Changes to

London Luton Airport Arrivals

CAP1616 Stage 7 Post-Implementation Review

PIR Main Document

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Roles

Action	Role	Date
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References

Ref No	Description	Links
1	SAIP AD6 CAA web page – progress through the airspace change process, and the consultation website including responses	Link to CAA portal Link to consultation site
2	CAA Decision Document CAP2288	Link to document
3	CAA Data Request Document	Link to document
4	Airspace Change Consultation material (selection of documents)	Executive summary Link to abridged document Link to full document
5	Consultation virtual exhibition	Link to website
6	Stage 4 Step 4A(ii) The Final Airspace Design (technical map for use on computers, unsuitable for smartphones and tablets, open using the free Adobe Reader DC app to make use of switchable layers)	Link to downloadable map
7	Airspace change: Guidance on the regulatory process for changing the notified airspace design (Edition 4 in force for this review) CAP1616	Link to document (Edition 4, March 2021)
8	CAA Definition of Overflight CAP1498	Link to document Link to short animation
9	UK Government Department for Transport's 2017 Guidance to the CAA on its environmental objectives when carrying out its air navigation functions (abbreviated to ANG2017)	Link to website Link to document

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1. About this document

1.1 Introduction

1.1.1 NATS and London Luton Airport (LLA) co-sponsored this airspace change proposal (ACP). It was approved by the UK Civil Aviation Authority (CAA) on 24th November 2021 (link to approval statement) and was implemented on 24th February 2022.

1.1.2 The CAA's website has a page dedicated to the history, progress and documentation relating to this ACP. In the electronic version of this documentation please click this link, otherwise go to the CAA website www.airspacechange.caa.co.uk and search for airspace change ID ACP-2018-65.

1.1.3 The objective of this project was to maintain a high standard of safety by reducing the complexity of LLA arrivals due to their interacting relationship with Stansted arrivals. In turn this was predicted to reduce air traffic controller workload and assure a safe and efficient operation for the future.

1.1.4 This post-implementation review (PIR) material provides evidence of what has happened since the airspace change was implemented.

1.1.5 Our overall conclusion is that the objectives of this ACP have been achieved.

1.2 Post-Implementation Review (PIR)

1.2.1 This document is the main part of a set of reports to fulfil the requirements of the CAA's airspace change process Stage 7, PIR. The purpose of the PIR is for NATS and LLA (the change co-sponsors) to carry out an assessment, and the CAA to evaluate, whether the anticipated impacts and benefits in the original proposal and published decision are as expected.

1.2.2 The PIR is not a review of the decision on the airspace change proposal, and neither is it a re-run of the original decision process.

1.2.3 This ACP was conducted and approved under the CAA's airspace change process known as CAP1616 Edition 4 (Ref 7), published[1] in March 2021. The DfT's Air Navigation Guidance 2017 (known as ANG2017, Ref 9) is also used as reference material.

1.2.4 The CAA supplied a document containing tables of data analysis requirements for this PIR (Ref 3). See Section 18 Appendix: CAA PIR Data Request (p.29) for a copy, adapted to fit this document.

1.3 Impacts of COVID-19 pandemic on UK aviation

1.3.1 Normally, a PIR compares the pre-ACP arrangements with the post-ACP arrangements after one year of operational experience, assuming an otherwise relatively steady state of air traffic flowing through the region.

1.3.2 The implementation of the new airspace and flightpaths occurred following the main period of the UK's COVID-19 pandemic which had significant and long-term impacts[2] on the UK's aviation industry, during 2020 and 2021.

1.3.3 Normally the PIR data-gathering period would start the day the change was implemented. The CAA discussed this situation with airspace change sponsors such as NATS-LLA. The CAA decided that data collection for PIRs would be suspended until it considered that the aviation industry had sufficiently recovered, and that air traffic flows were sufficiently similar to those pre-downturn, that an appropriate comparison could be made.

1.3.4 The CAA added a page to their website (link); this was regularly updated with the CAA's opinion as to whether it was appropriate to restart data collection.

1.3.5 In 2022 the aviation industry's recovery was underway. Most travel restrictions had been removed, but the reduction in the number of flights meant that previously-typical air traffic flows were not always present across the UK. There was still less traffic than usual, so it was safe for flights to be given extreme shortcuts (atypically efficient flightpaths), rather than follow more typical flightplanned routes.

1.3.6 However, as aviation recovery strengthened, the busier periods lengthened sufficiently so that a robust comparison could be made between pre-implementation and post-implementation traffic.

[1] CAP1616 Edition 5 was published in late 2023, however for the purposes of this PIR, Edition 4 will be used.
[2] Periods of 'lockdown' and other health-related restrictions of movement, nationally and internationally, massively reduced the number of flights domestically and worldwide for more than a year.

1.3.7 In February 2022 the CAA declared that data collection could recommence from late March. NATS-LLA originally agreed with the CAA that data collection would run from 1st June 2022 to 31st May 2023.

1.3.8 Subsequently, the CAA received a request from a relevant stakeholder to extend the data collection period for informing the PIR of this ACP. Following consideration of the request and in accordance with CAP1616 Ed4 (Ref 7) paragraph 290, the CAA published a statement asking that NATS-LLA extend the data collection period until 22nd September 2023 to inform the PIR analysis. The CAA believed that this extension would provide a more representative data set, i.e. the subsequent summer period would have more traffic recovery than the previous summer, thereby making for a better comparison with pre-pandemic traffic levels.

1.3.9 NATS-LLA discussed this with the CAA and agreed that the data collection and reporting period would change. Instead of 1st June 2022 to 31st May 2023, the period would be 23rd September 2022 to 22nd September 2023 as requested. This means that we would analyse fuel, greenhouse gas emissions etc for the year[3] of the most recent summer (including noise impacts over summer 2023), and would not be required to analyse the previous summer.

1.3.10 However, we were also clear that complaints received will be analysed from the implementation date, and would cover the full 575 day period from implementation until the end of the reporting period, i.e. 24th February 2022 to 22nd September 2023.

1.4 Other impacts on UK aviation

Russia-Ukraine conflict

1.4.1 The conflict between Russia and Ukraine started 24th February 2022, coincidentally the implementation date of this airspace change.

1.4.2 Airspace closures and restrictions were rapidly introduced in that region.

1.4.3 The conflict had the potential to be a contributing factor to changes in proportions of use of arrival routes to LLA due to these airspace closures and restrictions.

1.4.4 However, following analysis of the proportions of flights arriving at LLA from the main flow directions, there is no evidence to suggest the conflict had a noticeable impact on LLA arrivals during the PIR period.

1.4.5 Instability was ongoing at time of writing[4]; subsequent to the PIR period there is no evidence that the ongoing conflict is having a noticeable impact on LLA arrivals.

1.4.6 The analysis is detailed on p.5 of the separate Annex A Traffic Dispersion document, under **PIR Item 43a**.

ATC system failure at NATS

1.4.7 Due to a technical failure on 28th August (external link), data for the 4-day period 28th-31st August 2023 (inclusive) will be considered unrepresentative for the purposes of this PIR. This unrepresentative data will not be included in the analysis, August will be considered as 27 days and the number of days in the annual sample will be 361. Some of the data periods are different for specific analysis reasons (e.g. the noise technical analysis and Stansted Standard Instrument Departure (SID) analysis periods have a subset of dates within the year).
The same 4 days will be removed from each sample in order to avoid skewing the results.

1.4.8 This was discussed with, and agreed by, the CAA as a proportionate response.

1.5 Timescales for the PIR process

1.5.1 The PIR material was published on the CAA's public airspace portal page (Ref 1, link to portal) a short period after the general election, in July 2024. An airspace portal news article was also released, triggering email notifications to those stakeholders who subscribe to this airspace change page.

