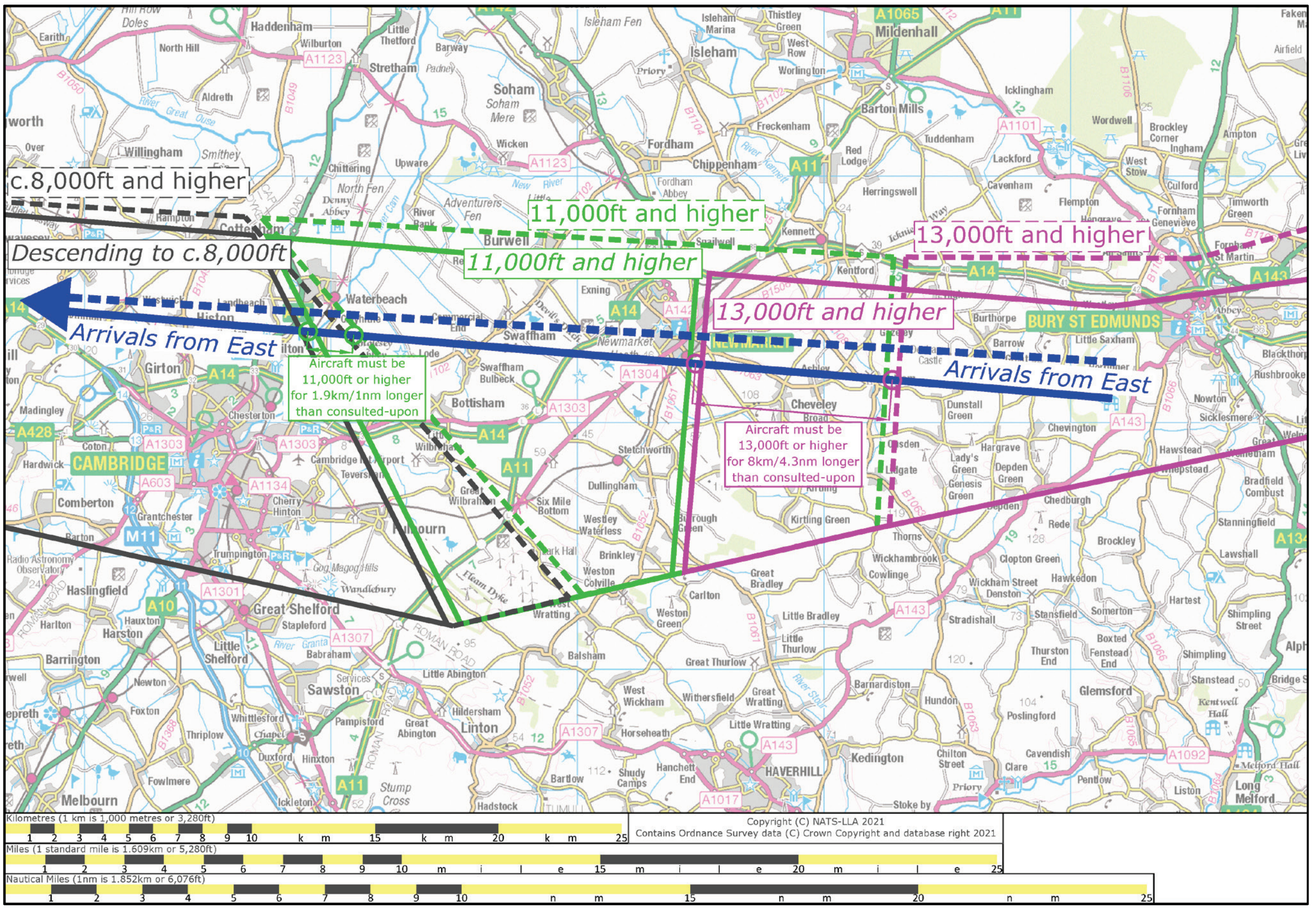


Figure 14 Route Altitude Constraint and Potential Design Opportunity

6.29. Figure 14 illustrates the consulted-upon route (blue dashed line) and the predicted lowest possible altitudes for arrivals from the east (pink, green and dark-grey dashed lines).

6.29.1. We have identified an opportunity to adapt the descent profile of these arrivals, keeping aircraft higher for longer. Higher aircraft generally burn less fuel, and less noise is observed by people living under the route.

6.29.2. We have calculated that moving the route slightly further south (solid blue line), and refining the planned descent profile, controlled airspace (CAS) bases could be slightly modified.

6.29.3. These changes in CAS would also reduce the impact on other airspace users, in particular the USAFE, and are explored further in Action 4 Section 9 from p.31 later in this document.

6.29.4. The CAS base change from 13,000ft to 11,000ft could be safely moved west c.8km. This means that aircraft could not descend below 13,000ft until the new CAS base-change position (solid pink line perpendicular to the blue route).

6.29.5. This means that, for example, LLA arrivals following the solid blue route would be at least 13,000ft high in the vicinity of Newmarket, and could not leave 13,000ft to start descending to 11,000ft until passing the railway station.

6.29.6. The CAS base change from 11,000ft to c.8,000ft could be safely moved west c.1.9km. This means that aircraft could not leave 11,000ft to start descending to c.8,000ft until the new CAS base-change position (solid green line at an angle to the blue route).

6.29.7. This means that, for example, LLA arrivals following the solid blue route would be at least 11,000ft high until passing Waterbeach, and could not even start descending until crossing the A10 road. Arrivals following the new blue route would generally be 1.8km away from the A14 north of Cambridge, but ATCOs may need to regularly position them further south depending on the arrival sequence.

6.29.8. Aircraft arriving from the south, west and northwest are altitude-constrained by other air traffic flows. They could not be kept higher than as consulted upon.

6.29.9. The arrival route from the east is the only place where this opportunity is possible, and the route could not be positioned further south because it is constrained by other air traffic flows.

Keep routes higher

6.30. From this paragraph and map you can understand the design opportunity we have identified.

6.31. Design suggestions and recommendations to keep routes significantly higher than this, and/or for significantly longer, cannot be accommodated.

6.32. However, an adjustment of the arrival route from the east, and its CAS bases, is possible to keep aircraft higher for longer as described above.

6.33. For the avoidance of doubt, aircraft arriving at LLA could not be lower than as described in Figure 14.

Analysis for Action 1 Noise At & Above 8,000ft (including Hold)

6.34. The analysis of 245 responses tagged 'Design Change' revealed 23 recommendations[4] under Action 1.

Tag Ref	Recommendation	Tag Count
1.01	Minimise impact on urban area: Huntingdon, Godmanchester and nearby	31
1.02	Minimise impact on urban area: St Neots and nearby	43
1.03	Minimise impact on urban area: Cambridge and nearby	4
1.04	Minimise impact on urban area: Includes move flights away from residential/populated areas, or move towards open countryside/sparsely populated/rural areas, opposite of 1.07	59
1.05	Minimise impact: Grafham Water & surrounding villages	24
1.06	Minimise impact on specific villages: Brampton, Buckden, Offords, Paxtons	19
1.07	Minimise impact on rural/village area: Includes move away from rural/quiet villages/open countryside (inc move towards already noisy urban area where won't be noticed), opposite of 1.04	23
1.08	(Recommendation combined with 1.07 and no longer used, nil return)	nil
1.09	Move holding region (inc hold exit) to overfly the Fens (specific location)	4
1.10	Move holding region (inc hold exit) north as far as possible	12
1.11	Move holding region (inc hold exit) east as far as possible	16
1.12	Move holding region (inc hold exit) south as far as possible (inc closer to, or other side of, Luton, hold near the airport, hold in your own county and similar)	35
1.13	Move holding region (inc hold exit) west as far as possible	45
1.14	Move upper routes or holding region (inc hold exit) somewhere else (not specified)	22
1.15	Schedule the hold, or move the hold according to a schedule, or set restrictions on its use	6
1.16	Change one or both Stansted holds, and rearrange the Luton hold to fit	10
1.17	Retain current holding arrangement, or use one hold per airport	37
1.18	Change hold rotation direction, or size of holding pattern	9
1.19	Move hold to location already considered under Stage 2	1
1.20	Do not hold at all or reduce need to hold via tech, including mention of advanced technology, new ATC systems, ATM tools, AMAN, XMAN etc	15
1.21	Use point merge or other linear hold	14
1.22	Hold over the sea (either Luton or Stansted)	41
1.23	Make the hold higher	25
1.24	Keep routes higher (upper area)	5

Table 1 Recommendations relevant to Action 1

[4] We originally ran the analysis with 24 recommendations, however 1.08 was too similar to 1.07 so they were combined.

About Action 1 recommendations

6.35. Some of the recommendations are mutually incompatible (e.g. 1.04 and 1.07).

6.36. The technical feasibility of carrying out each recommendation, given the previously-described constraints and mutual incompatibilities, is far more relevant than how frequently it was mentioned in consultation responses.

6.37. Thus it may not be possible to progress a frequently-mentioned recommendation, but it may be possible to progress a recommendation that was tagged only a few times.

How have these Action 1 recommendations impacted the final airspace design?

6.38. Action 1 is: Consider how the design may be adapted to minimise noise impacts at & above 8,000ft, with attention given to the hold.

6.39. We will act on recommendations tagged **1.01, 1.02, 1.04, 1.10, 1.13, 1.23** and **1.24**, shaded green in Table 1 above.

6.40. The first six recommendations will have a combined effect on the progression of Action 1 by focussing attention on the hold. The seventh will have an effect on arrival routes from the east.

- **1.01** Minimise impact on urban area: Huntingdon, Godmanchester and nearby
- **1.02** Minimise impact on urban area: St Neots and nearby
- **1.04** Minimise impact on urban area: Includes move flights away from residential/populated areas, or move towards open countryside/sparsely populated/rural areas (opposite of 1.07)

There is scope to minimise the impact on the two specific urban locations in **1.01** and **1.02** by adjusting the hold within the constraints of the pink region (as illustrated in Figure 7 on p.13).

These locations are the two biggest urban areas in the vicinity of the pink region, therefore acting on recommendations **1.01** and **1.02** automatically acts on recommendation **1.04**, and vice-versa.

By acting on **1.01**, **1.02** and **1.04**, we are minimising noise impacts on urban areas. As highlighted in **1.04**, this is the opposite of 1.07 and they are mutually incompatible.

