Swanwick Airspace Improvement Programme
Airspace Development 6

LTC Essex Sector Safety Improvement
and Luton Airport Arrival Routes

SAIP AD6 TC Essex-Luton Arrivals

Gateway documentation:
Stage 2 Develop & Assess

2 A (ii) Design Principle Evaluation

NATS

London Luton Airport

Roles

Action	Role	Date
Produced	Airspace Change Specialist NATS Airspace and Future Operations	08/11/2019
Produced	Airspace and Noise Performance Manager London Luton Airport	08/11/2019
Reviewed Approved	ATC Lead NATS Swanwick Development	08/11/2019
Reviewed Approved	Operations Director London Luton Airport	08/11/2019

Drafting and Publication History

Issue	Month/Year	Changes this issue
1.0	Nov 2019	Published to CAA Portal
1.1	Nov 2019	Additional clarity on meeting design principles (page 4)
1.2	Nov 2019	Further clarity on applicability of design principles (page 4) and clarification of DP8 assessment criteria

Contents

Introduction

NATS and LLA are co-sponsors of this proposal. The scope of our project is to reduce the complexity of Luton Airport arrivals (and their interacting relationship with Stansted arrivals), in turn reducing controller workload and assuring a safe operation for the future.

This document forms part of the document set required for the CAP1616 airspace change process: Stage 2 Develop and Assess, Step 2A (ii) Design Principle Evaluation. Its purpose is to consider this proposal's comprehensive list of airspace design options against its design principles, discarding those which fit least, progressing those which fit better. This document is designed to be read in conjunction with the document Step 2A (i) Design Options which describes and illustrates each element of the design concepts, and also refers to a preceding document Step 1B Design Principles, of which there are fifteen, with eight priorities.

We re-engaged our representative stakeholder groups, recapped the airspace change process and design principles, and explained the fundamental concept of this proposal. We explained that other (non-airspace-change) solutions[1] to the issue have already been considered, and either implemented if possible, or discarded if not, prior to the inception of this airspace change proposal. We explained the constraints, and what was feasible within those constraints. We targeted each stakeholder group for feedback relevant to their interests, which informed the construction of this document. We thank the stakeholders for this engagement.

Where are we in the airspace change process?

We have completed Stage 1 Define, where we established the need for an airspace change and the design principles underpinning it. We are now in Stage 2; Develop and Assess and this document is part of Step 2A.

The left hand side of this flowchart is an extract from the CAP1616 document, edition 2, describing how a sponsor generally identifies and narrows the list of options.	The right hand side describes additional work we have done for this proposal.

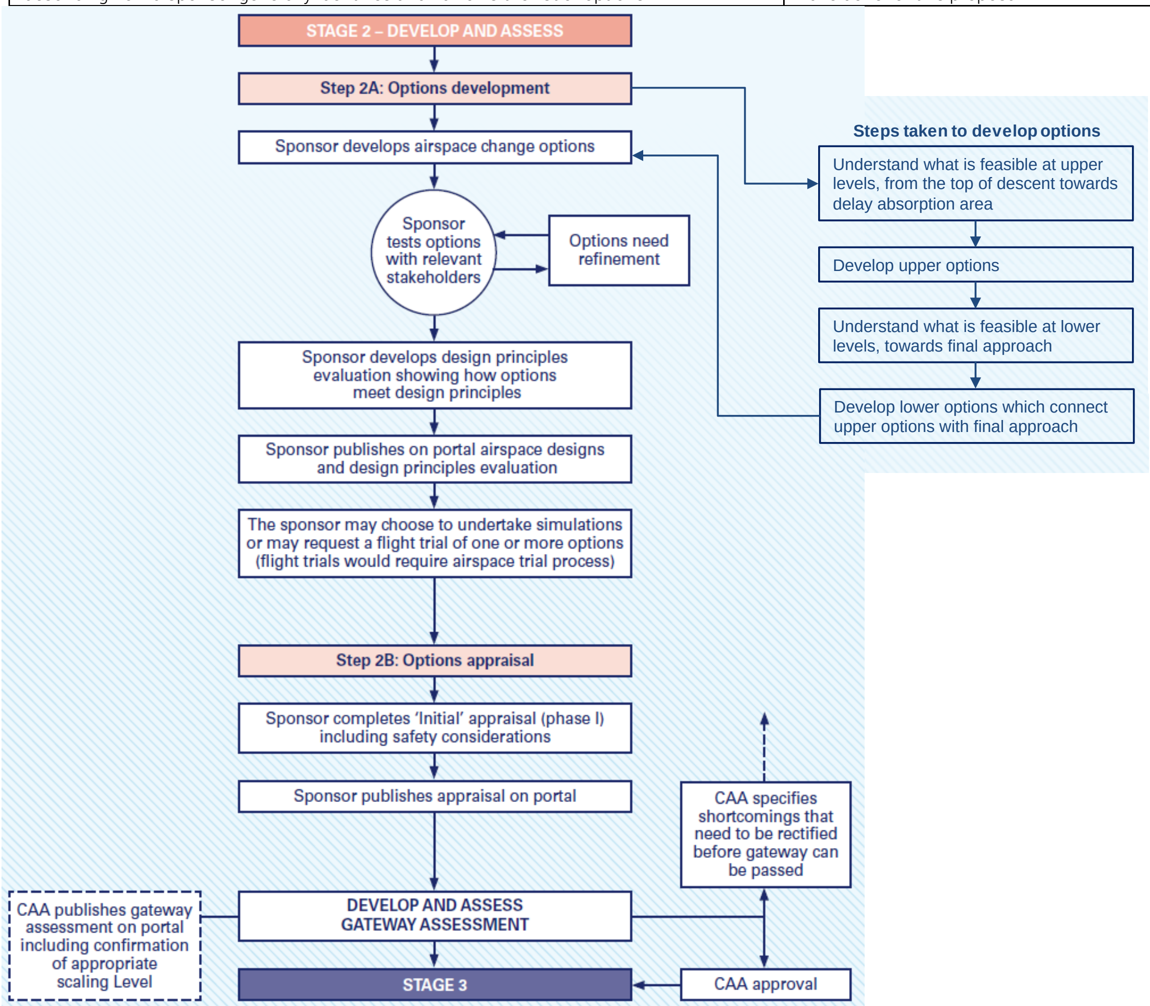

Figure 1 Airspace Change Process Stage 2

[1] CAP1616 Edn 2 page 157 para E14.

About Luton and Stansted Airports, and this proposal

Currently, Luton and Stansted Airports - two of the five busiest airports in the UK in terms of air traffic movements - share exactly the same arrival flows from the en-route cruise phase to the holds. This is a unique situation – other airports sometimes share arrival routes, but one always has a much bigger proportion of movements (for example, Heathrow and RAF Northolt, or London City and Biggin Hill).
Like most airports, Luton has a single runway which can be used in two directions – easterly or westerly.
The scope of this proposal specifically addresses Luton arrival flows, and their interaction with Stansted arrival flows in the existing London Terminal Manoeuvring Area (LTMA). The LTMA consists of a complex system of air traffic service (ATS) routes (for all traffic) plus Standard Departure/Arrival Routes (known as SIDs/STARs), existing holding facilities and airspace volumes for all London Airports.

How to read this document – two major sections:

This document describes the broad concept options for Luton Airport arrivals, from the end of the en-route cruise phase of flight, known as "Top of Descent" (TOD), to final approach Luton's runway. The total number of options from en-route to final approach is significant, so in order to manage their development we have split them into two major sections.