1.5.2 The CAA will invite stakeholders to provide feedback directly to the CAA during a 28-day window.

1.5.3 After that window closes, the CAA will study the feedback, then prepare and publish a report on their assessment. This is expected within three months, but the CAA may extend that period.

[3] However, this becomes 361 days, see paragraph 1.4.7 on page 6.
[4] Q1/Q2 2024.

2. The format of the PIR reports and annexes

2.1 Evidence section headings

2.1.1 Throughout the documentation, we will supply evidence to satisfy the CAA's data requirements by referring to headings, paragraph numbers and table items in Section 18 Appendix: CAA PIR Data Request, from page 29. We will usually write, in bold or in a subsection heading, **PIR Item (ref number)** to indicate how the evidence applies to the CAA requirement.

Evidence requirement (Section heading)	Ref		Evidence requirement (Section heading)	Ref
General Observations	16a-f		Environmental: Local Air Quality	49a-f
Safety Data	19a-d		Environmental: Noise Contours	49g-j
Service provision/ resource issues	22a-c		Environmental: Overflight and Operational Diagrams	49k-o
Utilisation of Continuous Climb Operations (CCO) & Continuous Descent Operations (CDO)	25a		Environmental: Fuel and CO_2 Emissions	49p-t
Infringement Statistics	28a		Environmental: Tranquillity	49u
Traffic figures (air transport movements)	31a-c		Environmental: Biodiversity	49v
Traffic dispersion comparisons	34a-d		Impact on International Obligations	52a
Operational Feedback	37a-b		Impact on Ministry of Defence operations	55a
Denied Access	40a-b		Stakeholder Feedback	58a-b
Utilisation of SIDs/STARs/IAPs	43a		Other information of relevance (5 items)	Other-a to Other-e
Letters of Agreement (LoAs)	46a-b			

Table 1 CAA data requirement heading and references

2.1.2 For example, evidence referring to **PIR Item 19a** falls under the heading of Safety Data. The CAA-specified details of that requirement are found in Section 18 Appendix, in the table beneath paragraph 19, for item a. In this example on page 32, it concerns instrument flight procedure data.

2.2 Alignment of PIR months in data tables

2.2.1 The comparison period is for the calendar year Jan-Dec 2019 (the pre-change period) and from 23rd September 2022 to 22nd September 2023 (excluding the disruption period as per paragraphs 1.3.9 and 1.4.7 on p.6).

2.2.2 The PIR sometimes requires us to compare data tables for a pre-change month against a post-change month, and also for the forecast we used for the implementation calendar year 2022.

2.2.3 However, the PIR period starts and ends part way through September which, itself, is part way through the calendar year. We will compare pre-change with post-change months out of sequence; for example, April 2019 with April 2023, but October 2019 with October 2022.

2.2.4 Where such a comparison is needed, we have prioritised keeping the equivalent months aligned. And where suitable, we have colour-coded the columns; the pre-change calendar year 2019 in pale orange, forecasts for the implementation calendar year 2022 in pale blue, and the PIR period 2022-2023 in pale green. The tables will often look like this:

2019	Forecast for implementation year 2022	PIR period	
Jan 2019	Jan 2022#	Jan 2023	
Feb 2019	Feb 2022#	Feb 2023	
Mar 2019	Mar 2022	Mar 2023	These months compare pre-change 2019 with post-change 2023
Apr 2019	Apr 2022	Apr 2023	The forecast implementation year was the calendar year 2022#
May 2019	May 2022	May 2023	# Jan 2022 was pre-implementation, Feb 2022 was mostly pre-implementation
Jun 2019	Jun 2022	Jun 2023	However the data provides insight into the comparison of forecast with actual arrivals
Jul 2019	Jul 2022	Jul 2023	
Aug 2019	Aug 2022	Aug 2023	
Sep 2019	Sep 2022	Sep 2022-23	This month compares 2019 with partial 2022 and 2023 combined to make a complete equivalent September
Oct 2019	Oct 2022	Oct 2022	
Nov 2019	Nov 2022	Nov 2022	These months compare pre-change 2019 with post-change 2022
Dec 2019	Dec 2022	Dec 2022	

Table 2 Example table illustrating how monthly comparison data is displayed

2.3 Separate evidence annexes

2.3.1 The evidence is sometimes supplied in separate annexes, and in most cases these annexes cover more than one evidence requirement.

2.3.2 For example, Traffic Dispersion Comparisons **PIR Items 34a-d** are associated with Overflight and Operational Diagrams **PIR Items 49k-o**, and others. The separate Annex A provides evidence for those **PIR Items** and each item is listed within that document. Other annexes are similarly arranged.

2.3.3 This main document lists all the evidence headings and directs the reader to a separate annex if it is more appropriate. This main PIR Document, the set of four annexes A-D, plus a separate technical appendix to Annex A, contain evidence to satisfy all the CAA's requirements listed in Table 2.

2.3.4 In this document, and in the separate annexes, we will explicitly state to which requirement number each piece of evidence refers, in bold, for example **PIR Item 55a**. We will illustrate and explain how this evidence satisfies the requirement, referring to previously-published material on the CAA airspace change portal (Ref 1, link to portal).

2.3.5 The next sections of this document are headed as per Table 2.

3. General Observations (CAA Data Request Paragraph 16)

3.1 General Observation PIR Item 16a: Meeting Objectives

An overview statement on whether, in the change sponsor's view, the original proposal met the intended objectives as described on the CAA's decision to approve the change.

3.1.1 Relevant extract from CAA decision document CAP2288 (Ref 2):

Objective of the Proposal

1. Under the modular Swanwick Airspace Improvement Programme, Airspace Deployment Number 6 (SAIP AD6), National Air Traffic Services (NATS) En Route Ltd (NERL) and London Luton Airport Operations Ltd (LLAOL) (EGGW) (the Sponsors) proposed the implementation of Standard Arrival Routes (STARs) in order to maintain a high standard of safety by reducing complexity, air traffic controller (ATC) workload and delays for EGGW arrivals and consequential delays to London Stansted (EGSS) arrivals. Full details of the proposal can be found on the CAA's Airspace Change Portal. The main proposed airspace changes, submitted for approval are:

   a. to implement 10 new STARs into EGGW removing the interdependency of the current STARs and shared holds with EGSS;
   b. to implement a new distinct EGGW hold (ZAGZO);
   c. to establish new Control Areas (CTAs) as Class C airspace in order to provide the requisite safe containment of the new STARS and;
   d. the re-classification, to Class G, of two volumes of existent controlled airspace (CAS) adjacent to EGSS, resulting in new vertical profiles for 8 EGSS standard instrument departures (SIDs).

3.1.2 The objective, as described by the CAA, is '…to maintain a high standard of safety by reducing complexity, air traffic controller (ATC) workload and delays for EGGW arrivals and consequential delays to London Stansted (EGSS) arrivals.' Items a-d above are the airspace design methods employed to achieve the objective.

3.1.3 In our view, the implementation of the proposal met the intended objective. By design, the removal of LLA and Stansted arrival interdependency (separation of arrival flows) reduces ATC complexity and maintains a high standard of safety. Delays caused by interdependency have been reduced, decreasing the amount of holding for both airports. This document and its annexes provide evidence to support our view.

3.2 General Observation PIR Item 16b: CAA Conditions

An overview statement on whether, in the change sponsor's view, the original proposal met any conditions described on the CAA's decision to approve the change (if applicable).

3.2.1 Relevant extract from CAA decision document CAP2288 (Ref 2):

> 5. CAA's decision is made subject to the following pre-conditions:
>
> a. all the draft Letters of Agreement (LoAs), shared with the CAA, must be finalised;
> b. the training of the requisite staff to safely implement the changes must be completed;
> c. ATC Instructions, which include the proposed ATC mitigation procedures, charts, etc must be submitted at least 30 working days prior to implementation of the change; and
> d. assurance that Human Performance monitoring on controller performance post implementation will be presented at Stage 7 (Post implementation review).