Therefore by acting on **1.04** we cannot act on 1.07.

- **1.10** Move holding region (inc hold exit) north as far as possible
- **1.13** Move holding region (inc hold exit) west as far as possible

Paragraph 6.17 (p.14) allows for localised adjustments of the hold location, and paragraph 6.23 (p.17) allows for localised adjustments to its orientation.

We have moved the hold northwest by c.2.5km, which takes the holding fix slightly closer to **Huntingdon**. This seems contrary to **1.01**, but crucially, this move allows the orientation of the holding axis to be adjusted by c.20° anticlockwise, which in turn keeps the predicted holding flightpath further away from Huntingdon. Aircraft in either the consulted-upon hold or the final design hold would be extremely unlikely to directly overfly Huntingdon itself. Using Hinchingbrooke Hospital as a landmark, the consulted-upon holding axis would pass c.2.7km from the town at its closest, approximately aligned with the A1. Moving the hold increases that holding flypast distance to more than 3.3km, and the new axis keeps the flightpath generally further west of the A1 away from the town.

This northwest shift and axis reorientation moves the predicted holding flightpath c.1.2km further away from **St Neots**, as per recommendation **1.02**. Moving the holding pattern reduces the likelihood of noise impact on St Neots but overflight of the town cannot necessarily be avoided by arrivals from the west, bypassing the hold. However, the repositioning and reorientation of the hold increases the likelihood of more dispersal caused by the slight increase in vectoring space available for controllers to bypass the hold.

By acting on **1.10** (north) we cannot act on 1.12 (south), and by acting on **1.13** (west) we cannot act on 1.11 (east), nor can we act on 1.09 (hold over the Fens which are to the northeast of

Huntingdon).These five recommendations have been acted upon to the greatest extent possible, given the constraints that limit the holding pattern to within the pink region.

- 1.23 Make the hold higher

Paragraph 6.27 (p.19) allows for the potential to raise the holding pattern's altitude.

We have acted on 1.23 by raising the lowest standard holding altitude by 1,000ft, from c.8,000ft to c.9,000ft, or Flight Level 90 (FL90) in standard ATC notation. We will ensure ATC instruction manuals are updated with this standard holding level.

Note that, as per the consultation document (Ref 8) Table 2 on p.15, the arrival noise information for the most common types at LLA would be 55dB LA_{max} at 8,000ft. As per paragraph 3.22 of that document, this is as low as the CAA-sourced measurements go. Therefore the same aircraft at 9,000ft can only be said to be 'less than 55dB LA_{max}' and we are unable to give a more precise number.

Paragraphs 6.24-6.28 above describe the circumstances and the caveats to this design decision.

- 1.24 Keep routes higher (upper area)

Paragraph 6.29 (p.19) allows for the potential to keep aircraft higher for longer.

We have acted on 1.24 by adjusting one of the main arrival routes and changing its CAS bases, to keep aircraft higher for longer.

For more information on how the routes may be adapted to minimise any increase in the use of aviation fuel, see Section 8 from p.30 later in this document.

6.41. Change log: Comparison of the consulted-upon holding region, and the Final Design holding region

6.41.1. We have changed the location, orientation and altitude of the hold by acting on Recommendations 1.01, 1.02, 1.04, 1.10, 1.13, 1.23.

6.41.2. The diagrams on the following page illustrate the consulted-upon design and the final design for the holding region.

6.41.3. The changes made as a result of this consultation are to minimise the impact on Huntingdon and St Neots, within the technical ATC constraints explained earlier in this document. This was done by moving the hold northwest towards less populated areas, and by changing its orientation axis. The impacts on less populated areas were minimised where possible to the north of the region by raising the standard holding altitude by 1,000ft, while retaining ATCO flexibility to use the consulted-upon altitude under contingency circumstances.

6.42. Change log: Comparison of the consulted-upon upper airspace, and the Final Design upper airspace

6.42.1. We have changed the arrival route from the east and CAS bases by acting on Recommendation 1.24.

6.42.2. Figure 14 on page 19 illustrates the consulted-upon design and the Final Design for the arrival route from the east.

6.42.3. The changes made due to this consultation are to keep aircraft higher for longer, within the technical ATC constraints explained earlier in this document. This was done by adjusting the location and direction of the route and by refining aircraft descent profiles to be as late as safely possible in that region.

6.43. We cannot act upon these recommendations:
1.03, 1.05, 1.06, 1.07, 1.08, 1.09, 1.11, 1.12, 1.14, 1.15, 1.16, 1.17, 1.18, 1.19, 1.20, 1.21 and 1.22
The constraints explained earlier in the document, combined with the mutual incompatibilities of some recommendations against others, mean these cannot be acted upon.

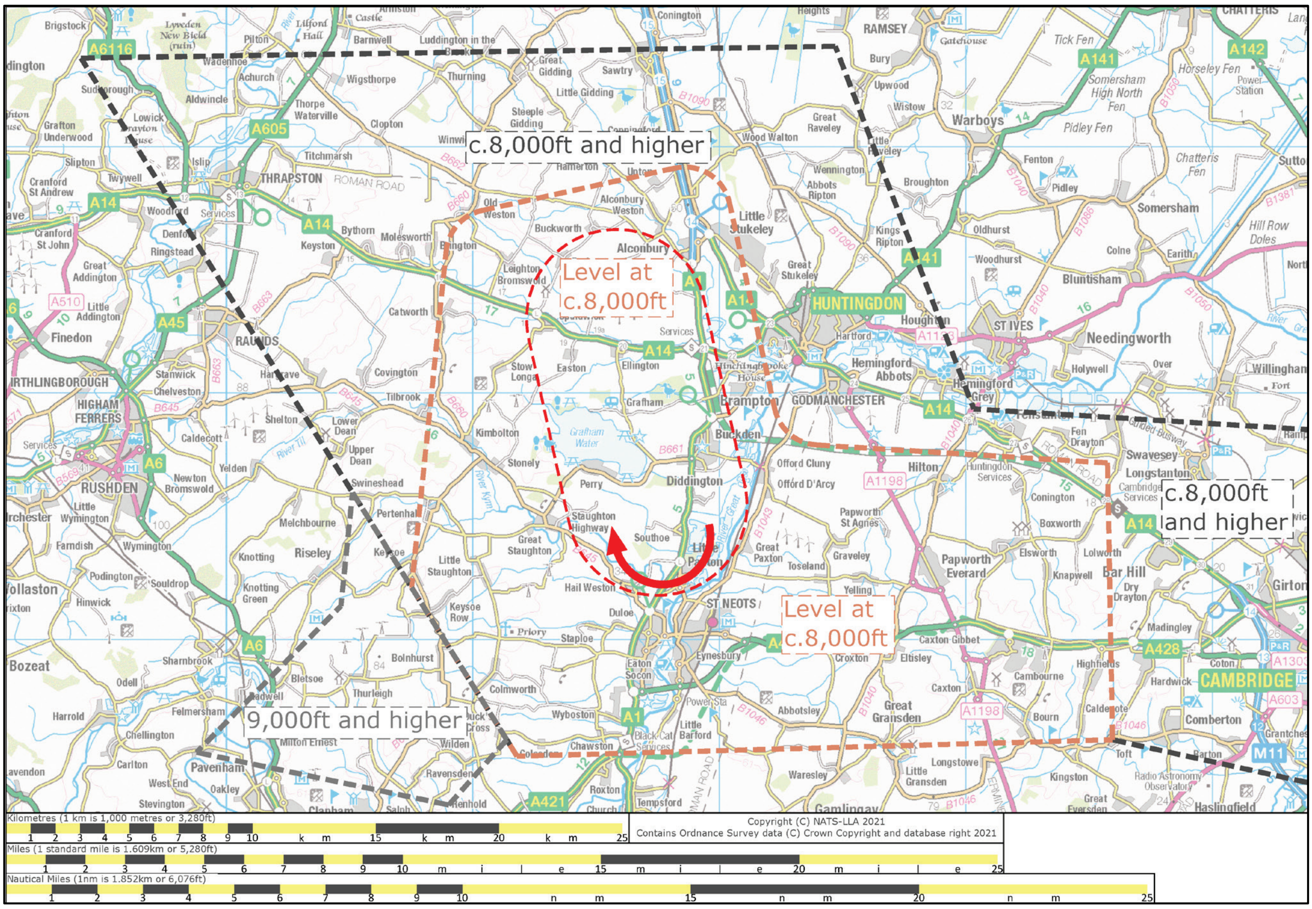
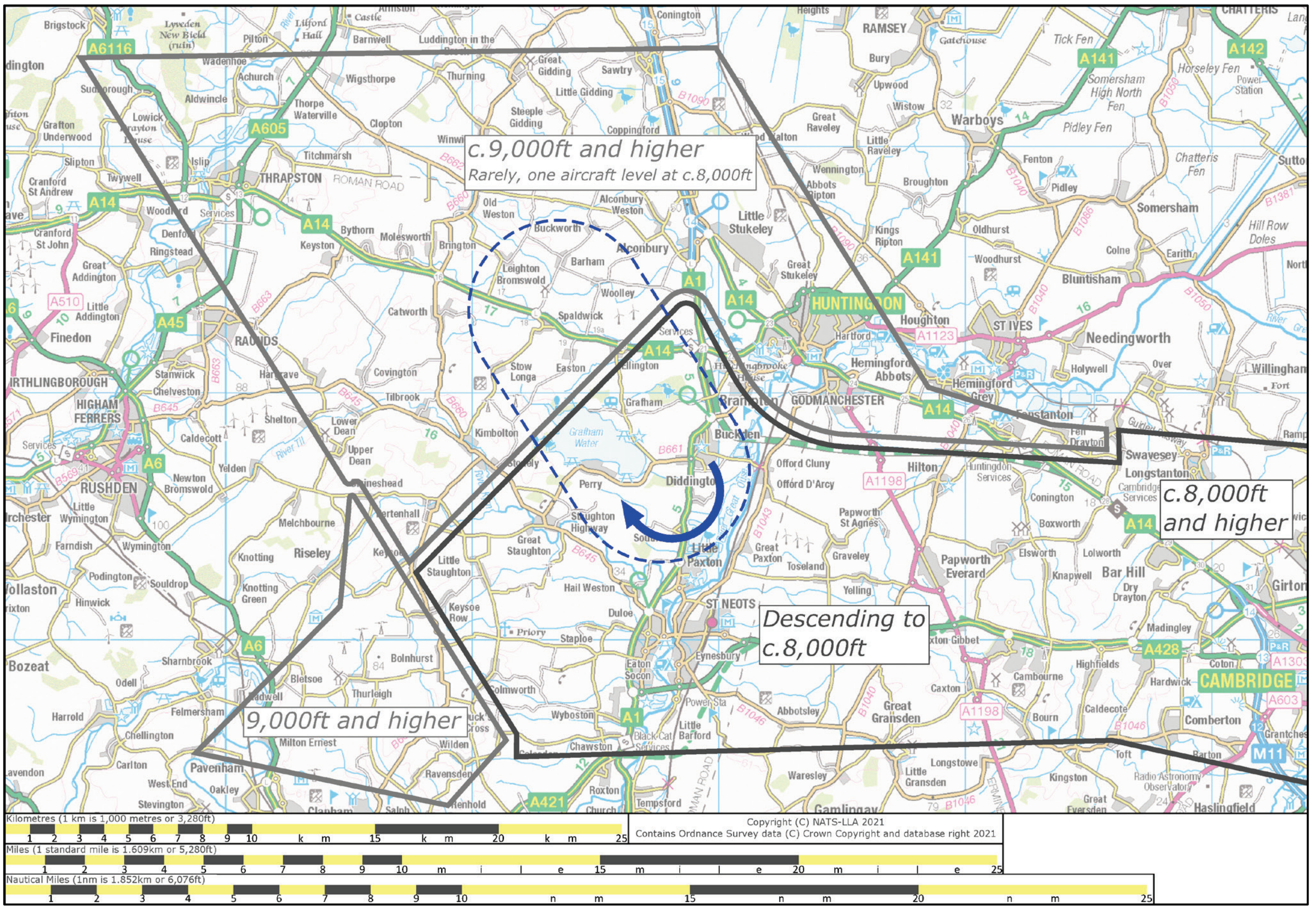