Section 1 Upper Options

Options for the routes from TOD, to arriving at the Delay Absorption area (referred to as 'holds' regardless of the existence of a formal holding pattern). This is at higher altitudes, from c.8,000ft and above. Summarising Government guidance, consideration of the reduction of CO_2 emissions takes priority over the minimising of aviation noise at these higher levels[2]. All upper options will be numbered 1.1, 1.2, 1.3…

Section 2 Lower Options

Options for the routes leaving the Delay Absorption area, to final approach at the runway. This is at lower altitudes, from c.8,000ft and below. Summarising Government guidance, between 7,000ft-4,000ft minimising the impact of aviation noise should be prioritised unless this disproportionately increases CO_2 emissions, and below 4,000ft the impact of aviation noise should be prioritised, with preference given to options which are most consistent with existing arrangements[2]. All lower options are numbered 2.1, 2.2…

The following set of tables is based on the proforma provided in CAP1616 2nd edition page 167. The tables list each design principle (the priorities are shown colour-coded to match those in the Step 1B Design Principles document). Design Principles may be abbreviated to "DP" so Design Principle 1 may be referred to as "DP1".

A green box means	'this design principle has been met by the specified option'
An orange box means	'this design principle has been partially met by the specified option', or 'there would be no significant change'
A red box means	'this design principle has not been met by the specified option'
A grey box means	'this design principle is not applicable* here', the box will span the other choices

*"Not applicable" may mean that the DP is only relevant to either upper or lower options. Additional context may still be supplied under the greyed-out DP if we consider it to be useful to the reader.

The decision to award green, orange or red to any DP was made qualitatively by appropriate experts, given the stage of this proposal and the maturity of the design up to this point.

How will we decide which options to progress to the next stage?

DP1 is about safety and is Priority 1.

Any design option which has not met this DP (red) or has partially met this DP (orange) contains safety concerns and **will** be rejected. .

DP2 is about Government environmental principles and aviation policies, and is Priority 2.

Any design option which has not met this DP (red) **will** be rejected.

DP3 is specific to MoD USAFE Lakenheath and is also Priority 2.

Any design option which has not met this DP (red) **will** be rejected.

Design options **may** progress even if DPs with a Priority of 3 or lower have not been met (red). Some are mutually exclusive, some may not be achievable at all by any design and are aspirational, and some may be manageable in practice even though the DP itself is not met.

[2] The altitude-based priorities for impacts due to noise vs emissions are set by the Government in the Department for Transport's 2017 paper "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", known as ANG2017, section 3 para 3.3.

What are the Assessment Criteria we used to evaluate the design options against the DPs?

Priority	Ref	Design Principle	Qualitative Criteria for Met, Partial, Not Met
1	1	Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project	Met: No safety concerns Partial: Some safety concern Not Met: Significant safety concern
2	2	Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017 and all appropriate Government aviation policies, and updates thereof	Met: Meets the three NPSE aims, the ANG and other Government Aviation policies Partial: Meets some, but not all, of the policies, OR unable to fully determine at this stage Not Met: Fails to meet any policy
	3	Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD	Met: Very likely to be acceptable Partial: Likely to be acceptable, with further work Not Met: Unlikely to be acceptable
3	4	Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met	Met: Unlikely to be constrained Partial: May be constrained to some degree Not Met: Likely to be constrained
	5	Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.	Met: Has no, or minimal, dependency Partial: Some dependency, likely to be manageable Not Met: Highly dependent
	6	Operational – Increase the predictability of LLA's arrivals	Met: Increases predictability significantly Partial: Increases predictability slightly, or not significantly Not Met: Does not improve, or reduces, predictability
	7	Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that	Met: Enables continuous descent from cruise Partial: Enables continuous descent from, or to, 7,000ft Not Met: Requires a period of level flight
4	8	Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years See footnote 3 at the bottom of the page.	Met: Lower option aligns with the section of AMS primarily concerned with lower altitudes Partial: Lower option may align with this section of AMS Not Met: Unlikely that lower option would align with this section of AMS
	9	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	Met: There is likely to be agreement between all of the listed stakeholders Partial: There may not be full agreement OR additional work is required to resolve Not Met: We expect significant disagreement by at least one stakeholder, with agreement unlikely to be reached
	10	Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite	Met: Enables equitable distribution Partial: May enable equitable distribution Not Met: Does not enable equitable distribution
5	11	Economic – Reduce fuel burn	Met: Clearly likely to reduce fuel burn Partial: Has the potential to reduce fuel burn Not Met: Unlikely to reduce fuel burn
	12	Economic – Minimise potential increases in fuel burn	Met: Clearly likely to minimise increases in fuel burn Partial: May minimise increases in fuel burn Not Met: Unlikely to minimise increases in fuel burn
6	13	Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft	Met: No communities overflown by multiple routes Partial: Communities may be overflown by multiple routes similar to today Not Met: Communities overflown by multiple routes due to the design
7	14	Operational – Should minimise tactical intervention by ATC below 7,000ft	Met: Minimal tactical intervention Partial: Some avoidable tactical intervention Not Met: Significant tactical intervention
8	15	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	Met: No new CAS Partial: Small or Medium new CAS OR elements of CAS managed under FUA Not Met: Large new CAS

[3] This DP was derived from local community focus group feedback, transparently discussed under Step 1B, re: future proofing the designs at lower altitudes. Logically and fairly, this means the assessment criteria for the lower design options should consider the section of the AMS which discusses modernisation at lower altitudes around airports, i.e. AMS paras 4.24-4.30. This DP is not applicable to the upper design options.

1. Section 1 Upper Options

1.1 Do nothing – the upper baseline			REJECT
Description of option: The current Luton and Stansted arrival flows are entwined at an early stage, up to the LOREL/ABBOT holds.			
Design principle 1, priority 1: Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project	NOT MET		
No change to existing arrangements, which has identified a latent risk.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof	DP not applicable to this option		
If no changes are made, there is nothing to assess against the NPSE, ANG 2017 or other policies.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD			MET
No change to existing arrangements, therefore there will be no impact to USAFE Lakenheath operations.			
Design principle 4, priority 3: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met	NOT MET		
No change to existing arrangements. Forecast traffic levels will require increased use of flow regulations to maintain levels of safety within this airspace which will constrain airport capacity at both Luton and Stansted.			
Design principle 5, priority 3: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.	NOT MET		
LLA arrivals will remain entwined with Stansted arrivals, which continues the dependency on Stansted traffic.			
Design principle 6, priority 3: Operational – Increase the predictability of LLA's arrivals	NOT MET		
No change to existing arrangements. Predictability of arriving traffic at Luton Airport will be fully dependent on Stansted arrivals and vice versa.			
Design principle 7, priority 3: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that	NOT MET		
No change to existing arrangements. In the upper region, traffic will be levelled off at intermediate altitudes to deconflict Luton and Stansted arrival flows.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years	DP not applicable to Upper options		
This section is about the upper options. No change to existing arrangements			
Design principle 9, priority 4: 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.		PARTIAL	
No change to existing arrangements. While maintaining the current airspace design will result in no change to the MoD, Lakenheath, Cambridge Airport and Cranfield Airport, for Stansted a no-change upper option will not address the issues associated with the current demand on the airspace.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, e.g. through use of multiple routes, new route structures, options/mechanisms for respite	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 11, priority 5: Economic – Reduce fuel burn	NOT MET		
No change to existing arrangements. No reduction.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn	NOT MET		
Predicted increases in traffic is likely to result in more holding, therefore there is a potential increase in fuel burn. The do nothing option provides no opportunity to minimise this potential increase.			
Design principle 13, priority 6: Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft	DP not applicable to Upper options		
This section is about the upper options. No change to existing arrangements.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft	DP not applicable to Upper options		
This section is about the upper options. Because there would be no change to existing shared arrangements, this option would not minimise tactical intervention.			
Design principle 15, priority 8: 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		PARTIAL	
No change to existing arrangements. Assumption that "do nothing" includes not considering release of other CAS.			