3.2.2 Paragraph 5 of the decision document has four conditions listed, a-d.

3.2.3 Our response is:

a. All LoAs were finalised and signed before implementation
b. Staff training was completed in good time
c. Updates to ATC instructions were completed and submitted in good time for implementation
d. Human Performance for controllers is discussed in this PIR, see section 16.5 on p.26.

Therefore the conditions were met.

3.3 General Observation PIR Item 16c: Implementation date

Confirm that implementation occurred on the dates identified in the Decision Letter. If no implementation date was specified in the Decision, please state so.

3.3.1 Relevant extract from CAA decision document CAP2288 (Ref 2):

> **Next Steps**
>
> 7. Implementation of the revised airspace will be notified through a single AIRAC cycle (AIRAC 2/2022) and will become effective on 24 February 2022.

3.3.2 Operational implementation of this airspace change did occur on 24th February 2022 as planned (see paragraph 3.6.1 below), and has been in effect continuously to date.

3.4 General Observation PIR Item 16d: Delay to implementation date

Not required – implementation occurred as planned.

3.5 General Observation PIR Item 16e: Other significant issues

Identify whether any other issues of significance have occurred during the period 12 months after date of implementation.

3.5.1 The COVID-19 pandemic had significant and long-term impacts on UK aviation. Section 1.3 on page 5 explains how this had the potential to affect the AD6 PIR but, in practice, did not.

3.5.2 The Russia-Ukraine conflict continues to impact UK aviation, and the ATC system failure had a short-term impact. Section 1.4 on page 6 summarises how each affected the AD6 PIR.

3.6 General Observation PIR Item 16f: Promulgation

Other than normal promulgation activity (e.g., NOTAM, AIC etc.), identify what steps were undertaken to notify local aviation stakeholders that the airspace change was about to be implemented.

3.6.1 Normal aviation promulgation activity occurred, relating to AIRAC 02-22 for 24th February 2022 implementation (link to entire implementing AIRAC).

3.6.2 The notifying AIC was published two weeks before implementation (link to AIC-Yellow 006/2022).

3.6.3 No further promulgation steps were undertaken.

3.7 General Observations Section: Conclusion

3.7.1 This airspace change was successfully implemented, and – in our view – has met the intended objectives.

4. Safety Data (CAA Paragraph 19)

4.1 Safety data PIR Item 19a: Instrument Flight Procedures

Data concerning any recurring instances of Instrument Flight Procedures (IAPs, SIDs, STARs, Holds) not being flown correctly.

4.1.1 Recurring instances, in this context, means regular and replicating cases as identified from operational data, safety reports and stakeholder feedback.

4.1.2 There are no reports relating to recurring instances of relevant Instrument Flight Procedures being flown incorrectly within the reporting period.

4.2 Safety data PIR Item 19b: Mandatory Occurrence Reports

Report concerning any known Mandatory Occurrence Reports (MORs).

4.2.1 Organisations within the aviation industry are required to submit MORs to the CAA. These reports cover any safety-related event which endangers or which, if left uncorrected, could endanger an aircraft, its occupants, or any other person.

4.2.2 Within the period since implementation (i.e. from 24th February 2022 to 22nd September 2023), 79 safety reports were filed in the general region of the airspace change.

4.2.3 We analysed those which *may* have had causal or contributing factors associated with the operation of the SAIP AD6 airspace change (i.e. arrivals to LLA in the areas where change would be expected), warranting further scrutiny.

4.2.4 These reports, their subsequent investigations, and their conclusions have been analysed and were initially assigned to one of the three following categories:

1. An event that occurred within a relevant region of the AD6 ACP where the airspace change was **likely** to be a causal or contributing factor;
2. An event that occurred within a relevant region of the AD6 ACP where the airspace change was **not likely** to be a causal or contributing factor; or
3. An event that occurred **outside** a relevant region of the AD6 ACP, **or** where the airspace change was clearly **not** a relevant factor.

4.2.5 Five of the 79 reports were removed as being Category 3. Sixty of the remaining 74 reports were removed as being Category 2.

4.2.6 Of the remaining 14 Category 1 reports, each fell into one of three further sub-categories:

a. Controlled Airspace (CAS) Excursion
b. CAS Infringement
c. Loss of Separation (LoS)

4.2.7 Twelve of the 14 were sub-category (a), CAS excursions.
Three of these events occurred on the same day, Wednesday 5th October 2022, during a period of low pressure, with yellow strong wind warnings in place for most of the country (link to Met Office press release). Another weather-related excursion occurred on Sunday 13th November 2022, where Storm Debi caused flight disruption across the UK and the Republic of Ireland (link to Met Office summary). Strong winds and pilot requests for weather avoidance would be contributory factors.

All 12 were controller error, pilot error, or a combination of factors including weather.

In almost all of the non-weather-related cases, there was a slight misjudgement of the anticipated descent profile vs. where the base of CAS changed.

4.2.8 One of the 14 was sub-category (b), a CAS infringement.
Infringements are a specific PIR Item number 28a and therefore addressed in Section 7 on p.18.

4.2.9 The final event of the 14 was sub-category (c), a Loss of Separation (LoS).
This was due to a controller's misjudgement of relative descent rates between the two subject aircraft. The event occurred at high altitude outside the new CAS created for AD6, more than a year after its introduction. The error could have occurred anywhere at any time in UK airspace. However, the route one of the aircraft was flying was introduced for AD6. Therefore we concluded (conservatively) that the airspace change could be a causal factor.

4.2.10 The table below lists the dates of the events, their incident ID and the type of event, the pie chart below illustrates their relative proportions.

Date	Incident ID	Event (relevant contributory factors)
05/10/2022	167896	CAS Excursion (weather)
05/10/2022	167861	CAS Excursion (weather)
05/10/2022	167844	CAS Excursion (weather)
07/10/2022	167909	CAS Excursion
10/10/2022	167957	CAS Excursion
14/10/2022	168105	CAS Excursion
28/10/2022	168537	CAS Excursion
13/11/2022	168901	CAS Excursion (weather)
17/01/2023	170273	CAS Infringement
08/04/2023	172343	Loss of Separation
12/05/2023	173307	CAS Excursion (weather)
21/05/2023	173618	CAS Excursion
22/08/2023	179590	CAS Excursion (wind)
23/08/2023	179638	CAS Excursion

Table 3 Dates, incident ID and event type for relevant MORs during the reporting period

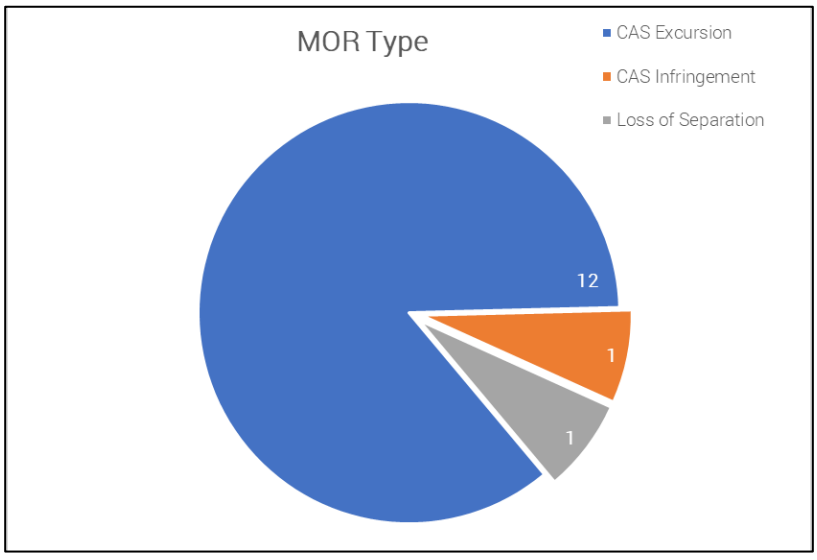

Figure 1 Proportions of type of relevant MORs during the reporting period

4.3 Safety data PIR Item 19c AIRPROX reports

Report concerning any known AIRPROX reports.