Figure 15 Consulted-upon holding region (above), Final Design holding region (below)



6.44. This concludes the consideration of, and application of, recommendations relevant to Action 1.

7. Action 2: Noise Below 8,000ft (including Option 1 or Option 2)

Consider how the design may be adapted to minimise noise impacts below 8,000ft, including choosing between Option 1 and Option 2.

7.1. This section discusses the results of the Step 3D feedback on Option 1 vs. Option 2. We recap the ATC constraints in this region. We choose which of the two Options will be progressed. We consider the results of the additional analysis from Action 5 (from paragraph 7.6 below), how we will or will not act on that analysis, and why.

Recap of Previous Constraints – Vectoring vs. Performance Based Navigation (PBN) routes, combinations, and where routes could technically go if implemented.

7.2. At Stage 2 (Refs 5-7) we explored the basic geographical constraints in the region below 8,000ft and created broad concept options, with several technical sub-options, each described in terms of the runway in use (easterly Runway 07*[5], westerly Runway 25*[5]). They were:

- Do Nothing
- Vectoring to each runway
- Follow PBN routes automatically and consistently to each runway (with technical constraints based on Instrument Flight Procedure IFP design criteria, existing airspace and a previous Leighton Buzzard arrangement). There were several PBN routes considered.
- A combination of PBN Routes and Vectoring to each runway

7.3. These were all considered via the Stage 2 Design Principles Evaluation (Ref 6) and Initial Options Appraisal (Ref 7), with the combinations suitable for further development into Stage 3 Consultation.

7.4. We did not consult on the rejected concept options because they had been considered, examined, and failed to progress through Stage 2 for the reasons given in that documentation.

7.5. The progressed concepts became the consulted-upon Option 1 Vectoring, and Option 2 PBN Routes with Vectoring.

7.6. The analysis of 245 responses tagged ‘Design Change’ revealed 11 recommendations under Action 2.

Tag Ref	Recommendation	Tag Count
2.01	Dispersal, like today, is fairer, or less unfair, than PBN routes; or Minimise flightpath change at low altitudes	30
2.02	PBN route: Move, or change operational hours, or delete part or all of route, or change traffic proportions on a route	46
2.03	Avoid concentration or focussing of noise	22
2.04	Keep routes higher; or use continuous descents and minimise level flight	11
2.05	Reduce existing impact on areas close to airport e.g. towns/villages under or near final approach, and/or existing shortcuts	21
2.06	Minimise impact on urban area: Biggleswade	16
2.07	Minimise impact on urban area: Leighton Buzzard	6
2.08	Minimise impact on Gamlingay and/or Potton	24
2.09	Consider rescinding Leighton Buzzard's existing minimise-overflight standing order	2
2.10	Minimise impact on rural area: Move flights to, or far side of, noisy transport link e.g. A1 or railway	31
2.11	Minimise impact on rural area: Chilterns, or Chiltern AONB	4

Table 2 Recommendations relevant to Action 2

[5] Runway 07 and Runway 25 were previously designated 08 and 26. This was a technical change due to variation in the Earth’s magnetic field over time. The runway designation must change as it is based on the magnetic compass heading, but the physical infrastructure does not change except for paint markings and taxiway signage. This redesignation occurred in May 2020 and has no impact on this proposal.

About Action 2 recommendations

7.7. If Option 1 Vectoring is progressed, recommendations most applicable to Option 2 PBN Routes would no longer be relevant and cannot be considered further.

7.8. The technical feasibility of carrying out each recommendation, given the previously-described constraints and mutual incompatibilities, is far more relevant than how frequently it was mentioned in consultation responses.

7.9. Thus it may not be possible to progress a frequently-mentioned recommendation, but it may be possible to progress a recommendation that was tagged only a few times.

7.10. It also may be possible for a recommendation to not be directly acted upon, but by default the impacts it describes could be partially mitigated due to other design choices.

How have these Action 2 recommendations impacted the final airspace design?

7.11. Action 2 is: Consider how the design may be adapted to minimise noise impacts below 8,000ft, including choosing between Option 1 and Option 2.

7.12. We will act on recommendations tagged **2.01 and 2.03**.

7.13. These recommendations have a combined effect on the progression of Action 2 by focussing attention on the choice between Option 1 Vectoring and Option 2 PBN Routes with Vectoring.

- **2.01** Dispersal, like today, is fairer, or less unfair, than PBN routes; or Minimise flightpath change at low altitudes
- **2.03** Avoid concentration or focussing of noise

From the Step 3D report, Option 1 was clearly preferred. Comments indicated a greater perceived fairness of shared impacts via vectoring dispersal, similar to LLA's pre-pandemic arrival operation at lower altitudes, rather than Option 2's daily use of PBN routes with some vectoring.

There was also the perception that the proposed route alternation would not bring enough predictable respite to those in the vicinity of the PBN routes.

Option 1 would mean that arrival flightpaths at the lowest altitudes (level at 5,000ft and below) would be very similar to, or the same as, the pre-pandemic traffic patterns – including shortcuts for about 30% of arrivals.

Flightpaths at higher altitudes (c.8,000ft descending to 5,000ft) would change, to link the holding region (see Section 6 above) with each runway, as described in the consultation document (Ref 8 Section 5 paragraphs 5.19-5.29 including the diagrams reproduced below at Figure 15). Those flightpaths are more likely to be dispersed than if Option 2 was progressed.

Option 1 was not our preferred option, and is less aligned with the Government's Airspace Modernisation Strategy AMS (Ref 14). However we acknowledge that Option 1 is a viable solution to the latent issue identified as the root cause of this airspace change proposal.

By acting on **2.01** and **2.03** we are progressing Option 1 Vectoring, where ATCOs will manually direct aircraft from the hold to the runway under normal circumstances.

As previously mentioned in paragraph 7.7 above, if Option 1 is progressed, recommendations most applicable to Option 2 PBN Routes cannot be progressed.