1.2 Point merge delay absorption			REJECT
Description of option: Luton flows are separated from the Stansted flows, towards a linear holding pattern using PBN principles			
Design principle 1, priority 1: Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project			MET
Luton arrivals will be independent from Stansted arrivals reducing complexity and workload.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof			MET
This section is about the upper options. A point merge holding area is considered a more environmentally efficient system than racetrack holds.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD	NOT MET		
The controlled airspace requirement to contain the Point Merge system option will impact USAFE Lakenheath operations to a degree that is likely to be unacceptable.			
Design principle 4, priority 3: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met			MET
Luton arrivals will be independent from Stansted arrivals, reducing the capacity constraints of complexity and workload.			
Design principle 5, priority 3: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.			MET
Luton arrivals will be independent from Stansted arrivals.			
Design principle 6, priority 3: Operational – Increase the predictability of LLA's arrivals			MET
Luton arrivals will have an independent arrival sequence, and therefore a more predictable arrival flow.			
Design principle 7, priority 3: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that	NOT MET		
In the upper region, the point merge structure is less likely than other upper options to facilitate continuous descent.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 9, priority 4: 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.	NOT MET		
The controlled airspace requirement will impact USAFE Lakenheath, other MoD, and Cambridge operations to an extent that ANSP agreement would be unlikely.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 11, priority 5: Economic – Reduce fuel burn	NOT MET		
Reduced holding due segregation from Stansted arrivals requires extended new arrival route structure with significantly longer tracks.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn		PARTIAL	
Longer routes are required, however point merge is considered a more efficient method of holding.			
Design principle 13, priority 6: Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft	DP not applicable to Upper options		
This section is about the upper options, however the ability to sequence arriving traffic within the holding system should aid in minimising tactical intervention at lower levels.			
Design principle 15, priority 8: 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	NOT MET		
This option requires a large area of new controlled airspace to accommodate point merge design with a single base FL75. Proposal to release existing controlled airspace southeast of Stansted.			

1.3 Delay absorption to the west of Luton Airport			REJECT
Description of option: Luton flows are not separated from the Stansted flows from the east until ABBOT, towards a delay absorption area west of Luton Airport favouring arrivals from the west.			
Design principle 1, priority 1: Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project	NOT MET		
The Luton-Stansted arrival complexity is where a latent risk has been identified, this option would move this latent risk into a new high traffic region of the LTMA. The routes to the delay absorption area would merge or cross many existing LTMA flows at all levels. The delay absorption area itself is within a region already busy with major LTMA flows. Moving the indicated position anywhere within the general area would cause the same result.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof			MET
This section is about the upper options. It meets the environmental aims of this DP.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD			MET
No additional CAS is required, therefore there would be no impact to USAFE Lakenheath operations.			
Design principle 4, priority 3: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met	NOT MET		
The positioning of a hold in an already congested area of airspace is likely to result in a complex traffic interaction which would require flow restrictions to manage safely, constraining Luton's capacity.			
Design principle 5, priority 3: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.			MET
This option strictly meets this DP, however it is very likely to leave LLA arrival's dependent on other airports' traffic flows.			
Design principle 6, priority 3: Operational – Increase the predictability of LLA's arrivals	NOT MET		
The positioning of a hold in an already congested area of airspace is likely to result in a complex traffic interaction which would require flow restrictions to manage safely, resulting in unpredictable arrival timings.			
Design principle 7, priority 3: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that	NOT MET		
In the upper region Luton traffic would need to be descended early (contrary to DP) to facilitate separation from other LTMA traffic.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years	DP not applicable to Upper options		
This section is about the upper options.			
Design principle 9, priority 4: 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.			MET
This option strictly meets the DP, however it is likely to increase complexity with other flows such as Heathrow.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 11, priority 5: Economic – Reduce fuel burn	NOT MET		
Reduced track mileage for arrivals from the west. The predominant arrival flows are from the east and south which would travel significantly further, likely outweighing the reduction from the west.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn	NOT MET		
Reduced track mileage for arrivals from the west. The predominant arrival flows are from the east and south which would travel significantly further, likely outweighing the reduction of the lesser flows from the west. Does not minimise potential increases in the upper region.			
Design principle 13, **priority 6**: *Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft*	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft	DP not applicable to Upper options		
This section is about the upper options, however the complexity that this option presents to the West of Luton is likely to increase the tactical intervention by ATC below 7,000ft.			
Design principle 15, priority 8: 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			MET
In this context, 'other airspace users' means non-commercial air traffic such as general aviation and the military. No new CAS is required which would impact those other airspace users, however this option would conflict with many other LTMA traffic flows – not compatible with existing LTMA airspace and route structures. Proposal to release existing controlled airspace southeast of Stansted.			

1.4 Delay absorption to the north of Luton Airport			ACCEPT
Description of option: Luton flows are separated from the Stansted flows & route towards a delay absorption area north of Luton Airport.			
Design principle 1, priority 1: Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project			MET
Luton arrivals will be independent from Stansted arrivals reducing complexity and workload.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof			MET
This section is about the upper options. It is expected to meet the aims of NPSE, ANG 2017 and other aviation policies.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD		PARTIAL	
This airspace concept will require additional CAS in the vicinity of RAF Lakenheath, however, it is designed to minimise impact on MoD USAFE operations and is agreed in principle as viable option to progress.			
Design principle 4, priority 3: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met			MET
Luton arrivals will be independent from Stansted arrivals reducing the capacity constraints of complexity and workload.			
Design principle 5, priority 3: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.			MET
Luton arrivals will be independent from Stansted arrivals.			
Design principle 6, priority 3: Operational – Increase the predictability of LLA's arrivals			MET
Luton arrivals will be independent from Stansted arrivals, ensuring increased predictability due to Luton traffic not being affected by issues at Stansted.			
Design principle 7, priority 3: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that		PARTIAL	
In the upper region, this concept is reasonably likely to facilitate continuous descent. However, this option does not resolve all confliction points to the hold so has been assessed as partially met. It is expected to be an improvement compared to today's operation.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 9, priority 4: 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.		PARTIAL	
The controlled airspace requirement is designed to minimise impact on MoD USAFE operations. Will almost completely remove the impact of Luton traffic on Stansted operations, and engagement to date indicates that it is unlikely to significantly affect the other ANSPs.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 11, priority 5: Economic – Reduce fuel burn		PARTIAL	
New extended arrival route concept will reduce holding and allow aircraft to maintain higher levels later in the flight profile, however will require slightly longer routeings.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn			MET
New arrival route concept extends the inbound routeing by the shortest possible distance to achieve separation from Stansted traffic and minimise impact on MoD operations.			
Design principle 13, priority 6: Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft	DP not applicable to Upper options		
This section is about the upper options.			
Design principle 15, priority 8: 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		PARTIAL	
This concept requires medium sized elements of new controlled airspace split to be as high as possible, designed to minimise impacts to other airspace users, and using a safety case to minimise CAS containment which also reduces overall volume. Proposal to release existing controlled airspace southeast of Stansted.			