4.3.1 Aircraft Proximity (AIRPROX) is a situation which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft, as well as their relative positions and speed, was such that the safety of the aircraft involved may have been compromised[5].

4.3.2 We have checked our operational data and safety system and there are no AIRPROX reports relating to this airspace change within the reporting period.

4.4 Safety data PIR Item 19d Air Safety Reports

Report concerning any known Air Safety Reports (ASR).

4.4.1 Air Safety Reports (ASRs) are externally reported events that come to the attention of ATC via submission of a request from external agencies (such as operators) to NATS Safety Performance & Investigations.

4.4.2 We have checked our operational data and safety system and there are no ASRs relating to this airspace change within the reporting period.

4.5 Safety data section: Summary and conclusion

4.5.1 Twelve of the 14 events (86%) of the MORs involved CAS excursions.
In 6 of those 14 events (43%) weather was likely to be a contributory factor.

For each of the 12 CAS Excursion MORs filed, one of the following three outcomes took place:

1. Senior management notified (10 out of 12)
2. Monitoring to identify possible recurrence (1 out of 12); and
3. Event reviewed, no action necessary (1 out of 12).

In most cases, the filing of the report itself, combined with the notification of senior management, was sufficient action to close the MOR.

4.5.2 One event (7%) was a CAS infringement (addressed separately in Section 7 below).

4.5.3 One event (7%) was a Loss of Separation (LoS). This was included in the PIR report due to one of the aircraft using an AD6-related arrival route.

This MOR resulted in the notification of senior management, followed by a unit investigation and associated remedial action.

5. Service Provision and Resource Issues (CAA Paragraph 22)

5.1 Service Provision PIR Item 22a: Refusals

Data on refusals of service

5.1.1 We looked through our data and there were no records of refusals of service attributable to this ACP within the PIR period.

5.2 Service Provision PIR Item 22b: Delays, also partly PIR Item Other-c: Resilience

Data regarding air traffic delays. Dates/times that flow restriction measures are applied.

5.2.1 The following data tables compare the number of times flow restriction measures were applied within a set of air traffic volumes related to the airspace change. Note that the relevant traffic volumes are not necessarily airport-specific because the delay regulations must apply to the volume, regardless of the air traffic that flies through it.

5.2.2 The comparison includes the reason for the restriction and the number of delay minutes accrued.

5.2.3 There are technical methods of accruing these minutes based on specific types of regulation. These are coded as follows:

Regulation Code	Delay Reason	Regulation Code	Delay Reason
A	Incident	S	Staffing
C	ATC Capacity	T	ATC Equipment
G	Airport Capacity	V	Environmental (noise restriction)
O	Other	W	Weather
P	Priority		

Table 4 Delay regulation codes and their meanings

[5] As defined in ICAO Doc 4444: PANS-ATM

5.2.4 NB paragraph 1.4.7 on p.6 describes the agreement with the CAA regarding the exclusion of PIR data during the period associated with the air traffic system failure on Bank Holiday Monday 28th August 2023. However, given that this section's purpose is about delay, we included that period for the AD6 airspace region as it could be considered inappropriate to discount the impacts of that event.

5.2.5 The following table summarises the number of events where flow regulations were applied, and the delay accrued, by type of regulation code.

Code	Number of Regulation Events		Total Delay (minutes)	
	2019	PIR Period 2022-23	2019	PIR Period 2022-23
A Incident	2	3	3,255	1,073
C ATC Capacity	79	21	13,333	6,312
G Airport Capacity	144	15	22,034	3,529
O Other	6	2	1,361	777
P Priority	3	1	1,062	112
S Staffing	27	37	19,336	5,458
T ATC Equipment	1	2	236	164
V Environmental	1	0	122	0
W Weather	128	134	55,477	67,300
Total	**391**	**215**	**116,216**	**84,725**
Change (number)	**176 fewer regulation events**		**31,491 fewer minutes**	
Change (proportion)	**45% fewer regulation events**		**27% fewer minutes**	

Table 5 Delay regulation: number of events and accrued minutes, by code

5.2.6 Note that, in both cases, a major cause of delay (number of events, and number of minutes) was caused by weather, which is outside our control. There were also more weather-related events and delay-minutes accrued in the PIR period than in 2019.

5.2.7 Including the weather delay, post-implementation there were 45% fewer regulation events, and 27% fewer minutes of delay. Although there were 10.7% fewer flights over the PIR period compared with 2019 (see Section 8 from p.20) we attribute the airspace design change for the significant reduction in delay, which can be used as a proxy for resilience.

5.2.8 The CAA has requested PIR evidence to show that the claimed increase of c.30% resilience is met (**PIR item Other-c**); we contend that a 45% improvement in delay events and 27% improvement in delay minutes is part of that evidence. See also section 16.3 on p.25 for additional discussion on resilience.

5.2.9 The following tables summarise the number of flow regulation events of any type-code, by month, and by hour of the day (UTC which is the same as GMT and was not adjusted for local time when BST was in effect).

2019	Number of Regulation Events		PIR Period	Difference
Jan 2019	8	4	Jan 2023	-4
Feb 2019	24	13	Feb 2023	-11
Mar 2019	11	7	Mar 2023	-4
Apr 2019	28	16	Apr 2023	-12
May 2019	18	16	May 2023	-2
Jun 2019	36	30	Jun 2023	-6
Jul 2019	23	17	Jul 2023	-6
Aug 2019	29	20	Aug 2023	-9
Sep 2019	60	7+15=22	Sep 2022+Sep 2023	-38
Oct 2019	52	19	Oct 2022	-33
Nov 2019	47	18	Nov 2022	-29
Dec 2019	55	33	Dec 2022	-22
2019 Total	**391**	**215**	**Total PIR period**	**-176**

Table 6 Number of flow regulation events by month

5.2.10 There were fewer events applied in each month in the PIR period compared with the 2019 pre-implementation period. Even in the months where most regulation events were applied, the PIR period had significantly fewer such periods (for example comparing December 2019 with 55 events, vs. December 2022 with 33 events).

Number of Regulation Events by period, & differences			
Hour UTC (GMT)	2019	PIR Period	Difference
0001-0059	6	5	-1
0100-0159	7	13	6
0200-0259	2	5	3
0300-0359	0	3	3
0400-0459	6	3	-3
0500-0559	94	34	-60
0600-0659	81	29	-52
0700-0759	18	6	-12
0800-0859	2	0	-2
0900-0959	1	7	6
1000-1059	10	4	-6
1100-1159	18	7	-11
1200-1259	15	10	-5
1300-1359	7	10	3
1400-1459	0	15	15
1500-1559	16	6	-10
1600-1659	22	12	-10
1700-1759	27	6	-21
1800-1859	3	8	5
1900-1959	6	4	-2
2000-2059	20	6	-14
2100-2159	23	13	-10
2200-2259	6	7	1
2300-2359	1	2	1
Total	391	215	-176

Table 7 Number of flow regulation events by the hour they were started (GMT)

5.2.11 There were fewer events started in most 60-minute blocks in the PIR period, compared with the 2019 pre-change period. In both periods, the two consecutive hours, 0500-0559 and 0600-0659 UTC (GMT), was when the start of most regulation events were applied. However the PIR period had significantly (176) fewer such events overall.