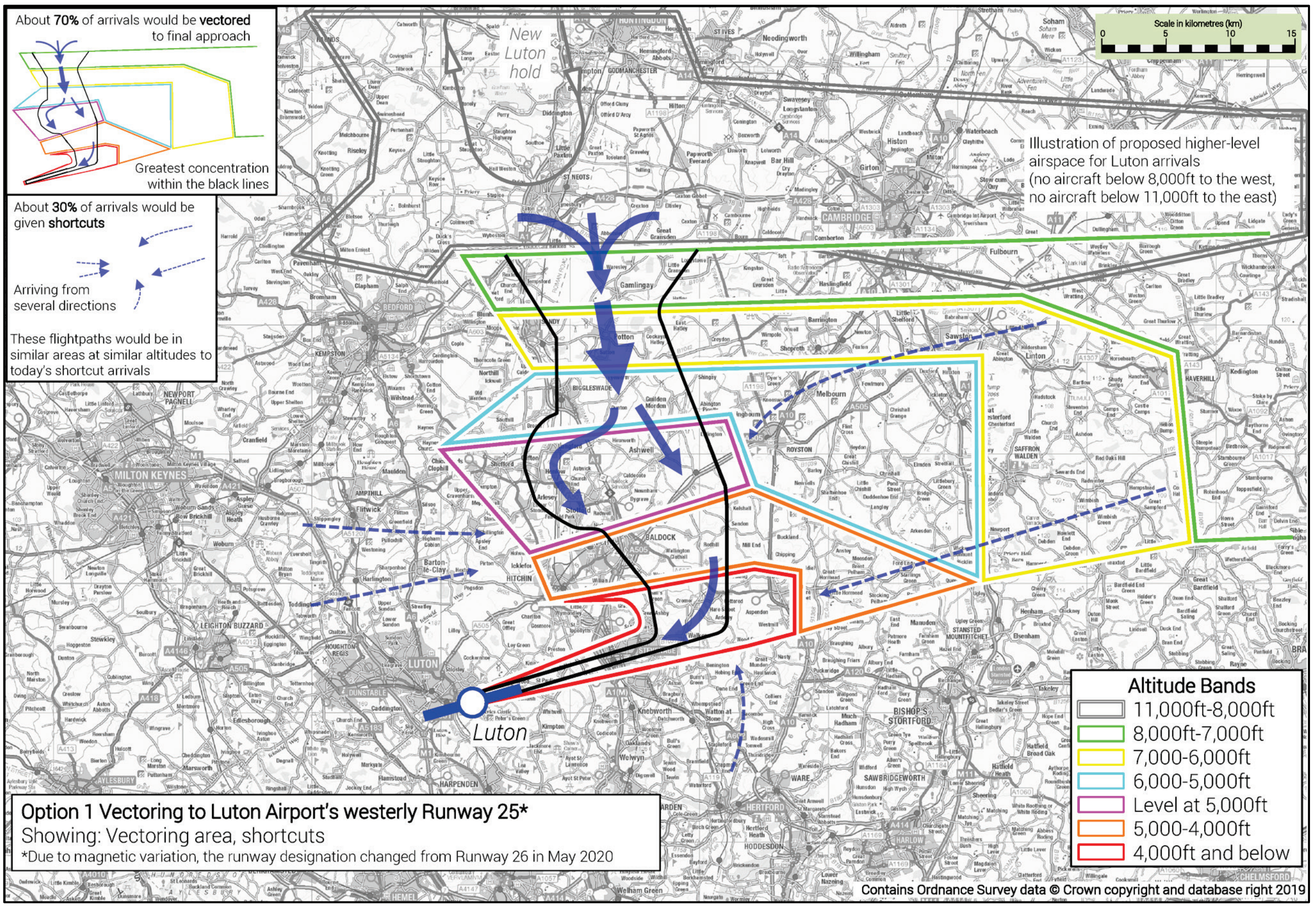
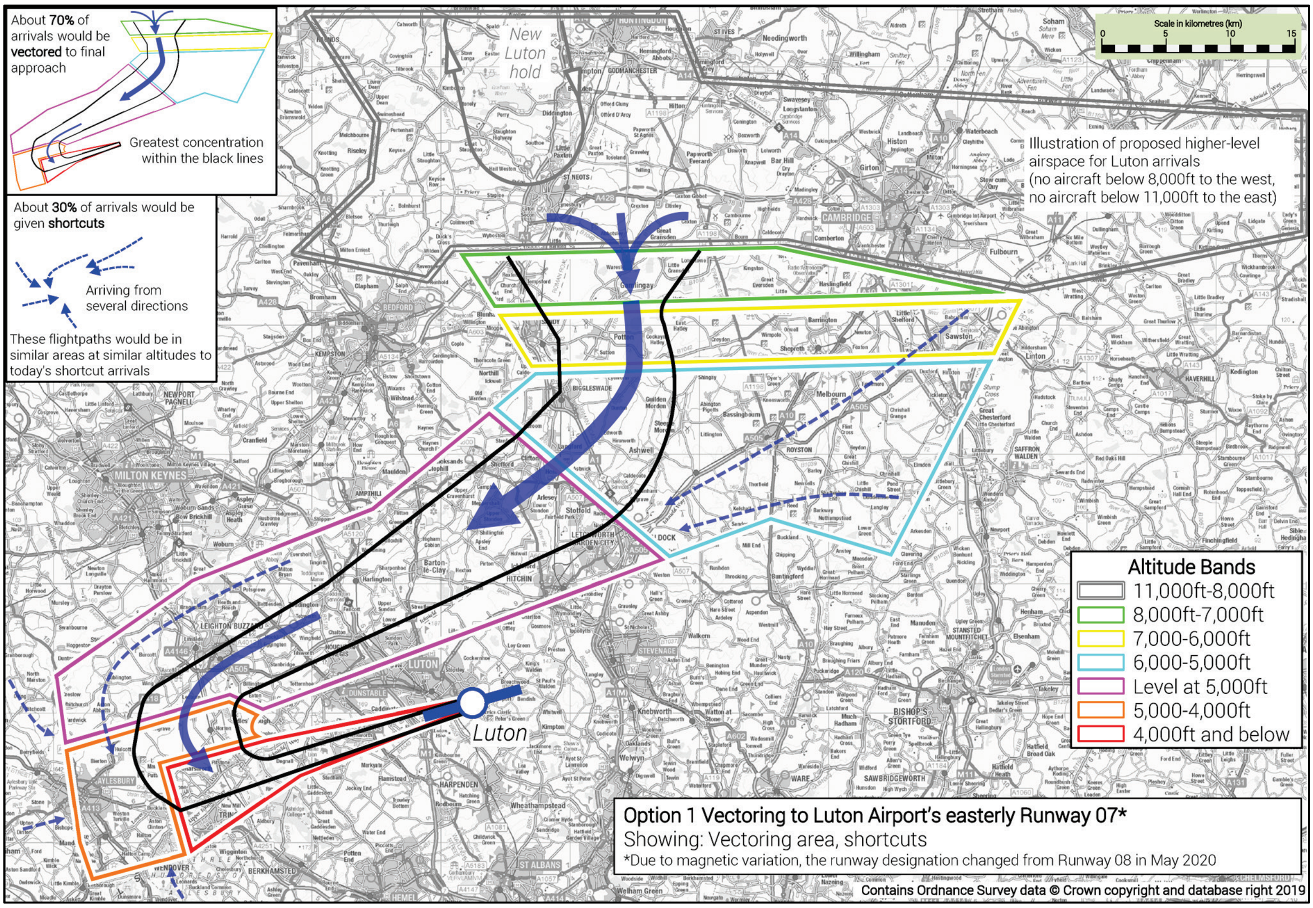


Figure 16 Final Design: Option 1 arrivals to Runway 07 (above) and Runway 25 (below), reproduced from the Consultation Document (note that the illustrated hold has moved, see Section 6)



7.14. We cannot act upon recommendations 2.02, 2.04, 2.05, 2.06, 2.07, 2.08, 2.09, 2.10 and 2.11. However, as per paragraph 7.10 above, the impacts some recommendations describe would be partially mitigated due to other design choices.

- We cannot act on 2.02 because it recommends changes to the PBN routes, and Option 2 is not progressing.
- We cannot act on 2.04 because both consulted-upon Options already keep aircraft slightly higher, above 5,000ft, as high as possible against other traffic flows (adjacent unchanging Heathrow, London City and Stansted departures). Continuous descents are only possible from 5,000ft and below regardless of the operational concept.
- We cannot act on 2.05 because Option 1 minimises changes to flightpaths from 5,000ft to the runway. For example, requests to change flightpaths in the Stevenage area cannot be acted upon because of the fixed geographical relationship between the town and LLA's final approach.
- We cannot act on 2.06 because Biggleswade is between the holding region and the runway and we could not guarantee to avoid overflight. However, the changes made in Section 6, combined with this Section's decision to progress Option 1, means that flightpaths are more likely to be dispersed across the black-lined areas between 8,000ft-5,000ft in Figure 15 than down the centre.
- We cannot act on 2.07 and we will not act on 2.09 because flightpaths in the Leighton Buzzard area would not change under Option 1. Pre-pandemic, air traffic generally bypasses the town to the south, sometimes to the north, and this would continue. As discussed in the Consultation Document (Ref 8 p.29 paragraph 5.29 and footnote 18) and Stage 2 documents (Refs 5-7) there is a pre-existing CAA condition to minimise overflight of this town, and we did not challenge it.
- We cannot act on 2.08 because Gamlingay and Potton are both between the holding region and the runway and we could not guarantee to avoid overflight. However, the changes made in Section 6, combined with this Section's decision to progress Option 1, means that flightpaths are more likely to be dispersed across the black-lined areas between 8,000ft-5,000ft in Figure 15 than down the centre.
- We cannot act on 2.10 because it is technically not possible to create flight procedures that accurately follow a road. Also, suggestions to move the flights to the opposite side of specified roads or transport links cannot be accommodated due to existing airspace constraints and other flows. For example, flightpaths cannot be moved over, or to the west of, the A1 due to existing northwest-bound major traffic flows described in Section 6's Figure 4 on page 10. Other roads mentioned in feedback, such as the M1, are even further west.
- We cannot act on 2.11 because overflight of the Chilterns Area of Outstanding Natural Beauty (AONB) cannot be avoided under Option 1. We are required by the airspace change process CAP1616 (Ref 11) to consider changes in impact on AONBs with regards to tranquillity, and as per our response to recommendation 2.05 above, there would be no change in this area under Option 1.

7.15. In the paragraphs above, we describe progressing Option 1 as consulted. We did not make changes to the vectoring areas based on the recommendations because additional vectoring flexibility is provided by the moved hold location described in Section 6, which means that flightpaths are more likely to be dispersed across the black-lined areas between 8,000ft-5,000ft.

The ATC complexity of the region will be significantly reduced, but the decision not to progress Option 2 means ATCOs would not gain the extra reduction in complexity via daily use of PBN routes from the hold to the runway. Changing the vectoring areas to attempt to avoid towns would increase complexity and cause natural concentrations either side of the town being avoided, where the aim of the proposal is to reduce complexity and unnecessary concentration as much as possible. Therefore, we will retain maximum vectoring flexibility which in turn maximises the opportunity for dispersal.

7.16. In the paragraphs above, we describe our expectation that flights are more likely to be spread across the black-lined areas between 8,000ft-5,000ft. This spread would not change impacts below 5,000ft compared with the consulted Option 1, and would therefore not make a difference to the formal noise metric calculations used by the Government to monetise health impacts and amenity caused by noise.

These calculations, known as WebTAG, contribute to the Final Options Appraisal (Ref 10C). It would be disproportionate to reperform the noise metric calculations because WebTAG calculates and monetises levels of noise impact which typically occur below 4,000ft.

7.17. Option 1 means that PBN routes from the hold to the runway will not be available for general use by ATCOs, however the PBN routes do need to be available to pilots under very rare contingency purposes – this is consistent with the Consultation Document (Ref 8 p.57 paragraph 7.46-7.47). ATCO instruction documentation will ensure that, day-to-day, they will use the vectoring method all the time. Pilots would only be able to fly the PBN routes under unusual circumstances such as a failed radio, where it would be necessary for the pilot to self-navigate unaided to the runway. PBN Routes 1 and 3 (as described in the Consultation Document Section 5 Option 2) will be progressed but would be used only under rare contingency circumstances.

7.18. As noted previously, Option 1 aligns less with the AMS (Ref 14) than Option 2, but Option 1 is a viable solution to the specific issue that this airspace change seeks to address. The AMS is Government driven, and requires future changes in a coordinated way with nearby airports and the wider air route network in the South East. See the Consultation Document (Ref 8 p.10-11) paragraphs 2.35-2.46 for more details.