1.5 Technology driven delay absorption en route			**REJECT**
Description of option: Luton flows are separated from Stansted flows to the north of Luton Airport. It relies on an extended arrival management system to absorb delay and set the sequence long before aircraft are in the vicinity of Luton Airport, with no delay absorption area. The technology to achieve this does not yet exist.			
Design principle 1, priority 1: Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project	NOT MET		
The lack of a short term delay absorption area would mean that, in the event of a short term issue which stops or restricts the landing rate, there could be multiple aircraft in the vicinity of Luton which would require extensive tactical intervention in order to separate. This would introduce a level of traffic complexity that is considered unacceptable. No current arrival management systems are designed entirely without a delay absorption area.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof			MET
This section is about the upper options. It meets the environmental aims of this DP.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD		PARTIAL	
This airspace concept will require additional CAS in the vicinity of RAF Lakenheath, however, it is designed to minimise impact on MoD USAFE operations.			
Design principle 4, priority 3: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met		PARTIAL	
Arrival management tools are designed to help smooth out general peaks in traffic and do not have the "resolution" to set up an accurate sequence from multiple directions which achieves today's runway capacity. It is likely that the capacity of the airport would be at least partially constrained by this option.			
Design principle 5, priority 3: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.			MET
Luton arrivals will be separated from Stansted traffic.			
Design principle 6, priority 3: Operational – Increase the predictability of LLA's arrivals		PARTIAL	
This option is likely to partially, not fully, increase the predictability due to the arrival management tools limitations of generally smoothing out peaks, not setting up accurate arrival sequences.			
Design principle 7, priority 3: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that		PARTIAL	
In the upper region, this concept is reasonably likely to facilitate continuous descent.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 9, priority 4: 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.*		PARTIAL	
The controlled airspace requirement is designed to minimise impact on MoD USAFE operations. Will almost completely remove the impact of Luton traffic on Stansted operations, and is unlikely to significantly affect the other ANSPs.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 11, priority 5: Economic – Reduce fuel burn		PARTIAL	
New extended arrival route concept would allow aircraft to maintain higher levels later in the flight profile and expect less racetrack holding, however it will require slightly longer routeings.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn			MET
New arrival route concept extends the inbound routeing by the shortest possible distance.			
Design principle 13, priority 6: Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft	DP not applicable to Upper options		
This section is about the upper options, however, not having a hold within the design is likely to increase low level tactical intervention.			
Design principle 15, priority 8: 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		PARTIAL	
This concept requires medium sized elements of new controlled airspace split to be as high as possible, designed to minimise impacts, and using a safety case to minimise CAS containment which also reduces overall volume.			

1.6 Delay absorption via tactical vectoring at low level			REJECT
Description of option: Delay absorption to arriving aircraft occurs purely within Luton's Radar Manoeuvring Area, the volume of airspace entirely dedicated to Luton traffic.			
Design principle 1, priority 1: Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project	NOT MET		
Separation of Luton and Stansted traffic would be achieved in this upper region. In theory this reduces the complexity of interactions with Stansted arrivals. However, the impact on the lower region cannot be ignored because it would get rapidly overwhelmed even in medium traffic levels, backing up arrivals into the upper region, where there is no delay absorption facility. For unplanned events (e.g. runway closure or thunderstorm activity), no short-term or en-route delay absorption is allowed for, requiring extremely high workload tactical vectoring or bespoke unplanned holds.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof			MET
This section is about the upper options. It meets the environmental aims of this DP.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD		PARTIAL	
This airspace concept will require additional CAS in the vicinity of RAF Lakenheath, however, it is designed to minimise impact on MoD USAFE operations.			
Design principle 4, priority 3: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met	NOT MET		
This option would represent a significant restriction to capacity, as peak traffic will quickly overload the controller.			
Design principle 5, priority 3: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.			MET
Luton arrivals will be separated from Stansted traffic.			
Design principle 6, priority 3: Operational – Increase the predictability of LLA's arrivals	NOT MET		
Whilst the new airspace corridor will separate the Luton and Stansted traffic, the complexity of the Essex sector will simply be transferred to the Luton approach sector, therefore there will be no improvement in arrival predictability.			
Design principle 7, priority 3: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that		PARTIAL	
In the upper region, this concept may facilitate continuous descent, with the caveat that the lower traffic would build more quickly to impact the upper region.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 9, priority 4: 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.*	NOT MET		
The controlled airspace requirement is designed to minimise impact on MoD USAFE operations and may reduce the impact of Luton traffic on Stansted operations. However, the likely need for an enlarged RMA is likely to adversely affect other ANSPs. Additional vectoring below 7,000ft in order to achieve sequencing will mean that aircraft joining the route structure from Cranfield and Cambridge are likely to be disadvantaged.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 11, priority 5: Economic – Reduce fuel burn	NOT MET		
New extended arrival route concept would allow aircraft to maintain higher levels later in the flight profile, however will require slightly longer routeings. The extensive low level vectoring that this option would entail increases the potential fuel burn.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn	NOT MET		
New arrival route concept extends the inbound routeing by the shortest possible distance to achieve separation from Stansted traffic and minimise impact on MoD operations. However without any delay absorption area except for the lower level vectoring, the likely backing-up of arrivals from the lower region is likely to cause unplanned vectoring or ad hoc holding at upper levels.			
Design principle 13, priority 6: Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft	DP not applicable to Upper options		
This section is about the upper options. The intent of this DP is related to noise impacts, influenced primarily by the lower options.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft	DP not applicable to Upper options		
This section is about the upper options. However this option's basic principle is that of tactical vectoring at lower levels.			
Design principle 15, priority 8: 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		PARTIAL	
This concept requires medium sized elements of new controlled airspace split to be as high as possible, designed to minimise impacts, and using a safety case to minimise CAS containment which also reduces overall volume.			

2. Section 2 Lower Options

2.1 Do nothing – the lower baseline for Runway 08 (easterly) arrivals and 2.2 Do nothing – the lower baseline for Runway 26 (westerly) arrival			REJECT
Description of options: Luton and Stansted arrival flows arrive jointly at the shared LOREL/ABBOT holds and are separated at lower levels by tactical vectoring.			
Design principle 1, priority 1: Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project	NOT MET		
No change in the lower option is intrinsically linked to the 'Do nothing' high level option, where a latent risk has been identified.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof	This DP not applicable if no change		
If no changes are made, there is nothing to assess against the NPSE, ANG 2017 or other policies.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD	DP not applicable to Lower options		
No change to existing arrangements, therefore there will be no impact to USAFE Lakenheath operations.			
Design principle 4, priority 3: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met	NOT MET		
No change to existing arrangements. Forecast traffic levels will require increased use of flow regulations to maintain levels of safety within this airspace which will constrain airport capacity at both Luton and Stansted.			
Design principle 5, priority 3: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.	NOT MET		
LLA arrivals will remain dependent on Stansted traffic.			
Design principle 6, priority 3: Operational – Increase the predictability of LLA's arrivals	NOT MET		
No change to existing arrangements. Predictability of arriving traffic at Luton Airport will be fully dependent on Stansted arrivals and vice versa.			
Design principle 7, priority 3: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that		PARTIAL	
No change to existing arrangements. CDAs are possible today from 5,000ft.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years	NOT MET		
The do nothing option will increase the requirement to change the airspace design in the future.			
Design principle 9, priority 4: 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.*		PARTIAL	
No change to existing arrangements. While maintaining the current airspace design will result in no change to the MoD, Lakenheath, Cambridge Airport and Cranfield Airport, for Stansted a no-change lower option will not address the issues associated with the current demand on the airspace.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite		PARTIAL	
No change to existing arrangements.			
Design principle 11, priority 5: Economic – Reduce fuel burn	NOT MET		
No change to existing arrangements. There will be no opportunity to reduce fuel burn.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn			MET
No change to existing arrangements. No increases in fuel burn in the short-term.			
Design principle 13, priority 6: Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft		PARTIAL	
No change to existing arrangements and therefore there is no mechanism to avoid overflight of the same communities.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft	NOT MET		
No change to existing arrangements. This option requires not only full tactical intervention for Luton arrivals but also for Stansted arrivals.			
Design principle 15, priority 8: 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		PARTIAL	
No change to existing arrangements. Assumption that "do nothing" includes not considering release of other CAS.			