5.3 Service Provision PIR Item 22c: Resource allocation

Details of additional resource allocated, considering daily and seasonal traffic patterns.

5.3.1 Every year, planning meetings are held to estimate and plan for the required staffing levels that will be required during two distinct periods of the following year, summer and winter. Traffic flows vary considerably throughout the year, requiring extra staffing during the summer months.

5.3.2 From this plan, each radar position in the Terminal Control Operations Room is given projected opening and closing times through the day and staff resources are allocated appropriately.

5.3.3 The data used for this planning is a combination of the previous year's traffic levels, predicted change to these traffic levels, and actual opening and closing times of all sectors as recorded by an Operational Positional Monitoring system (OPM). This allows modelling of the required resourcing for the following year. Once these numbers are agreed, they are monitored throughout the year and changes made where necessary.

5.3.4 The resourcing for Stansted and LLA arrivals is predominantly split between 6 distinct air traffic control sectors. These sectors are, in effect, the smallest subdivision of labour possible in the radar room.

Stansted Approach Support sector Stansted Approach Intermediate sector Stansted Approach Final sector	SS SPT SS INT SS FIN	Collectively known as ESSEX RADAR pre-change, and STANSTED RADAR post-change
Luton Approach Intermediate sector Luton Approach Final sector	GW INT GW FIN	Collectively known as LUTON RADAR pre- and post-change
Terminal Control LOREL sector	TC LOREL	A higher-level feed sector

Table 8 Relevant air traffic control sector names, short codes and description
(SS is shorthand for Stansted's airport code 'EGSS', GW likewise for LLA's 'EGGW').

5.3.5 For every sector, resource has to be allocated to cover their opening and closing throughout each 24-hour period. This is also fine-tuned for each day of the week, as some days are predicted to be significantly busier than others based on the advance filing of airline flightplans.

5.3.6 The tasks performed by each sector can often be combined so that one controller operates more than one position; for example, one controller can operate both GW INT and GW FIN sectors at the same time. For 24-hour sectors such as these six, their tasks are always being operated in an appropriate combination by controllers qualified for each task set. When the combined sector gets busier, and when staffing allows, the combined sector group can be split into its component sectors.

5.3.7 In the pre-change scenario, splitting the sector could only reduce the controller's workload so far because the combined arrival route airspace design prevented it – we could not simply add another controller to the same radar position, the airspace design needed to change.

5.3.8 The data in the following tables describes the Annual Sector Duration which is the number of minutes when the sector is being operated standalone, i.e. a single controller is focused completely on that dedicated task set, and is not combined with any other sector.

5.3.9 This resource allocation had a distinct pattern before the airspace change was introduced. The three Stansted (SS) sectors were resourced at a much higher usage rate than the two LLA (GW) sectors. The usage rates for TC LOREL remained consistent for both periods.

5.3.10 Data obtained from the OPM system for 2019 shows that LLA (GW) rarely had more than one open sector, typically GW INT. GW FIN was less frequently open as a standalone sector.

5.3.11 Stansted (SS) always needed two, sometimes three sectors.

5.3.12 The way ATC resourcing is directed was transformed, because the airspace change allows the traffic flows into Stansted and LLA to be resourced at a more refined granular level than pre-change.

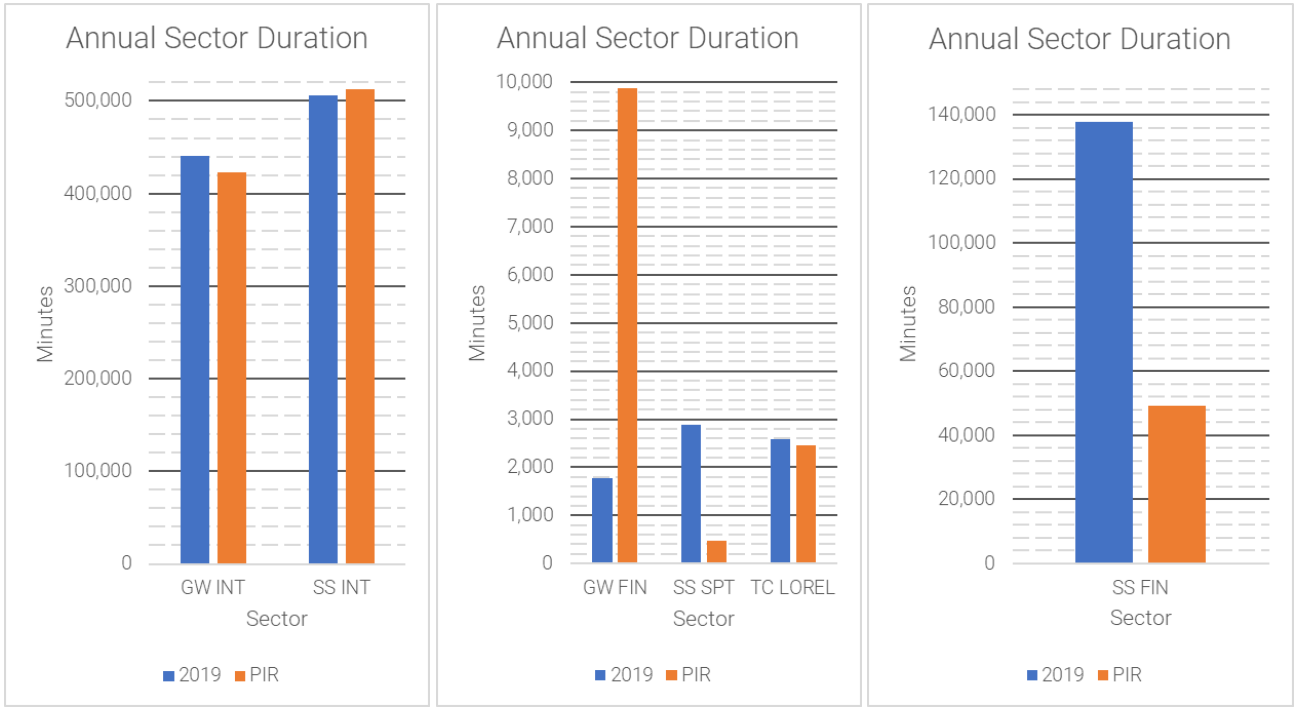

Figure 2 Operational Position Monitoring - Sector balance pre-change (blue) and post-change (orange)

5.3.13 Figure 2 shows the total number of minutes per sector, per reporting period, that each of the 6 defined sectors were recorded as being open and in use as standalone sectors.

5.3.14 In the left chart we see that the bar charts for GW INT and SS INT sectors are consistent pre-change and post-change (c.430,000 minutes is c.300 days per year for GW INT, c.510,000 minutes is c.354 days for SS INT operating standalone). In the middle chart we see that GW FIN was open infrequently pre-change; post-change it is open standalone for more than five times as many minutes. Conversely, SS SPT's usage as a standalone sector significantly reduced, and the right chart shows the same for SS FIN, i.e. post-change standalone usage has also significantly reduced.

5.3.15 This data shows that the balancing of the two respective main workloads has been achieved and it is now possible for sector tasks to be better distributed in accordance with need. The resourcing for this workload rebalancing was planned carefully and introduced on the date that the airspace change was implemented.

5.4 Service Provision Section: Conclusion

5.4.1 Rebalancing the controller resource was not possible under the pre-change arrangement; adding resource to Luton Radar would not reduce the workload and complexity of Essex Radar because all Luton arrivals had to use the Essex sectors due to the combined arrival routes. The airspace change unlocked the ability to redistribute the effort between controllers and reduce the bottleneck where the task could not be subdivided.