7.19. Change log: The Final Design below 8,000ft

7.19.1. We have acted upon Recommendations 2.01 and 2.03, the effect of which is to progress Option 1 Vectoring below 8,000ft. There are no changes to the vectoring area design below 8,000ft.

7.19.2. For completeness, we have also made a technical flight procedural change which is targeted at aviation experts, and there are no noise or fuel impacts attributable to this change.
In the consultation document (Ref 8) Aviation Technical Section 7, paragraph 7.54, we stated:
Should the glideslope become unserviceable, a PBN approach procedure would be provided for aircraft so equipped, and a localiser-DME procedure would be available for others.
Following technical discussions with the CAA's IFP Regulator, we agreed a PBN approach procedure could not be provided at this time. Conventional IFP arrangements (such as LOC-DME) would remain available for pilots should the ILS glideslope fail.

7.20. This concludes the consideration of, and application of, recommendations relevant to Action 2.

8. Action 3: Minimise increases in aviation fuel and associated CO_2

Consider how the design may be adapted to minimise any increase in the use of aviation fuel as part of the complexity-reducing, safety-enhancing primary aim of this proposal, consequently minimising increases in greenhouse gas emissions and costs for aircraft operators.

8.1. This section differs from Sections 6 and 7 because there is only one recommendation, 3.01, which was tagged 6 times in the additional analysis. We are acting on that recommendation.

8.2. The recommendation is to find a way to shorten the consulted-upon routes, reducing fuel consumed and flying time, minimising the increase in greenhouse gas emissions due to this proposal as per the Action itself.

8.3. Action 3 applies to the upper arrival route structure, ending at the hold. The hold location was discussed in Section 6 from p.9, and the arrival flows from the hold to the runway were discussed in Section 7 from p.25.

8.4. Figure 17 overleaf provides an overview of the consulted-upon upper routes.

8.5. The red dashed lines illustrate the consulted-upon route structures from the east via A and B, and from the south via D.

8.6. The route segment from C to F is equivalent length-wise, but in Section 6's Figure 14 on page 19 and paragraph 6.42 on p.23 we explain how we changed the design to keep aircraft higher for longer as per Recommendation 1.24. This meant moving the route slightly further south and raising CAS bases which reduces the impact on other airspace users such as USAFE.

8.7. The blue solid lines illustrate the shortening of routes between these common points, given the constraints of the orange Stansted routes.

8.8. Change log:

8.8.1. Blue Route Segment A-C would be slightly longer than Red (between 0.9nm-2.7nm depending on whether the shortcut was available due to adjacent traffic). This route is only used by c.1% of LLA arrivals, and has been modified to minimise the CAS that needs to be implemented to contain the routes, reducing impacts on other airspace users such as USAFE (see Section 9 Action 4 for details).

8.8.2. Blue Route Segment B-C would be 2.1nm shorter than Red. This route is the most popular and was used by c.51% of all LLA arrivals in pre-pandemic traffic conditions. This shortening would therefore reduce the track mileage disbenefit for the greatest proportion of LLA arrivals.
This route could not be shortened any further due to the constraint of the orange Stansted route. Our aim is to separate out LLA arrivals from Stansted arrivals as early as possible, and moving the B-C route further south would not 'design out' that separation to a sufficient degree against the orange route to the ABBOT hold, increasing the complexity of the operation in that region.

8.8.3. Both the above routes would require moving the rarely used en route contingency hold, from the Red Dashed hold to the Blue Solid hold shortly after both routes converge at high levels over eastern Suffolk (14,000ft and above, with rare holding 15,000ft and above).

8.8.4. Blue Route Segment D-F would be 1.5nm shorter than Red D-E-F. This route is the second most popular and was used by c.36% of all LLA arrivals in pre-pandemic traffic conditions. This shortening would therefore reduce the track mileage disbenefit for the second-greatest proportion of LLA arrivals.

8.9. The routes from the west could not be shortened because they must fit with the existing major traffic flows described in Section 6 paragraph 6.7 on p.10.

8.10. These shortened route lengths, the raised route segments and the raised hold all combine to reduce the disbenefit caused by the overall track length increases necessary to separate out the LLA arrival flows from Stansted's.

8.11. Additionally, the moved/reoriented hold and the adjusted confluence angle between Blue Segments D-F and C-E-F has simplified the way ATCOs can fit aircraft into an arrival sequence. Initial assessments indicate that this may reduce the likelihood of aircraft needing to enter the hold.

8.12. For full details of the differences in fuel and greenhouse gas emissions, see the Final Options Appraisal (Ref 10C).

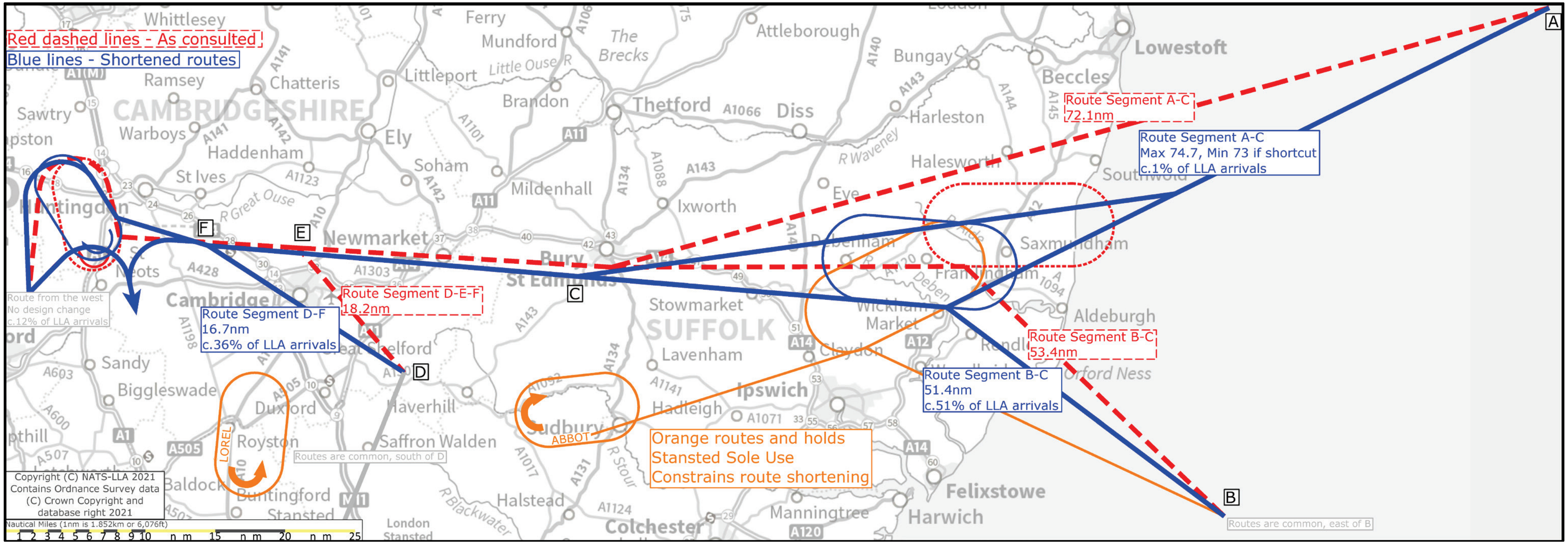


Figure 17 Shortening the proposed route structure (with illustration of Stansted constraints)

8.13. This concludes the consideration of, and application of, the recommendation relevant to Action 3.

9. Action 4: Minimise impacts on other airspace users

Consider how the design may be adapted to minimise impacts on other airspace users, by reducing the requirement for controlled airspace while still enhancing safety, and by agreeing operational practices to mitigate airspace access impacts.

9.1. This section differs from Sections 6 and 7 because there are only two recommendations, **4.01** and **4.02**.

9.2. Both recommendations are aviation-technical in nature and we will use such language in this Section, assuming the reader is familiar with common aviation terminology.

9.3. We are acting on both recommendations, and explain the constraints at the same time.

9.4. See also Step 3D Consultation Feedback Report (Ref 10A) Section 14 for detailed feedback on aviation technical matters.

9.5. We have also previously committed to reducing existing CAS southeast of Stansted, with thanks to London Stansted Airport for their agreement. See Consultation Document (Ref 8) paragraph 7.32 on page 53.

- **4.01** Minimise impact on other airspace users: Low-altitude airspace (tagged 27 times)
- **4.02** Minimise impact on other airspace users: Higher-altitude airspace (tagged 7 times)

9.6. For **4.01** this refers to the establishment, under Option 2, of a 4,500-5,500ft Class D CAS diamond-shaped volume northwest of Leighton Buzzard.

9.7. As Option 2 is not progressing, this volume is not required, and it does not progress to the Final Design.

9.8. Part of the reason Option 2 did not progress was several responses from the local gliding community at London Gliding Club, combined with the fact that Option 1 was a viable solution albeit not preferred by us, therefore this recommendation has been acted upon and is complete.

9.9. For **4.02** this refers to two different types of impact in the newly proposed CAS FL75+:

9.9.1. The establishment of the minimum volume and classification of CAS to contain commercial IFR flights in the hold, the routes leading to the hold, and the vectoring area leaving the hold towards the runway; and

9.9.2. Identifying, through engagement and consultation, those airspace users who would be significantly impacted by this FL75+ CAS establishment, and working with those users to identify mitigating operational practices where it is practicable to do so.

Minimising the CAS volumes, identifying mitigating operational practices

9.10. We have worked closely with the MoD, in particular USAFE at the combined RAF Lakenheath and Mildenhall operation, RAF Wittering, and 78 Sqn Swanwick (Military), in order to understand their current and near-future operations.

9.11. USAFE at RAF Lakenheath and Mildenhall

9.11.1. We identified that adapting the position and orientation of the hold under Action 1 Recommendations **1.01, 1.02** and **1.04** would also allow for reduced CAS requirement in the holding region. We have reduced the lateral requirement by up to 2.6nm to the east of the hold, while retaining 4nm containment of the reoriented holding axis against the boundary. Combined with some minor flight procedural changes at FL80+ kindly agreed and implemented by Lakenheath ATC, this reduces the impacts on that military air activity east of the hold.

9.11.2. We have also identified that, as part of keeping aircraft higher for longer (Action 1 Recommendation **1.24**), we can reduce the impacts on Lakenheath's Runway 11 approaches for certain types of future training flights.