2.3 Controller vectoring to Runway 08 (easterly) arrivals and 2.4 Controller vectoring to Runway 26 (westerly) arrivals			ACCEPT
Description of options: Luton flow is separated from Stansted flow at upper levels, followed by vectoring to final approach at either runway			
Design principle 1, priority 1: Safety is the highest priority *Optimise the complexity of the TC Essex sector within the scope of this project*			MET
Assuming that the Luton and Stansted arrival flows have been separated in one of the high-level options, maintaining tactical vectoring as a method of routing to the runways from the hold is considered safe.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof		PARTIAL	
It should not result in the change of traffic flows below c.5,000ft. However, unlike options 2.1 & 2.2, tracks over the ground would change above c.5,000ft to connect to the high level options. It is therefore unlikely that this option increases adverse effects. However, the tactical nature of this solution means that the design cannot be said to minimise the number of people adversely impacted due to the less predictable nature of the concept.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD	DP not applicable to Lower options		
This option would have no effect on MoD Lakenheath operations, only the Upper options may have an impact.			
Design principle 4, priority 3: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met			MET
Tactical vectoring is currently the most flexible way of ensuring the airport capacity is not constrained and this method is used throughout the UK.			
Design principle 5, priority 3: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.			MET
This option complements the re-positioning of Luton arrivals to the high-level options which aims to separate the Luton and Stansted arrival flows.			
Design principle 6, priority 3: Operational – Increase the predictability of LLA's arrivals		PARTIAL	
The high level options primarily affect the predictability of Luton arrivals. Tactically vectored routes to final approach would not directly contribute towards increasing the predictability of Luton arrivals for the airport or communities. However, the controller would be able to position aircraft to appropriately space and sequence arriving traffic.			
Design principle 7, priority 3: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that	NOT MET		
Continuous descent from 7,000ft is not possible because traffic is likely to be levelled off to deconflict from other LTMA routes. Continuous descent from 5,000ft is likely to be similar to today.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years	NOT MET		
While it is not possible to pre-determine future design for Luton airport and the wider LTMA, the Airspace Modernisation Strategy supports the use of "PBN transitions" – the name given to a route linking the upper region with final approach. Therefore, it is reasonable to infer that a design based entirely on tactical vectoring will not be consistent with future low altitude arrival flows within the LTMA.			
Design principle 9, priority 4: 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.*			MET
Tactical vectoring is used today, therefore this option is expected to be acceptable to other ANSPs.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite		PARTIAL	
Whilst tactical vectoring should provide a distribution of traffic, this option does not provide route structures or mechanisms for respite. As this option does not result in concentration of traffic, initial engagement shows it in a favourable light.			
Design principle 11, priority 5: Economic – Reduce fuel burn			MET
The track miles and descent profile are likely to be broadly improved, when compared to the situation today, at low levels, therefore fuel burn in this phase of flight is likely to be reduced.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn			MET
The track miles and descent profile are likely to be broadly improved, when compared to the situation today, at low levels, therefore fuel burn in this phase is unlikely to be increased.			
Design principle 13, priority 6: Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft			MET
Tactical vectoring from a hold to runway would negate 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.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft	NOT MET		
This option relies solely on tactical vectoring as the mechanism to route from a hold to the runways.			
Design principle 15, priority 8: 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			MET
The use of tactical vectoring should keep aircraft within existing CAS (in the lower region). Release of CAS will be considered.			

2.5 PBN Route (RNAV1) south of Leighton Buzzard to Runway 08 (easterly) arrivals			ACCEPT
Description of option: Luton flow is separated from Stansted flow at upper levels, followed by a PBN Route (RNAV1 standard) south of Leighton Buzzard to Runway 08 (easterly) arrivals			
Design principle 1, priority 1: Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project			MET
This option reduces the complexity of the airspace by concentrating the flow of arrival traffic to Runway 08. This results in known and predictable interaction with other flows which is expected to significantly reduce controller workload.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof		PARTIAL	
Using a PBN transition enables aircraft to accurately fly a profile avoiding Leighton Buzzard to the south, therefore likely to reduce the population overflown. However, it removes the ability to provide respite for those properties that are overflown. Controllers may need to use a degree of tactical vectoring to appropriately space and sequence arriving traffic.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD	DP not applicable to Lower options		
Design principle 4, priority 3: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met		PARTIAL	
There is no evidence to suggest that a PBN transition would constrain Luton airport's capacity. However, a degree of tactical vectoring would be required to enable the controller to appropriately space and sequence arriving traffic. The use of a PBN transition should result in a reduced radio workload which improves controller capacity. A single PBN transition would be preferable from the perspective of air traffic management, by keeping complexity to a minimum.			
Design principle 5, priority 3: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.			MET
This option complements the re-positioning of Luton arrivals with the high-level options with the provision of an independent holding facility. The PBN transitions are not expected to have any dependency on Stansted arrivals.			
Design principle 6, priority 3: Operational – Increase the predictability of LLA's arrivals			MET
This option complements the re-positioning of Luton arrivals with the high-level options with the provision of an independent holding facility. The PBN transitions are expected to deliver predictability to the TC Luton Approach function, the airport and the communities surrounding the airport.			
Design principle 7, priority 3: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that	NOT MET		
Owing to the constraints of the LTMA interactions on the Luton RMA, continuous descent from 7,000ft is not possible. PBN transitions are likely to increase compliance with continuous descent procedures from 5,000ft.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years		PARTIAL	
While it is not possible to pre-determine future design for Luton airport and the wider LTMA, the Airspace Modernisation Strategy supports the use of PBN transitions.			
Design principle 9, priority 4: 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.*			MET
There will be no new controlled airspace, therefore it is expected that there will be no impact on stakeholder ANSPs.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite	NOT MET		
As a standalone option this does not offer multiple routes to facilitate respite. If this option is progressed it could be combined with other PBN options later in the ACP, which may make traffic distribution more equitable.			
Design principle 11, priority 5: Economic – Reduce fuel burn			MET
A single PBN transition optimised for track miles would fully meet this principle, subject to the caveat that controllers will require a level of tactical vectoring to space and sequence arriving traffic.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn			MET
A single PBN transition optimised for track miles would enable increases in fuel burn to be minimised by design, subject to the caveat that controllers will require a level of tactical vectoring to space and sequence arriving traffic.			
Design principle 13, priority 6: Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft	NOT MET		
There is no proposed change to any other traffic flow other than the Luton arrivals. Where the proposed PBN transition crosses these routes below 7,000ft, communities will still be overflown by multiple routes.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft			MET
The PBN transitions minimise the need for tactical intervention below 7,000ft. However, a degree of tactical vectoring will be required to separate Luton arrivals from other flows and for sequencing. The 180° wraparound turn onto final approach may also require tactical intervention dependent on the wind conditions.			
Design principle 15, priority 8: 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			MET
This option would not require any new Controlled airspace because the transition design is wholly contained within existing CAS and is compliant with the containment policy. Release of CAS will be considered.			