6. Utilisation of Continuous Climb Operations CCO and Continuous Descent Operations CDO (CAA Paragraph 25)

6.1 Utilisation of CCO and CDO PIR Item 25a: Continuous Descent Operations

The % of traffic achieving CCO and/or CDA [Continuous Descent Approach, see below], compared monthly before and after the change (e.g. comparing the month of July before and after the change)

6.1.1 This ACP's intent was to separate LLA and Stansted arrival flows at high levels.

6.1.2 LLA's departure climbs were not predicted to change as part of this ACP. Therefore, only arrivals are considered in this item, i.e. CCOs are out of scope.

6.1.3 The intent of the implemented final design was to minimise change to arrival flows below 5,000ft, in turn minimising the changes in noise impacts at these lower altitudes.

6.1.4 The CAA's requirement includes this statement:
CDA/CCO should be analysed using the standard definition set out by Sustainable Aviation in their Arrivals and Departures Code of Practice.

6.1.5 CDA refers to Continuous Descent Approach, a subset of CDO. Sustainable Aviation's CDO booklet (external link) states 'CDA… typically starts from an altitude of 6,000ft (amsl)'.

6.1.6 However, LLA has an entry in the UK Aeronautical Information Publication (AIP) referring to CDA. It is published[6] at EGGW AD 2.21 Section 3:
d. CDA will commence from 5000 FT QNH and will be deemed to have been continuous provided that no segment of level flight [is] longer than 2.5 NM.

6.1.7 It would not be proportionate to perform two different analyses. We contend that the AIP definition of CDA supersedes the Sustainable Aviation definition because the AIP is a flight operations instruction for LLA specifically, while Sustainable Aviation's booklet is general advice, guidance and best practice on the subject.

6.1.8 CDA analysis in this section is therefore solely provided in accordance with the AIP definition.

6.1.9 The following data tables show the percentages of LLA arrivals achieving CDA in 2019 and the PIR period, with the months adjusted to show a calendar year.

- The tables show the average over the 24hr period, daytime hours (0700-2300 local time) and night-time hours (2300-0700 local time).
- The colour of each cell is set by the values over all the cells in all three tables, with a higher percentage being greener and a lower percentage redder.
- The average over the comparison years is also shown, followed by the improvement.

24 Hour			
Jan-19	91	91	Jan-23
Feb-19	90	92	Feb-23
Mar-19	88	92	Mar-23
Apr-19	93	93	Apr-23
May-19	92	94	May-23
Jun-19	92	95	Jun-23
Jul-19	93	94	Jul-23
Aug-19	93	95	Aug-23
Sep-19	92	95	Sep-23
Oct-19	90	93	Oct-22
Nov-19	89	89	Nov-22
Dec-19	88	90	Dec-22
Average	90.92	92.75	Average
	Improvement	**1.83**	

Day (0700-2300 local)			
Jan-19	91	91	Jan-23
Feb-19	90	92	Feb-23
Mar-19	88	92	Mar-23
Apr-19	94	94	Apr-23
May-19	92	95	May-23
Jun-19	92	95	Jun-23
Jul-19	93	93	Jul-23
Aug-19	93	95	Aug-23
Sep-19	92	95	Sep-23
Oct-19	91	92	Oct-22
Nov-19	90	89	Nov-22
Dec-19	88	90	Dec-22
Average	91.17	92.75	Average
	Improvement	**1.58**	

Night (2300-0700)			
Jan-19	90	88	Jan-23
Feb-19	89	88	Feb-23
Mar-19	91	87	Mar-23
Apr-19	88	91	Apr-23
May-19	91	90	May-23
Jun-19	92	94	Jun-23
Jul-19	94	97	Jul-23
Aug-19	95	96	Aug-23
Sep-19	93	95	Sep-23
Oct-19	87	94	Oct-22
Nov-19	84	85	Nov-22
Dec-19	85	90	Dec-22
Average	89.92	91.25	Average
	Improvement	**1.33**	

Table 9 Continuous Descent percentage comparisons (L) 24hr (C) Day (R) Night)

6.1.10 In each table, the right hand (PIR period) column contains more green than the left hand (2019) column, meaning the continuous descent proportions were higher. Some individual months had the same proportions, and some individual months in the PIR period for Night had some slightly worse months.

[6] No hyperlink is provided because the hyperlinks change every 28 days due to the ongoing cycle of aeronautical data changes. However, this link to the AIP home page can be followed by selecting 'Current AIP' and navigation to Part 3 Aerodromes then AD 2 then London Luton EGGW, finally to AD 2.21 EGGW Noise Abatement Procedures.

6.1.11 However, the overall year shows improvements for the majority of months in each of the tables, and the total average also shows an improvement over the year.

6.1.12 Finally, please also refer to Annex A Traffic Dispersion paras 4.3.29-4.3.33. Pre-change, LLA arrivals to easterly Runway 07 complied with CDO from 5,000ft and below, as per the data presented in this section. In practice, they actually flew level at 5,000ft for c.60km before commencing that CDO.

6.1.13 Post-change, easterly LLA arrivals do not fly level at 5,000ft for as long as pre-change; they descend more continuously from the higher network levels and do not level off for as long before making their approach to land. Therefore, even though the CDO from 5,000ft is an improvement since the airspace change was introduced, for easterly arrivals (c.30%) there has been a further improvement in CDO from much higher altitudes.

6.2 CDO Section: Conclusion

6.2.1 The data shows that CDOs have increased. The airspace design is a significant factor in this increase, for diagrammatical evidence please see Annex A which illustrates the lateral and vertical traffic dispersion.

6.2.2 There were fewer overall flights in the PIR period compared with the forecast (see Section 8 from page 20) which is also likely to be a contributing factor[7]. However the post-change flightpaths, by design, provide greater scope for CDO than pre-change.

6.2.3 For easterly arrivals in particular, there has been a further improvement in CDO from much higher altitudes than the formal sub-5,000ft data analysis indicates; this can also be seen in Annex A.

[7] Fewer flights in a system generally means less bunching, which improves the likelihood of an arrival being given continuous descent.

7. Infringement statistics

Data on the % change in infringements, compared on a monthly basis before and after the change. New and amended CTAs (DTY 21, 25 and CLN 10, 11, 12) and airspace south east of EGSS (what was EGSS CTA3).

7.1.1 Infringements, in this context, means the unauthorised entry of an aircraft into airspace controlled by ATC.

7.1.2 This section is split into two parts. The first provides infringement statistics for the new CAS volumes designed to accommodate the new LLA arrival flows, the lowest of which has a base of FL75, and all are north of LLA.

7.1.3 The second part is entirely unrelated to LLA arrivals. It provides infringement statistics for the low-altitude CAS volumes east of Stansted that were reduced/removed to increase Class G airspace 'headroom' in that region. The AD6 ACP was an opportunity to implement a change for the benefit of lower-altitude General Aviation (GA) airspace users.