9.11.3. As part of shortening the routes (Action 3 Recommendation **3.01**), we have moved the CAS-defining arrival route from the east, shifting it slightly further south and changing its confluence angle at the far northeast. Normally, 3nm CAS containment is required by CAA policy[6] between an RNAV1 STAR and its CAS boundary, however we will provide a safety case to reduce that containment to 2nm. Therefore, moving the route moves the 2nm CAS containment boundary further south, away from the air bases, reducing the impacts on USAFE's operations. We have also reduced the CAS requirement to the northeast, and ensured at least 3nm CAS containment against the moved en route hold at FL190.

9.11.4. Finally, the installation of any new CAS north of the existing LTMA boundary means that USAFE traffic joining the civilian ATS route network, or leaving the same, would be impacted.

9.11.5. We have addressed this by working with USAFE to write updated operational procedures, using a draft Letter of Agreement as the mechanism. This draft LoA was, in principle, agreed by USAFE ATC and we look forward to continuing to work closely with them.

9.12. RAF Wittering

9.12.1. As per paragraph 9.11.1 above, we identified that adapting the position and orientation of the hold under Action 1 Recommendations **1.01, 1.02** and **1.04** would also allow for reduced CAS requirement in the holding region.

9.12.2. RAF Wittering's operations are Elementary Flying Training for student pilots in aircraft equipped with basic instruments. They use this area above FL75 semi-regularly, and would be impacted by a new CAS volume.

9.12.3. We discussed the possibility of agreeing operational procedures to allow access under agreed conditions, using a draft Letter of Agreement as the mechanism. RAF Wittering decided that this would increase the workload on student pilots to an unacceptable level, therefore we agreed that RAF Wittering would avoid the new volumes of CAS assuming implementation in due course. However, we also agreed that, should the workload become relatively tolerable for student pilots compared with avoiding CAS, RAF Wittering would consider re-engaging on the subject of an airspace sharing arrangement via LoA.

9.13. 78 Sqn Swanwick (Military), known as Swanwick Mil.

9.13.1. This ATC provider is unique in the way it operates – it is a military air traffic control unit embedded alongside civilian ATCOs at the air traffic control centre in Swanwick, Hampshire and they work closely together.

9.13.2. In this region Swanwick Mil manages an airspace element known as the DTY Corridor that would require a modification to fit with the holding region.

9.13.3. We discussed the possibility of agreeing operational procedures to ensure Swanwick Mil has continued access for operational air traffic, using a draft Letter of Agreement as the mechanism. Swanwick Mil was content that a draft LoA was, in principle, agreed by both parties and we look forward to working with them on finalising details.

9.14. We have also worked with civilian airspace users in the region. These include Cranfield Airport's ATC and the National Flying Laboratory Cranfield (NFLC), Cambridge Airport, and the East Anglian Rocketry Society (EARS).

9.15. Cranfield Airport's ATC and NFLC

9.15.1. NFLC teaches part of the aerospace engineering course at the associated University by flying groups of students and showing them aircraft flight behaviours. We engaged with them to understand their operation. They use this area above FL75 semi-regularly, and would be impacted by a new CAS volume.

[6] SARG Controlled Airspace Containment Policy 2014 https://publicapps.caa.co.uk/docs/33/20140117ContainmentPolicyFinal.pdf

9.15.2. We discussed the possibility of agreeing operational procedures to allow access under agreed conditions, using a draft Letter of Agreement as the mechanism. NFLC agreed, along with Cranfield Airport ATC, such that a draft LoA was, in principle, agreed by all three parties and we look forward to working with them on finalising details.

9.16. Cambridge Airport

9.16.1. We held engagement sessions with Cambridge Airport to understand their operation. We discussed the need to update the existing LoA to better reflect the revised sectorisation arrangements under this proposal. Cambridge Airport agrees, in principle, that the updates were appropriate, and we look forward to working with them on finalising details.

9.17. East Anglian Rocketry Society EARS

9.17.1. EARS launches rockets from a site near Papworth Everard in Cambridgeshire. Rarely, they launch above FL75 but when they do they would be impacted by this proposal. We held an engagement session with EARS to understand their operation.

9.17.2. We discussed the possibility of agreeing operational procedures to ensure EARS has a way to acquire temporary access when their launches are likely to enter the proposed CAS, using a draft Letter of Agreement as the mechanism. EARS was content that a draft LoA was, in principle, agreed by both parties and we look forward to working with them on finalising details.

9.18. Airspace Classification

9.18.1. Most responses to the consultation stated they had no preference on the airspace classification in the upper region.

9.18.2. In order to act upon recommendation **4.02**, we must consider the aim of the proposal and the minimising of impacts on other airspace users.

9.18.3. Class A would not permit VFR flight and would be too impactful on other airspace users.

9.18.4. Class D would allow VFR flight, but would not provide for radar separation between VFR and IFR flights.

9.18.5. Class C permits VFR flight but also provides for radar separation between VFR and IFR flights, and is the best balance for this region.

9.19. Design Change Log:

9.19.1. Recommendation **4.01** is related to Action 2 (Section 7 from p.25) which removes Option 2 from progression. The lower CAS volume was part of Option 2 thus it has been removed from further progression.

9.19.2. Recommendation **4.02** was acted upon because we reduced the size of CAS volumes compared with the consulted-upon design, by more than 10% (48.1nm^2). We mitigated where practicable the impacts on other airspace users, by offering to discuss access arrangements to the proposed CAS volumes.

9.19.3. We decided to progress Class C as the best balance for this region.

9.20. Figure 18 on the next page shows the Final Design CAS, illustrates some of the construction notes, and compares it against the consulted-upon design Option 1.

9.21. This concludes the consideration of, and application of, the recommendations relevant to Action 4, and also completes all the design decisions, leading to the Final Airspace Design (Ref 10B, a layered PDF map published concurrently with this document).

About Action 5

9.22. This Action was to consider the specific design change suggestions and recommendations received, and decide to what extent they could be achieved. We took Action 5 and used it to drive the airspace design development given the constraints explained in each section. There are no further suggestions or recommendations to consider or address, and Action 5 is complete.

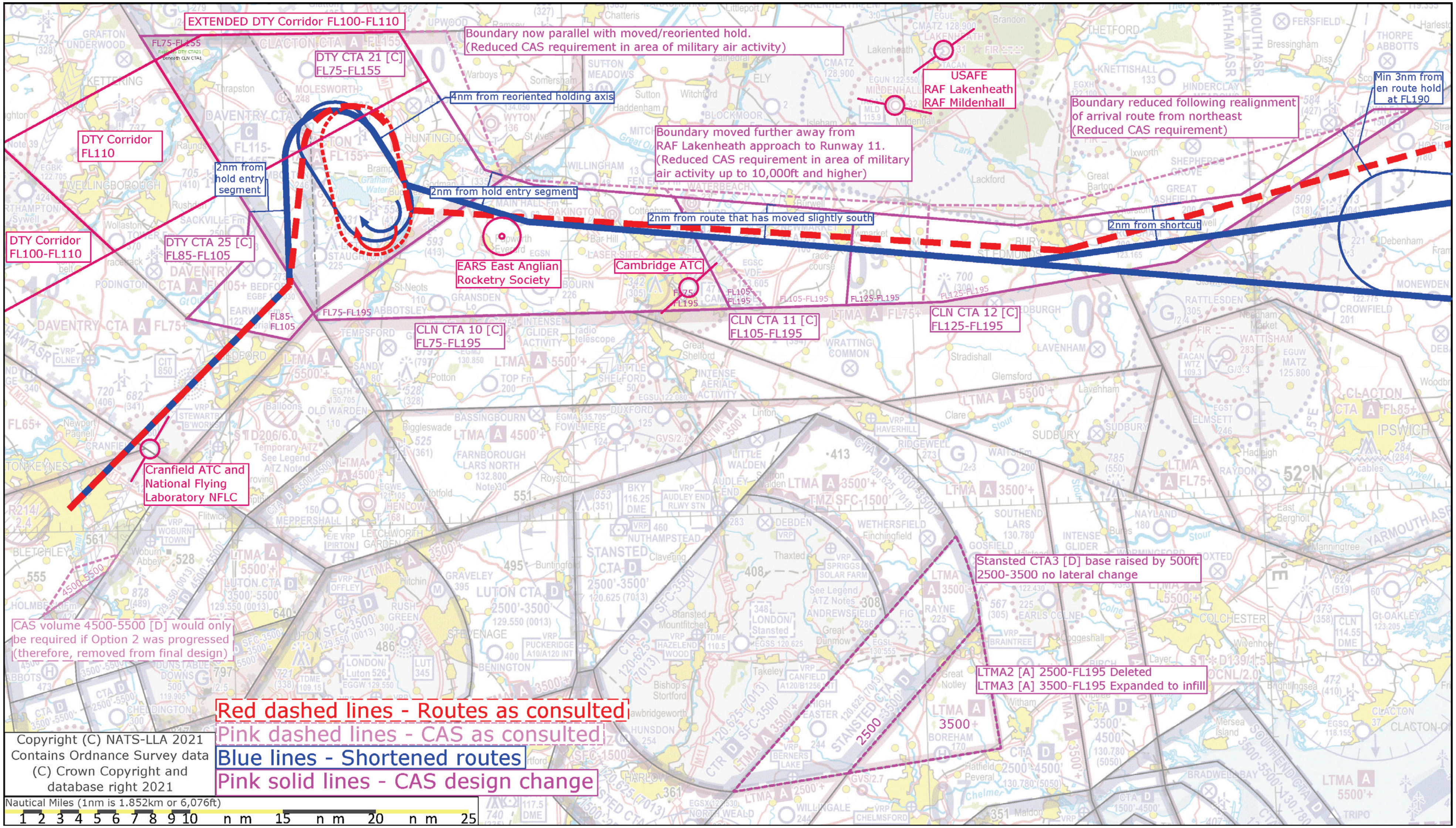


Figure 18 Action 4: Controlled Airspace Final Design, illustrating the engaged agencies (RAF Wittering is off the map to the northwest)

10. The Final Airspace Design has been changed. Is the consultation still valid?

10.1. This document explains how feedback from the consultation has been used to derive major Actions, with associated design recommendations per Action.

10.2. Each design recommendation has been addressed, and constraints preventing or limiting its application have been provided where appropriate.