2.6 PBN Route (RNAV1) over Leighton Buzzard to Runway 08 (easterly) arrivals			REJECT
Description of option: Luton flow is separated from Stansted flow at upper levels, followed by a PBN Route (RNAV1 standard) over Leighton Buzzard to Runway 08 (easterly) arrivals			
Design principle 1, priority 1: Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project			MET
This option reduces the complexity of the airspace by concentrating the flow of arrival traffic to Runway 08. This results in known and predictable interaction with other flows which is expected to significantly reduce controller workload.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof	NOT MET		
While other options are considered viable, using a PBN transition that results in aircraft accurately overflying Leighton Buzzard increases the total population overflown, and most would be newly overflown. This does not meet the aims of the NPSE or the ANG 2017 and is counter to the CAA condition from the May 2006 airspace change.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD	DP not applicable to Lower options		
Design principle 4, priority 3: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met		PARTIAL	
There is no evidence to suggest that a PBN transition would constrain Luton airport's capacity. However, a degree of tactical vectoring would be required to enable the controller to appropriately space and sequence arriving traffic. The use of a PBN transition should result in a reduced radio workload which improves controller capacity. A single PBN transition would be preferable from the perspective of air traffic management, by keeping complexity to a minimum.			
Design principle 5, priority 3: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.			MET
This option complements the re-positioning of Luton arrivals with the high-level options with the provision of an independent holding facility. The PBN transitions are not expected to have any dependency on Stansted arrivals.			
Design principle 6, priority 3: Operational – Increase predictability of LLA's arrivals			MET
This option complements the re-positioning of Luton arrivals with the high-level options with the provision of an independent holding facility. The PBN transitions are expected to deliver predictability to the TC Luton Approach function, the airport and the communities surrounding the airport.			
Design principle 7, priority 3: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that	NOT MET		
Owing to the constraints of the LTMA interactions on the Luton RMA, continuous descent from 7,000ft is not possible. PBN transitions are likely to increase compliance with continuous descent procedures from 5,000ft.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years		PARTIAL	
While it is not possible to pre-determine future design for Luton airport and the wider LTMA, the Airspace Modernisation Strategy supports the use of PBN transitions.			
Design principle 9, priority 4: 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.*			MET
There will be no new controlled airspace, therefore it is expected that there will be no impact on stakeholder ANSPs.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite	NOT MET		
As a standalone option this does not offer multiple routes to facilitate respite. If this option is progressed it could be combined with other PBN options later in the ACP, which may make traffic distribution more equitable.			
Design principle 11, priority 5: Economic – Reduce fuel burn			MET
A single PBN transition optimised for track miles would fully meet this principle, subject to the caveat that controllers will require a level of tactical vectoring to space and sequence arriving traffic.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn			MET
A single PBN transition optimised for track miles would enable increases in fuel burn to be minimised by design, subject to the caveat that controllers will require a level of tactical vectoring to space and sequence arriving traffic.			
Design principle 13, priority 6: Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft	NOT MET		
There is no proposed change to any other traffic flow other than the Luton arrivals. Where the proposed PBN transition crosses these routes below 7,000ft, communities will still be overflown by multiple routes.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft			MET
The PBN transitions minimise the need for tactical intervention below 7,000ft. However, a degree of tactical vectoring will be required to separate Luton arrivals from other flows and for sequencing.			
Design principle 15, priority 8: 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			MET
This option would not require any new Controlled airspace because the transition design is wholly contained within existing CAS and is compliant with the containment policy. Release of CAS will be considered.			

2.7 PBN Route (RNAV1) north of Leighton Buzzard to Runway 08 (easterly) arrivals			ACCEPT
Description of option: Luton flow is separated from Stansted flow at upper levels, followed by a PBN Route (RNAV1 standard) north of Leighton Buzzard to Runway 08 (easterly) arrivals			
Design principle 1, priority 1: Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project			MET
This option reduces the complexity of the airspace by concentrating the flow of arrival traffic to Runway 08. This results in known and predictable interaction with other flows which is expected to significantly reduce controller workload.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof		PARTIAL	
Using a PBN transition enables aircraft to accurately fly a profile avoiding Leighton Buzzard to the north, therefore likely to reduce the population overflown. However, it removes the ability to provide respite for those properties that are overflown. Controllers may need to use a degree of tactical vectoring to appropriately space and sequence arriving traffic.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD	DP not applicable to Lower options		
Design principle 4, priority 3: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met		PARTIAL	
There is no evidence to suggest that a PBN transition would constrain Luton airport's capacity. However, a degree of tactical vectoring would be required to enable the controller to appropriately space and sequence arriving traffic. The use of a PBN transition should result in a reduced radio workload which improves controller capacity. A single PBN transition would be preferable from the perspective of air traffic management, by keeping complexity to a minimum.			
Design principle 5, priority 3: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.			MET
This option complements the re-positioning of Luton arrivals with the high-level options with the provision of an independent holding facility. The PBN transitions are not expected to have any dependency on Stansted arrivals.			
Design principle 6, priority 3: Operational – Increase the predictability of LLA's arrivals			MET
This option complements the re-positioning of Luton arrivals with the high-level options with the provision of an independent holding facility. The PBN transitions are expected to deliver predictability to the TC Luton Approach function, the airport and the communities surrounding the airport.			
Design principle 7, priority 3: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that	NOT MET		
Owing to the constraints of the LTMA interactions on the Luton RMA, continuous descent from 7,000ft is not possible. PBN transitions are likely to increase compliance with continuous descent procedures from 5,000ft.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years		PARTIAL	
While it is not possible to pre-determine future design for Luton airport and the wider LTMA, the Airspace Modernisation Strategy supports the use of PBN transitions.			
Design principle 9, priority 4: 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.*		PARTIAL	
To meet the CAA containment policy, this option is likely to require a small fillet of CAS which is expected to have an impact to other ANSPs. It is expected that this additional CAS will be kept to a minimum.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite	NOT MET		
As a standalone option this does not offer multiple routes to facilitate respite. If this option is progressed it could be combined with other PBN options later in the ACP, which may make traffic distribution more equitable.			
Design principle 11, priority 5: Economic – Reduce fuel burn			MET
A single PBN transition optimised for track miles would fully meet this principle, subject to the caveat that controllers will require a level of tactical vectoring to space and sequence arriving traffic.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn			MET
A single PBN transition optimised for track miles would enable increases in fuel burn to be minimised by design, subject to the caveat that controllers will require a level of tactical vectoring to space and sequence arriving traffic.			
Design principle 13, priority 6: Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft	NOT MET		
There is no proposed change to any other traffic flow other than the Luton arrivals. Where the proposed PBN transition crosses these routes below 7,000ft, communities will still be overflown by multiple routes.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft			MET
The PBN transitions minimise the need for tactical intervention below 7,000ft. However, a degree of tactical vectoring will be required to separate Luton arrivals from other flows and for sequencing.			
Design principle 15, priority 8: 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		PARTIAL	
To meet the CAA containment policy, this option is likely to require a small fillet of CAS. It is expected that this additional CAS will be kept to a minimum. Release of CAS will be considered.			