7.2 Infringements PIR Item 28a Part 1: New CAS volumes FL75 and above

DTY CTA21, DTY CTA25, CLN CTA10, CLN CTA11, CLN CTA12

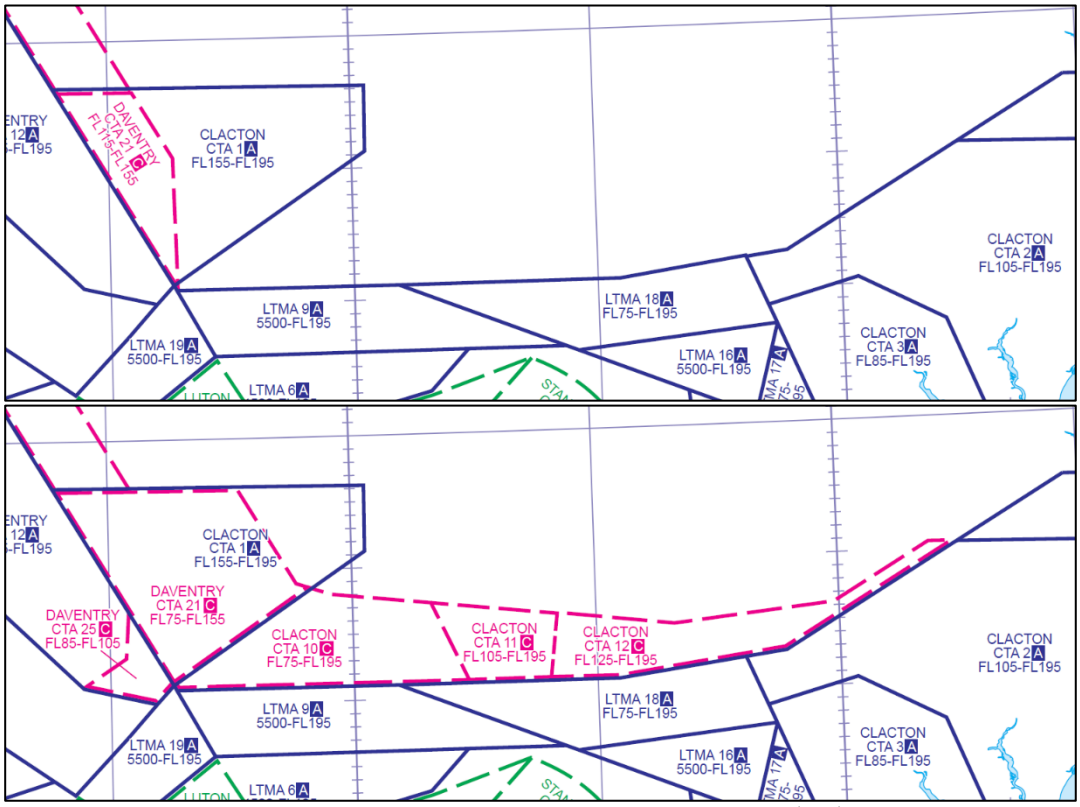

Figure 3 CAS volumes relevant to this project: Jan 2022 pre-change (top), Feb 2022 post-change (above)

7.2.1 Until the implementation of these CTAs containing the new LLA arrival routes, it was not possible for there to be infringements, there being no CAS to infringe.

7.2.2 For the AD6 airspace change there was one safety report concerning an airspace infringement in these CAS regions. An MOR was raised (see paragraph 4.2 above), and is addressed here.

7.2.3 On Tuesday 17th January 2023 a Cessna C150 infringed DTY CTA21 (Class C, base FL75). The incident ID was 170273. The controller was alerted via a safety system known as CAIT, or Controlled Airspace Infringement Tool. Post-incident, the pilot (flight instructor) reported a loss of situational awareness during climb-descend training, combined with an unusually low pressure contributing to the aircraft indicating FL76 before descending below the CAS base.

7.2.4 The outcome was that the CAA provided remedial action (guidance on avoiding infringements, pre-flight planning and advice on error management strategy).

7.2.5 This is the single recorded infringement of the CAS volumes introduced for AD6 within the reporting period.

7.3 Infringements PIR Item 28a Part 2: Removed/reduced CAS volumes

EGSS CTA3 base raised by 500ft to 2,500ft, LTMA2 deleted

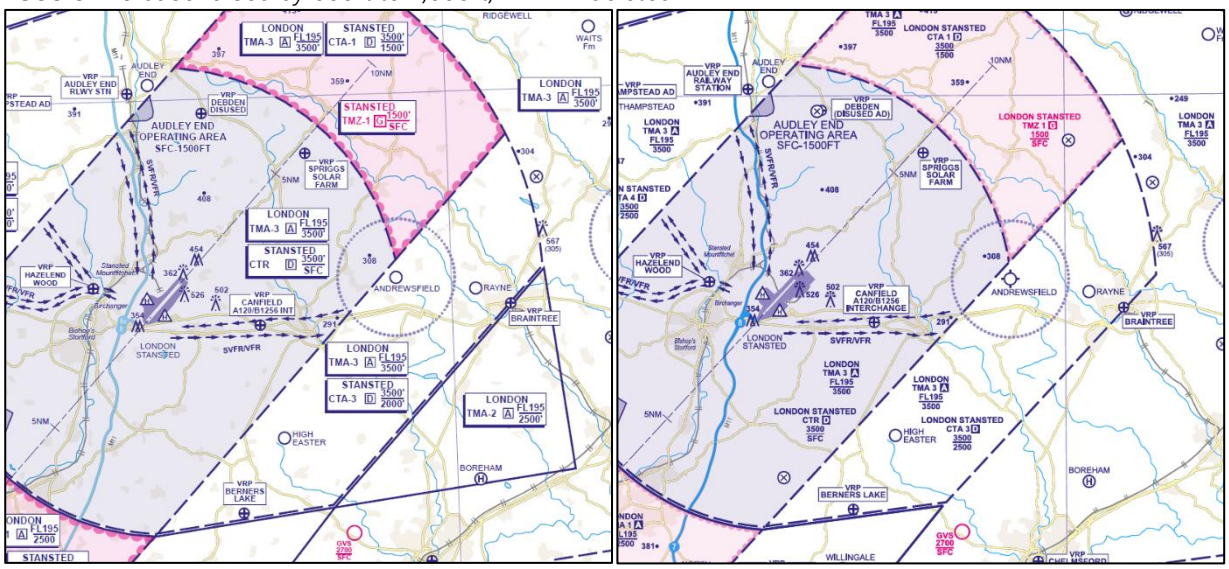

Figure 4 CAS volumes reduced/deleted in this project: Jan 2022 pre-change (left), Feb 2022 post-change (right)

7.3.1 We identified two CAS volumes east of Stansted that were rarely used by Stansted departures. We demonstrated that relevant Stansted departures outclimbed the departure profile, allowing for one of the CAS volumes to be reduced vertically, and the other to be removed entirely. We updated the climb profile of the SIDs to ensure CAS containment (see Annex C Stansted SID Climb Evidence) and amended the CAS volumes as per Figure 4 above.

7.3.2 We also identified this would reduce two known infringement risks:

- EGSS CTA3 had an unusual pre-change CAS base of 2,000ft; most CAS volumes have a base at a 500ft interval rather than a whole thousand. The adjacent CAS base of LTMA1 to the southwest was (and remains) a large region with a base of 2,500ft.
- LTMA2 was a triangular region with a base of 2,500ft jutting into a large region (LTMA3) with a base of 3,500ft.

7.3.3 There were 8 infringements of either CAS volume in 2019, compared with none in the equivalent region for this PIR reporting period.

Date	Incident ID	CAS Volume infringed	Total by month in 2019	Total in PIR period
12/01/2019	140987	Stansted CTA3	Jan: 2	Nil
18/01/2019	141176	Stansted CTA3		
17/02/2019	141784	Stansted CTA3	Feb: 1	
05/05/2019	144027	Stansted CTA3	May: 3	
14/05/2019	144300	Stansted CTA3		
25/05/2019	144682	Stansted CTA3		
07/08/2019	147675	Stansted CTA3	Aug: 2	
13/08/2019	147278	Stansted CTA3		
		Totals	8	0

Table 10 Comparison of numbers of infringements pre and post airspace change

7.4 Infringements Section: Conclusion

7.4.1 In the PIR period, one infringement occurred in one of the new CAS volumes established for this airspace change. The primary cause was a pilot altimetry miscalculation.

7.4.2 In 2019 infringements occurred 8 times in Stansted CTA3. During the PIR period there were no equivalent infringements of the modified Stansted CTA3.