10.3. In accordance with CAP1616 (Ref 15) paragraph 200, there is no additional airspace and there are no new routes. The intended use of the airspace would not change from that consulted upon. The intended use of the airspace has not altered such that stakeholders already consulted would have substantially negative impacts due to the alterations.

10.4. Where an airspace change affects flightpaths at different altitudes, the Government's Air Navigation Guidance (ANG2017, Ref 15 paragraphs 3.3c and 3.3d) is clear that, at or above 4,000ft to below 7,000ft, the minimising of noise impacts has environmental priority over the minimising of CO_2 emissions. Conversely, at or above 7,000ft, the minimising of noise is not the priority and the reduction of CO_2 is prioritised.

10.5. We consulted on a holding region where we stated aircraft would be at c.8,000ft. Therefore we contend that the precise placement of the hold anywhere within that region is compliant with the ANG2017 and the CAP1616 airspace change process (Ref 11).

10.6. There is not a fundamental difference between this Final Airspace Design and that consulted upon; they are clearly substantively similar. This consultation remains valid. We do not intend to re-consult.

11. Design Principles Revisited

11.1. The Design Principles (DPs) for this proposal were agreed at Stage 1, were used to evaluate potential design options at Stage 2, developed the consulted-upon design at Stage 3 and will be discussed here at Stage 4 now the design has been finalised.

- *DP1 Safety is the highest priority. Optimise the complexity of the TC Essex sector within the scope of this project.*

The final design meets this DP because it separates the LLA arrival flows from those of Stansted, which corrects the airspace design latent safety issue of entwined arrival flows serving two of the five busiest airports in the UK.

- *DP2 Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017 and all appropriate Government aviation policies, and updates thereof*

The final design meets this DP because the 3 aims of the NPSE have been met as far as possible:
a. Avoid significant adverse impacts on health and quality of life
The final design would not lead to new significant adverse impacts.

b. Mitigate and minimise adverse impacts on health and quality of life
The design decisions described in this document were taken in order to follow this aim as far as possible.

c. Where possible, contribute to the improvement of health and quality of life
In every airspace change there are some who will be positively impacted and some who will be negatively impacted. The design decisions described in this document would have positive and negative impacts. We used best endeavours to balance these conflicting impacts.

The final design is consistent with the ANG2017. It is as consistent as possible with the AMS Government strategy, however the design decisions were driven by consultation feedback, which has been contrary to the full intent of the AMS.

- *DP3 Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD*

The final design meets this DP because we have engaged extensively with Lakenheath ATC and have agreed (in principle) a viable operational partnership via Letter of Agreement.

- *DP4 Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met*

The final design meets this DP because airport capacity would not be constrained should it be implemented.

- *DP5 Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.*

The final design meets this DP because it separates the LLA arrival flows from those of Stansted at a much higher level than the current design.

- *DP6 Operational – Increase the predictability of LLA's arrivals*

The final design meets this DP because the separated LLA arrival flows will not have a dependency on Stansted, therefore any arrival issues at Stansted would be much less likely to impact LLA (and vice-versa).

- *DP7 Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that*

The final design cannot fully meet this DP because adjacent unchanging Heathrow, London City and Stansted departures require LLA arrival flows to fly level at 5,000ft, though under this design the distance of level flight would be reduced compared with the current design. Above 7,000ft the final design meets the DP within the constraints of the LTMA.

- *DP8 Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years*

The final design is as consistent as possible with the AMS Government strategy, however the design decisions were driven by consultation feedback which has been contrary to the full intent of the AMS. Therefore this DP is not met, as the progression of Option 2 would reduce (but not eliminate) the future requirement for such changes. This statement and this document do not prejudice any potential future airspace design associated with NATS and LLA's compliance with the Government's AMS.

- *DP9 Technical – There must be agreement between stakeholder ANSPs that the design concept being progressed suits all operations:*
  MoD (other than USAFE Lakenheath), MoD (USAFE Lakenheath), Stansted Airport, Cambridge Airport, Cranfield Airport

The final design has considered these stakeholder ANSPs and all are content in principle that it is suitable for their operations. This DP is met.

- *DP10 Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite*

The final design provides a distribution of traffic via vectoring, but does not provide route structures or mechanisms for respite. However, feedback led to the decision to progress vectoring because it was seen as fairer, or less unfair, than PBN routes. Thus we consider this DP as partially met.

- *DP11 Economic – Reduce fuel burn, and*
- *DP12 Economic – Minimise potential increases in fuel burn*

The final design cannot satisfy both DPs. It does not meet DP11 as we do predict an increase in fuel burn due to the requirement to separate LLA arrival flows from Stansted, which necessarily means making routes slightly longer. However, it does meet DP12 because feedback from the consultation, via design recommendation 3.01, led to the routes being shortened.

- *DP13 Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft*

The final design uses tactical vectoring from the hold to the runway, which negates the need to publish specific routes (which could require traffic to accurately overfly the same communities). Routes of other airports would be considered by controllers on a tactical (case by case) basis.

- *DP14 Operational – Should minimise tactical intervention by ATC below 7,000ft*

The final design does not meet this DP because the progressed concept, following decisions made in light of consultation feedback, is vectoring.

- *DP15 Technical – Minimise negative impact on other airspace users by keeping CAS requirements to a minimum, investigating potential release of existing CAS, keeping new airspace boundaries simple where possible, and FUA if possible*

The final design meets this DP because all elements of the DP have been addressed using consultation feedback, and have been described in this document.

12. Final Options Appraisal Summary

12.1. The document Step 4A(iii) Final Options Appraisal (Ref 10C) presents a quantitative cost benefit analysis of both the consulted Option 1, and the final design described in this document (now named Option 1A).

12.2. These analyses provide a summary report on the Net Present Value (NPV)[7] of this proposal (Ref 10C p.19 Table 1, reproduced below):

Without DCO	NPV
Option 1	-£ 27,998,000
Option 1A	-£ 10,864,000
Difference (Opt 1A minus Opt 1)	£17,134,000

With DCO	NPV
Option 1	-£ 30,001,000
Option 1A	-£ 10,892,000
Difference (Opt 1A minus Opt 1)	£19,109,000

Table 3 Rounded summary of cost benefit analyses showing the differences in NPVs

12.3. The final design Option 1A would provide a significantly reduced disbenefit compared with the consulted Option 1, for either DCO scenario.

12.4. The reduction in NPV disbenefit is caused by the changed airspace design, via the application of design change recommendations extracted from the consultation feedback. The same analysis data and methodology was used for both scenarios to ensure a like for like comparison.

[7] Applies to a series of cash flows occurring at different times. The present value of a cash flow depends on the interval of time between now and the cash flow. It also depends on the discount rate. NPV accounts for the time value of money. It provides a method for evaluating and comparing projects such as an airspace change. The Net Present Value of each option is calculated as the difference in total impacts between the option and the baseline scenario.

13. Conclusion, and next steps

13.1. We held a consultation on the airspace change proposal.

13.2. We received feedback which we processed, analysed and categorised.

13.3. The analysis led to actions, and design recommendations to address those actions.

13.4. This document explains how we changed the consulted-upon design to the final design, why we made those changes, and why we could not make others.

13.5. The consultation process was successful. We do not intend to re-consult.

13.6. We now have a final design. We will now make a formal application to the CAA for this design.

13.7. The CAA will decide if this proposal has merit, and we expect a decision in Autumn 2021.

13.8. Should the proposal succeed, we plan to implement it not before February 2022.

13.9. The CAA's airspace change portal (Ref 1) will contain all published material, and further information as it becomes available.

Annex A. Responses tagged Design Change: Which influenced the final design, and which did not?

This table lists all responses tagged Design Change, i.e. those who have provided design change suggestions and recommendations as per Action 5 (see paragraph 3.5.5 on p.6).

All (except one) responses in this table have a unique ID starting ANON-SJ4M-xxxx-x, the acknowledgement email from the survey will contain this ID (note that the survey website is hosted by the CAA so the email came from a caa.co.uk address).

Most responses were published, they have an additional publishing reference, and a hyperlink to open the response itself. Grey diagonal shading cell means a response is unavailable online for technical reasons (see Step 3D main document para 7.2 and Annex D).

Responses with green shading contained design-change feedback leading to design recommendations that influenced the final airspace design, as described in this document.

Responses without green shading contained design-change feedback leading to design recommendations that did not influence the final airspace design, as described in this document.

The 'Which recommendations?' column lists the specific recommendations that did influence the final design, attributable to the individual green-shaded response.