2.8 PBN Route (RNAV1 standard) – S-bend type – to runway 26 (westerly) arrivals			ACCEPT
Description of option: Luton flow is separated from Stansted flow at upper levels, followed by a PBN Route (RNAV1 standard) to Runway 26 (westerly) arrivals via an S-bend to the west			
Design principle 1, priority 1: Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project			MET
This option reduces the complexity of the airspace by concentrating the flow of arrival traffic to Runway 26. This results in known and predictable interaction with other flows which is expected to significantly reduce controller workload.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof		PARTIAL	
Using a PBN transition enables aircraft to accurately fly a profile, therefore likely to reduce the population overflown. However, it removes the ability to provide respite for those properties that are overflown. Controllers may need to use a degree of tactical vectoring to appropriately space and sequence arriving traffic.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD	DP not applicable to Lower options		
Design principle 4, priority 3: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met		PARTIAL	
There is no evidence to suggest that a PBN transition would constrain Luton airport's capacity. However, a degree of tactical vectoring would be required to enable the controller to appropriately space and sequence arriving traffic. The use of a PBN transition should result in a reduced radio workload which improves controller capacity. A single PBN transition would be preferable from the perspective of air traffic management, by keeping complexity to a minimum.			
Design principle 5, priority 3: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.			MET
This option complements the re-positioning of Luton arrivals with the high-level options with the provision of an independent holding facility. The S bend PBN transition is not expected to have any dependency on Stansted arrivals.			
Design principle 6, priority 3: Operational – Increase the predictability of LLA's arrivals			MET
This option complements the re-positioning of Luton arrivals with the high-level options with the provision of an independent holding facility. The PBN transitions are expected to deliver predictability to the TC Luton Approach function, the airport and the communities surrounding the airport.			
Design principle 7, priority 3: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that	NOT MET		
Owing to the constraints of the LTMA interactions on the Luton RMA, continuous descent from 7,000ft is not possible. PBN transitions are likely to increase compliance with continuous descent procedures from 5,000ft.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years		PARTIAL	
While it is not possible to pre-determine future design for Luton airport and the wider LTMA, the Airspace Modernisation Strategy supports the use of PBN transitions.			
Design principle 9, priority 4: 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.*			MET
There will be no new controlled airspace, therefore it is expected that there will be no impact on stakeholder ANSPs.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite	NOT MET		
As a standalone option this does not offer multiple routes to facilitate respite. If this option is progressed it could be combined with other PBN options later in the ACP, which may make traffic distribution more equitable.			
Design principle 11, priority 5: Economic – Reduce fuel burn			MET
A single PBN transition optimised for track miles would fully meet this principle, subject to the caveat that controllers will require a level of tactical vectoring to space and sequence arriving traffic.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn			MET
A single PBN transition optimised for track miles would enable increases in fuel burn to be minimised by design, subject to the caveat that controllers will require a level of tactical vectoring to space and sequence arriving traffic.			
Design principle 13, priority 6: Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft	NOT MET		
There is no proposed change to any other traffic flow other than the Luton arrivals. Where the proposed PBN transition crosses these routes below 7,000ft, communities will still be overflown by multiple routes.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft			MET
The PBN transitions minimise the need for tactical intervention below 7,000ft. However, a degree of tactical vectoring will be required to separate Luton arrivals from other flows and for sequencing.			
Design principle 15, priority 8: 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			MET
This option would not require any new Controlled airspace because the transition design is wholly contained within existing CAS and is compliant with the containment policy. Release of CAS will be considered.			

2.9 PBN Route (RNAV1 standard) – direct type – to runway 26 (westerly) arrivals			ACCEPT
Description of option: Luton flow is separated from Stansted flow at upper levels, followed by a PBN Route (RNAV1 standard) to Runway 26 (westerly) arrivals via a direct route to final approach			
Design principle 1, priority 1: Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project			MET
This option reduces the complexity of the airspace by concentrating the flow of arrival traffic to Runway 26. This results in known and predictable interaction with other flows which is expected to significantly reduce controller workload.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof		PARTIAL	
Using a PBN transition enables aircraft to accurately fly a profile, therefore likely to reduce the population overflown. However, it removes the ability to provide respite for those properties that are overflown. Controllers may need to use a degree of tactical vectoring to appropriately space and sequence arriving traffic.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD	DP not applicable to Lower options		
Design principle 4, priority 3: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met		PARTIAL	
There is no evidence to suggest that a PBN transition would constrain Luton airport's capacity. However, a degree of tactical vectoring would be required to enable the controller to appropriately space and sequence arriving traffic. The use of a PBN transition should result in a reduced radio workload which improves controller capacity. A single PBN transition would be preferable from the perspective of air traffic management, by keeping complexity to a minimum.			
Design principle 5, priority 3: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.		PARTIAL	
This option complements the re-positioning of Luton arrivals with the high-level options with the provision of an independent holding facility. The direct PBN transition may create a dependency on Stansted arrivals.			
Design principle 6, priority 3: Operational – Increase the predictability of LLA's arrivals			MET
This option complements the re-positioning of Luton arrivals with the high-level options with the provision of an independent holding facility. The PBN transitions are expected to deliver predictability to the TC Luton Approach function, the airport and the communities surrounding the airport.			
Design principle 7, priority 3: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that	NOT MET		
Owing to the constraints of the LTMA interactions on the Luton RMA, continuous descent from 7,000ft is not possible. PBN transitions are likely to increase compliance with continuous descent procedures from 5,000ft.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years		PARTIAL	
While it is not possible to pre-determine future design for Luton airport and the wider LTMA, the Airspace Modernisation Strategy supports the use of PBN transitions.			
Design principle 9, priority 4: 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.			MET
There will be no new controlled airspace, therefore it is expected that there will be no impact on stakeholder ANSPs.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite	NOT MET		
As a standalone option this does not offer multiple routes to facilitate respite. If this option is progressed it could be combined with other PBN options later in the ACP, which may make traffic distribution more equitable.			
Design principle 11, priority 5: Economic – Reduce fuel burn			MET
A single PBN transition optimised for track miles would fully meet this principle, subject to the caveat that controllers will require a level of tactical vectoring to space and sequence arriving traffic.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn			MET
A single PBN transition optimised for track miles would enable increases in fuel burn to be minimised by design, subject to the caveat that controllers will require a level of tactical vectoring to space and sequence arriving traffic.			
Design principle 13, priority 6: Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft	NOT MET		
There is no proposed change to any other traffic flow other than the Luton arrivals. Where the proposed PBN transition crosses these routes below 7,000ft, communities will still be overflown by multiple routes.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft			MET
The PBN transitions minimise the need for tactical intervention below 7,000ft. However, a degree of tactical vectoring will be required to separate Luton arrivals from other flows and for sequencing.			
Design principle 15, priority 8: 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			MET
This option would not require any new Controlled airspace because the transition design is wholly contained within existing CAS and is compliant with the containment policy. Release of CAS will be considered.			