ANON-SJ4M	Publishing ref	Link	Which recommendations?	ANON-SJ4M	Publishing ref	Link	Which recommendations?
97NU-H	754490140	Response	1.04	9769-W	491246738	Response	4.01
9MVU-F	974442661	Response		9HH8-Y	107725771	Response	1.04
97F1-5	672683578	Response	1.04	97TT-P	261484027	Response	4.01
9HYY-H			1.04	9HGH-E	526702335	Response	
9MQK-Z	472801130	Response		97RC-3	728125427	Response	1.23, 1.24, 2.01, 2.03
9H1M-W	596344920	Response		9HXY-G	808636412	Response	1.04, 1.13
BHLF-SJ4M-97BD-M	98095636	Response		972C-3	340666873	Response	2.01, 2.03
97SP-H	156726072	Response		97G4-9	29283240	Response	
97Y8-Y	733249568	Response	1.02, 1.13	9HQ7-7	434173388	Response	1.23
97RP-G	537388747	Response	4.01	97WJ-F	141986755	Response	
97D8-A	604217100	Response		9HPM-V	640386654	Response	
973T-N	752825508	Response	4.01, 4.02	9HW4-A	999346350	Response	1.10, 2.01, 2.03
9HAG-7	927457907	Response	1.04	9HT6-9	262162036	Response	1.01, 1.04
9HVZ-F	392071685	Response	1.02, 1.10	97CF-Q	359304184	Response	2.01
97HN-4	1061318991	Response	2.01, 2.03	971X-Q	93775194	Response	4.01
9HYX-G	530773036	Response	1.02, 1.13	97N6-J	601820796	Response	1.04
97M8-K	47334871	Response	1.10	9HKA-B	213664684	Response	1.01, 1.04
9HAT-M	965985022	Response	1.04, 1.10	97MY-M	621165541	Response	4.01
97CY-A	681752253	Response		9MUT-D	970951405	Response	1.01
978C-9	1012547578	Response		9HDE-8	153712432	Response	1.04
97Y6-W	952512543	Response	4.01	97ZT-V	1058214227	Response	1.04, 1.23
9M5M-6	705293524	Response		971G-6	40421495	Response	
97SE-6	702794272	Response	1.01	9HRF-Q	376885855	Response	1.01, 1.02, 1.04
9H5R-6	562992248	Response		97DN-Z	39637108	Response	
9HF5-T	947019711	Response	1.01, 1.02	97PT-J	928209402	Response	1.01
97DB-M	488790238	Response	1.13, 2.01	9HS3-5	58751715	Response	1.04
9HHM-M	90543889	Response	1.01, 1.02, 1.10, 1.13	9MUE-X	146819083	Response	
9MJV-4	937882238	Response	1.13	9H34-6	511083839	Response	
97M4-F	821349419	Response	1.04	9H6A-P	1019832340	Response	
97SS-M	624554012	Response	4.01	9MZ2-G	702097122	Response	
97SA-2	754704834	Response	1.01, 1.02, 1.04	972S-K	903167424	Response	
97C1-2	294621880	Response		9MDX-Z	962743660	Response	
9798-Y	807864888	Response	1.01, 1.02, 1.04, 1.13	9MAV-U	530993353	Response	
97WZ-Y	725008576	Response	4.01	97MN-9	801080177	Response	1.02, 1.04, 1.13
9HCJ-C	578194952	Response	1.02, 1.13	971B-1	1035572035	Response	4.01
9HP7-6	347584435	Response		9H62-7	583020825	Response	1.02, 1.04
97BZ-A	764766831	Response	1.13	9H1H-R	457407289	Response	1.10
9HQK-U	591991002	Response	1.01, 1.02, 2.01	97R3-K	784990694	Response	4.01
9HYQ-9	484169815	Response		97HJ-Z	338865911	Response	1.04, 1.13, 2.01, 2.03
9HMM-S	638198177	Response	1.04	9HRK-V	702001727	Response	This response starts BHLF-SJ4M-
9HHQ-R	326919597	Response	1.04, 1.13	977U-T	500048557	Response	1.01
9MYM-A	802371617	Response	1.01, 1.02, 1.04, 2.01	97ED-Q	321352048	Response	
97KM-6	275108163	Response		97B9-9	541301092	Response	1.01, 1.02
9MQH-W	15723688	Response		9H75-B	400905874	Response	1.02
9HBY-T	599566877	Response	1.01, 1.02, 1.10, 1.13	9741-K	612669433	Response	1.01, 1.02, 1.04, 1.13, 1.23

ANON-SJ4M	Publishing ref	Link	Which recommendations?	ANON-SJ4M	Publishing ref	Link	Which recommendations?
9HVB-Q	823650072	Response	1.04, 1.13	97WH-D	1025679788	Response	1.02, 1.04
97JH-Z	1026124856	Response	4.01	9HSY-B	259030087	Response	
9MAR-Q	983852881	Response		97AB-H	507085887	Response	
97H4-A	730143124	Response	1.04, 1.13	9H13-3	691628742	Response	
9H7C-S	1010517321	Response	1.02, 1.04, 1.23	9H1G-Q	876982968	Response	1.23, 2.01, 3.01
971D-3	888255243	Response	4.01	97UP-K	606818226	Response	
9762-P	950263118	Response	1.10, 1.13, 1.23	979J-H	307053383	Response	4.01
97JD-V	781989385	Response		97GE-T	178038061	Response	
9HTS-6	189403241	Response	1.13	978T-T	289871107	Response	
9H9N-6	676005616	Response	1.01, 1.02, 1.04, 1.13	9HAZ-T	756008979	Response	1.01
97XA-7	643957120	Response		97EP-3	641474813	Response	
9H3Z-C	2203848	Response		97XJ-G	629766150	Response	2.01, 2.03
9HS6-8	429681158	Response	1.02, 1.04	97ME-Z	1016087799	Response	3.01
97JP-8	560689778	Response	1.01, 1.02, 1.04, 1.10, 1.13	97JU-D	963446555	Response	
978W-W	976171366	Response	1.01, 1.04, 1.13	97RS-K	222877636	Response	
9HGR-R	918050476	Response	1.04, 1.13	97TZ-V	405965590	Response	4.01
9H68-D	67451961	Response	1.01, 1.13	97EX-B	109079195	Response	
97F2-6	743778437	Response	1.04	9MW9-M	253072117	Response	
973A-2	496720602	Response	4.01	97JC-U	707487755	Response	1.02, 1.04
97BX-8	39694170	Response	1.13	9HXR-9	424848100	Response	1.13
97WD-9	188210640	Response	4.01	97DV-8	768546043	Response	1.13
971U-M	797862897	Response	4.01	9MD3-U	253455328	Response	1.02
972W-Q	595921425	Response	1.04	9H5Q-5	641927748	Response	1.02
97NK-7	138254989	Response	4.01	9H2A-J	511664164	Response	1.02, 1.04
9HA3-K	565530669	Response	1.02, 1.04, 1.10, 1.13	97TV-R	1059618988	Response	1.23
9HTU-8	614891276	Response	1.02, 1.04, 1.13	9H9X-G	368360828	Response	2.03
9HR9-A	888066381	Response	1.02, 1.04, 1.13	972Y-S	333832679	Response	
97Y4-U	234822580	Response	4.01	97XG-D	218839460	Response	
9MDU-W	687665258	Response		97QS-J	931381823	Response	1.23
9HYJ-2	885586291	Response		97GF-U	894919746	Response	
97EQ-4	509597791	Response	4.01	976N-J	867178565	Response	4.02
979H-F	664641116	Response	1.04, 1.13	97PE-3	679336118	Response	
97A7-6	243664067	Response		9MZX-P	909786513	Response	1.23
9HT5-8	534122442	Response	1.04, 1.13	971M-C	551779653	Response	
9H2K-V	883656414	Response	1.04	9HUE-S	641476784	Response	1.01, 1.13, 1.23
9HA8-R	361452109	Response	1.02, 1.23	9H3A-K	712550167	Response	2.01
97TJ-C	807225717	Response		9H8F-W	546803442	Response	
973Z-U	806885935	Response	4.01	972D-4	56628956	Response	1.02, 1.13, 2.03
9HTX-B	[redacted]			9HY7-F	854678047	Response	1.24, 2.03
9HDX-U	797744388	Response	1.13	97K8-H	250318109	Response	1.04, 1.23
9H5F-T	1139873	Response	1.13	9HNR-Y	97404324	Response	1.02, 2.01
9HHJ-H	[redacted]		1.01, 1.02, 1.04, 1.13	9HRV-7	290876575	Response	
97U9-V	209103295	Response		973Y-T	422234672	Response	2.01, 2.03
97JQ-9	490879994	Response		9HJU-X	[redacted]		1.04
97JW-F	457587437	Response	4.01	97VD-8	59632903	Response	1.02, 1.13, 2.01, 2.03
97RY-S	237845285	Response		9MB6-V	141125585	Response	
9HBD-5	321434831	Response	1.04	9729-S	933844270	Response	1.02, 1.13, 2.01, 2.03
977N-K	691235741	Response	1.01, 1.02, 1.04, 1.13	97E8-B	283266451	Response	1.01, 3.01
97P3-H	80555744	Response	1.04	973X-S	679956078	Response	2.01
97TS-N	738926874	Response	1.02, 1.04, 1.23	9797-X	997050829	Response	2.01
97FT-8	316529019	Response	1.04	9785-U	824435916	Response	
9H2P-1	687132072	Response		97AR-1	811105233	Response	2.01, 2.03
9MUF-Y	194805302	Response	1.01, 1.02, 1.04, 1.13	9MPP-4	593256669	Response	
97US-P	564301436	Response		9M51-A	416491056	Response	1.23
9HBC-4	6772911	Response	1.04	972N-E	959658062	Response	
9H6Z-F	917844580	Response		977B-7	1060772515	Response	2.01, 2.03, 4.01, 4.02
9HWF-V	[redacted]		4.01, 4.02	9MG6-1	249556434	Response	1.24, 4.02
972G-7	665598723	Response	2.01	9715-M	923421219	Response	1.13, 2.01, 2.03
9MZW-N	1064149907	Response		9716-N	299352150	Response	1.13, 2.01, 2.03
9HJC-C	[redacted]			97EV-9	193462600	Response	1.04
9H65-A	300357218	Response	1.13	97JF-X	611490425	Response	
975S-P	793768562	Response	4.01	9H3C-N	343930793	Response	1.23, 4.02
97F8-C	583363677	Response	1.01, 1.02, 1.04, 1.13	97R2-J	419865242	Response	1.01, 1.02, 1.04
9MXN-A	246194450	Response		971Q-G	546599491	Response	
975C-6	1031918731	Response		97AC-J	470200331	Response	1.01, 1.02
97PK-9	68978366	Response		9HAK-B	617262460	Response	1.02, 1.04
975Q-M	439863193	Response	4.01	9MSG-X	855583012	Response	1.23, 1.24, 2.01, 2.03, 3.01
97HP-6	47488317	Response		9MCZ-1	187902290	Response	
9HKZ-4	789817683	Response		9MCE-C	521019146	Response	1.04, 1.23
9HTH-U	[redacted]		1.23	97MW-J	733153145	Response	1.23, 3.01
97P9-Q	1024196908	Response	1.13	9M5A-T	967032965	Response	1.23
97KS-C	231895126	Response	1.01, 1.02, 1.04, 1.10	97TC-5	417397619	Response	
97C5-6	432471102	Response	1.01, 1.10, 1.23, 4.02	9MB8-X	496655780	Response	1.23
97PD-2	317803088	Response	2.01	97MS-E	308422750	Response	1.23

ANON-SJ4M	Publishing ref	Link	Which recommendations?
978H-E	539000434	Response	
97PA-Y	656521015	Response	
97TU-Q	479993131	Response	2.01, 2.03
97TM-F	1008036102	Response	2.01, 2.03
9H2E-P	627705721	Response	2.01, 2.03
978P-P	277229637	Response	2.01, 2.03
9MCT-U	203303917	Response	1.23, 1.24, 2.01, 2.03, 3.01
End of list. Full data is available for CAA audit purposes.			

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