2.10 PBN Route (RNAV1 standard) – wider type – to runway 26 (westerly) arrivals			REJECT
Description of option: Luton flow is separated from Stansted flow at upper levels, followed by a PBN Route (RNAV1 standard) to Runway 26 (westerly) arrivals via a wider S-bend to the east			
Design principle 1, priority 1: Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project		PARTIAL	
This option interacts with the Stansted RMA and therefore introduces complexity at low levels.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof		PARTIAL	
Using a PBN transition enables aircraft to accurately fly a profile, therefore likely to reduce the population overflown. However, it removes the ability to provide respite for those properties that are overflown. Controllers may need to use a degree of tactical vectoring to appropriately space and sequence arriving traffic.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD	DP not applicable to Lower options		
*Design principle 4, **priority 3**: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met*		PARTIAL	
There is no evidence to suggest that a PBN transition would constrain Luton airport's capacity. However, a degree of tactical vectoring would be required to enable the controller to appropriately space and sequence arriving traffic. The use of a PBN transition should result in a reduced radio workload which improves controller capacity. A single PBN transition would be preferable from the perspective of air traffic management, by keeping complexity to a minimum.			
*Design principle 5, **priority 3**: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.*	NOT MET		
This option interacts with the Stansted RMA and therefore introduces a dependency on Stansted traffic.			
*Design principle 6, **priority 3**: Operational – Increase the predictability of LLA's arrivals*			MET
This option complements the re-positioning of Luton arrivals with the high-level options with the provision of an independent holding facility. The PBN transitions are expected to deliver predictability to the TC Luton Approach function, the airport and the communities surrounding the airport.			
*Design principle 7, **priority 3**: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that*	NOT MET		
Owing to the constraints of the LTMA interactions on the Luton RMA, continuous descent from 7,000ft is not possible. PBN transitions are likely to increase compliance with continuous descent procedures from 5,000ft.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years		PARTIAL	
While it is not possible to pre-determine future design for Luton airport and the wider LTMA, the Airspace Modernisation Strategy supports the use of PBN transitions.			
Design principle 9, priority 4: 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.*			MET
There will be no new controlled airspace, therefore it is expected that there will be no impact on stakeholder ANSPs.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite	NOT MET		
As a standalone option this does not offer multiple routes to facilitate respite. If this option is progressed it could be combined with other PBN options later in the ACP, which may make traffic distribution more equitable.			
Design principle 11, priority 5: Economic – Reduce fuel burn			MET
A single PBN transition optimised for track miles would fully meet this principle, subject to the caveat that controllers will require a level of tactical vectoring to space and sequence arriving traffic.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn			MET
A single PBN transition optimised for track miles would enable increases in fuel burn to be minimised by design, subject to the caveat that controllers will require a level of tactical vectoring to space and sequence arriving traffic.			
*Design principle 13, **priority 6**: Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft*	NOT MET		
There is no proposed change to any other traffic flow other than the Luton arrivals. Where the proposed PBN transition crosses these routes below 7,000ft, communities will still be overflown by multiple routes.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft			MET
The PBN transitions minimise the need for tactical intervention below 7,000ft. However, a degree of tactical vectoring will be required to separate Luton arrivals from other flows and for sequencing.			
Design principle 15, priority 8: 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			MET
This option would not require any new Controlled airspace because the transition design is wholly contained within existing CAS and is compliant with the containment policy. Release of CAS will be considered.			

2.11 Supplementing RNP+RF designs with RNAV1 designs			REJECT
Description of option: Luton flow is separated from Stansted flow at upper levels. RNP+RF routes are designed but only available to c.70% of traffic, so they are supplemented with RNAV1 route designs for those aircraft unable to meet the RNP+RF standard.			
Design principle 1, priority 1: Safety is the highest priority Optimise the complexity of the TC Essex sector within the scope of this project		PARTIAL	
If a combination of RNAV and RNP+RF PBN routes were used to the same runway, there would be an increase in workload for the controller to determine the PBN equipage of each aircraft prior to the controller issuing the appropriate route from the hold.			
Design principle 2, priority 2: Environmental – Must meet the 3 aims of the NPSE, Air Navigation Guidance 2017, all appropriate Government aviation policies, & updates thereof			MET
The mix of RNP+RF and RNAV1 routes would likely lead to some natural dispersal (depending on the equipage of each aircraft). Dispersal would be based on aircraft equipage instead of being based on airspace design or ATC. Nothing in these policies precludes the use of mixed PBN specifications. A degree of tactical vectoring to appropriately space and sequence arriving traffic would be expected.			
Design principle 3, priority 2: Technical – Minimise impacts on MoD USAFE Lakenheath operations to a level acceptable to MoD	DP not applicable to Lower options		
Design principle 4, priority 3: Operational – Should not constrain the airport's capacity, providing the environmental objectives/ requirements have been met		PARTIAL	
The mix of RNP+RF and RNAV1 routes would introduce routes with different track lengths, making it difficult to sequence aircraft. This is likely to constrain runway capacity.			
Design principle 5, priority 3: Technical – Minimise dependency of LLA's arrivals on those of Stansted Airport.			MET
These PBN routes do not result in a dependency on Stansted traffic. Traffic will have been split by the upper level options.			
Design principle 6, priority 3: Operational – Increase the predictability of LLA's arrivals			MET
This option complements the re-positioning of Luton arrivals with the high-level options with the provision of an independent holding facility. The PBN transitions are expected to deliver predictability to the TC Luton Approach function, the airport and the communities surrounding the airport.			
Design principle 7, priority 3: Environmental – Should enable continuous descent from at least 7,000ft & facilitate continuous descent above that	NOT MET		
Owing to the constraints of the LTMA interactions on the Luton RMA, continuous descent from 7,000ft is not possible.			
Design principle 8, priority 4: Environmental – Minimise the requirement to change future low altitude arrival flows within the next ten years		PARTIAL	
While it is not possible to pre-determine future design for Luton airport and the wider LTMA, the Airspace Modernisation Strategy supports the use of PBN transitions.			
Design principle 9, priority 4: 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.*			MET
We expect there would be no impact on stakeholder ANSPs.			
Design principle 10, priority 4: Environmental – Should provide an equitable distribution of traffic where possible, through e.g. use of multiple routes, new route structures, options/mechanisms for respite		PARTIAL	
The mix of RNP+RF and RNAV1 routes would likely lead to some natural dispersal (depending on the equipage of each aircraft). Dispersal would be based on aircraft equipage instead of being based on airspace design or ATC. It is unlikely to provide equitable distribution. A degree of tactical vectoring to appropriately space and sequence arriving traffic would be expected.			
Design principle 11, priority 5: Economic – Reduce fuel burn			MET
These routes are designed to be optimised for fuel efficiency.			
Design principle 12, priority 5: Economic – Minimise potential increases in fuel burn			MET
These routes are designed to be optimised for fuel efficiency.			
Design principle 13, priority 6: Environmental – Should avoid overflying the same communities with multiple routes, & take into account routes of other airports, below 7,000ft		PARTIAL	
There is no proposed change to any other traffic flow other than the Luton arrivals. Where the proposed PBN transitions cross these routes below 7,000ft, communities will still be overflown by multiple routes.			
Design principle 14, priority 7: Operational – Should minimise tactical intervention by ATC below 7,000ft		PARTIAL	
The PBN transitions minimise the need for tactical intervention below 7,000ft. The mixed PBN specification would result in more tactical intervention to sequence traffic on routes of different length. A degree of tactical vectoring will be required to separate Luton arrivals from other flows and for sequencing.			
Design principle 15, priority 8: 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		PARTIAL	
This option may require new Controlled airspace because some of the transition designs are not wholly contained within existing CAS and the design would need to comply with the containment policy. Release of CAS will be considered.			

3. Conclusion and Shortlist

The design options have been evaluated, and are summarised below.

		Design Principle															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Accept or Reject
Design Option	1.1 Do Nothing																Reject
	1.2 Point Merge																Reject
	1.3 Delay absorption to west																Reject
	1.4 Delay absorption to north																**Accept**
	1.5 Technology solution																Reject
	1.6 Delay absorption at low level																Reject
	2.1 Do nothing 08																Reject
	2.2 Do nothing 26																Reject
	2.3 Vectoring 08																**Accept**
	2.4 Vectoring 26																**Accept**
	2.5 PBN 08 South of LB																**Accept**
	2.6 PBN 08 Over LB																Reject
	2.7 PBN 08 North of LB																**Accept**
	2.8 PBN 26 S-bend west																**Accept**
	2.9 PBN 26 direct																**Accept**
	2.10 PBN 26 wider east																Reject
	2.11 RNP+RF and RNAV1																Reject

We conclude that upper design option 1.4 and lower design options 2.3, 2.4, 2.5, 2.7, 2.8 and 2.9 best meet the design principles and their relative priorities.

4. Next Steps

These options will be formally appraised under Stage 2 Step 2B Options Appraisal (Phase 1 Initial), including Safety Assessment.

Only one upper option progressed through this evaluation and all of the progressed lower options are compatible with this upper option. Therefore the Options Appraisal only needs to refer to options 2.3, 2.4, 2.5, 2.7, 2.8 and 2.9 because upper option 1.4 will be common to all.

End of document