7.4.3 We consider this to be a very successful outcome. GA access to Class G airspace has improved due to the raising of both bases of CAS in the region. Crucially, there has been a significant reduction in infringements, improving safety for both GA flights and commercial air traffic that get impacted by an infringement. No ANSP would expect to be able to completely eradicate infringements. However, we have successfully modified the CAS in order to mitigate the overall risk.

8. Traffic figures (Air Transport Movements ATMs)

8.1 ATM PIR Item 31a: Actual Vs. Forecast

Data on the actual traffic volumes Vs. forecast.

8.1.1 In the original consultation material we used 2019's actual arrivals and rounded it for the implementation year forecast. This is because LLA was already operating at its planning capacity limit so no flight growth was predicted for the implementation year.

8.1.2 During the PIR period LLA's traffic has recovered to over 89% of pre-pandemic levels.

Data type	2019 Actual	Forecast for implementation year	PIR period Actual
Number of arrivals	70,736	70,740	63,190
Proportion of forecast	100%	100%	89.3% of forecast

Table 11 LLA arrivals: Annual Forecast vs. Actual

8.1.3 This level of traffic means the flightpath patterns are representative of typical operations. See Annex A Traffic Dispersion for details.

8.2 ATM PIR Item 31b: Monthly Comparison

Data on the % change compared monthly before and after the change.

8.2.1 The proportion of arrivals by month is shown in the table below. It covers the 2019 pre-implementation year's actual arrival proportions, the implementation year forecast (which uses the same proportions as the pre-implementation year) and the PIR period actual proportions.

8.2.2 The PIR period columns in the table have been reversed to allow for easier comparison.

	2019 Actual		Implementation calendar year forecast			PIR period Actual (columns reversed)		
2019	Arrivals	Proportion	2022	Arrivals	Proportion	Proportion	Arrivals	PIR period
Jan 2019	4,933	7.0%	Jan 2022#	4,933	7.0%	6.8%	4,270	Jan 2023
Feb 2019	4,867	6.9%	Feb 2022#	4,867	6.9%	7.0%	4,395	Feb 2023
Mar 2019	5,410	7.6%	Mar 2022	5,410	7.6%	7.9%	5,008	Mar 2023
Apr 2019	6,007	8.5%	Apr 2022	6,007	8.5%	8.5%	5,375	Apr 2023
May 2019	6,547	9.3%	May 2022	6,547	9.3%	9.4%	5,921	May 2023
Jun 2019	6,511	9.2%	Jun 2022	6,511	9.2%	9.4%	5,957	Jun 2023
Jul 2019	6,765	9.6%	Jul 2022	6,765	9.6%	9.9%	6,239	Jul 2023
Aug 2019	6,504	9.2%	Aug 2022	6,504	9.2%	9.3%	5,907	Aug 2023
Sep 2019	6,542	9.2%	Sep 2022	6,542	9.2%	9.2%	5,810	Sep 2022-23*
Oct 2019	6,414	9.1%	Oct 2022	6,414	9.1%	9.0%	5,716	Oct 2022
Nov 2019	4,702	6.6%	Nov 2022	4,702	6.6%	6.3%	3,986	Nov 2022
Dec 2019	5,534	7.8%	Dec 2022	5,534	7.8%	7.3%	4,606	Dec 2022
Total	**70,736**	**100.0%**	**Total**	**70,740$**	**100.0%**	**100.0%**	**63,190**	**Total**

Table 12 LLA Arrivals: Number and proportions by month

Jan was pre-implementation, Feb was mostly pre-implementation however the data provides insight into the comparison of forecast with actual arrivals
* Partial months combined to make a complete equivalent September
$ Total was rounded to the nearest 10. The monthly data has not been modified.

8.2.3 The greatest differences between relative proportions are in the range 0.3%-0.5%.

8.2.4 The monthly proportions of PIR period arrivals are therefore consistent with the pre-change actual proportions, and with those of the implementation year forecast.

8.2.5 The seasonal flightpath patterns reflect the same proportions post-change as pre-change, consistent with the forecast.

8.3 ATM PIR Item 31c: External factors

Confirmation that there are no factors over the 10-year forecast period that would cause a material change to the traffic forecasts provided in support of the original proposal, i.e. that the original forecasts are still reasonable. (Includes the impacts of COVID-19 pandemic).

8.3.1 Section 1.3 on p.5 describes the impacts on UK aviation of the COVID-19 pandemic. Those impacts were considered in the original forecasts, and while full recovery is yet to be achieved across the UK, we contend that the original forecast remains a reasonable projection.

8.3.2 Section 1.4 on p.6 describes the potential impact on UK aviation of the Russia-Ukraine conflict. There is no evidence to suggest this would influence traffic forecasts.

8.3.3 Section 1.4 on p.6 also describes the ATC system failure at NATS; this was a unique event and would not influence traffic forecasts.

8.3.4 None of these events appear to have changed the proportions of arrivals at LLA, see Table 12 above.

Planning application for 19 million passengers per annum

8.3.5 In December 2021 LLA was granted permission to increase its annual passenger limit from 18m to 19m. That decision was followed by a local inquiry, called in jointly by the respective Secretary of States for Levelling Up and for Transport. The inquiry concluded that the 19m planning permission should be granted. The decision was announced on 13th October 2023, after the closure of the PIR period, and was subject to conditions (link to Government decision document).

8.3.6 These conditions (18, 9 and 19) were for travel plan and car park management, noise contour reduction strategy and carbon reduction strategy. These three plans/strategies had to be submitted and approved to Luton Borough Council before the passenger limit could be increased by 1m.

8.3.7 The condition plans were submitted and subsequently approved by Luton Borough Council. LLA has therefore received permission to grow passenger numbers to 19m passengers per annum (mppa), in time for summer 2024.

8.3.8 This increase in passenger numbers would not, in practice, affect the number of flights at LLA (current nor forecast) because we expect a similar number of flights would have more passengers per flight.

Application for 32 million passengers per annum via Development Consent Order (DCO)

8.3.9 Luton Borough Council is the sole shareholder (owner) of Luton Rising which is the trading name of LLA.

8.3.10 London Luton Airport Operations Limited (LLAOL) are the concession which runs the airport, and is one of the co-sponsors to this airspace change/PIR.

8.3.11 Luton Rising submitted an application for a DCO to grow to 32mppa. There was a public enquiry that began in late 2023 and ended on 10th February 2024. Luton Rising, along with LLAOL, are now awaiting the outcome of this application.

8.3.12 The DCO outcome was anticipated to be delivered in summer 2024, however a general election was called for 4th July[8]. Due to rules on the announcement of major decisions during the pre-election period (sometimes known as purdah), the outcome is unlikely to be delivered until some time after the new government has been formed. We expect this to be in 2025 at the earliest.

8.3.13 Should the DCO be granted in 2025, flight increases could occur to a certain extent using existing infrastructure but major upgrades such as a new terminal would take time. This update regarding the earliest possible implementation of the DCO is consistent with our original forecast, which included DCO-related increases. However, similar to the 19mppa application above, there would be a number of conditions which LLAOL and Luton Borough Council would need to meet before the DCO can be implemented and airport growth could commence.

8.4 ATM Section: Conclusion

8.4.1 Traffic at LLA continues to recover, and is now above 89% of pre-pandemic levels.

8.4.2 The monthly proportions of arrivals in the PIR period are consistent with the pre-change proportions.

8.4.3 The original forecast included estimates of the pandemic recovery, and the DCO should it be granted. The recovery period for the UK aviation industry has taken longer than predicted. However, for this airspace change there are no other forecasts available. We contend the original forecast remains reasonable for the purposes of the ongoing operation.

[8] This PIR report's publication was also delayed until a short period after the election due to the pre-election sensitivity period.

9. Traffic dispersion comparisons

For full details including aircraft track maps and charts, please see the separate Annex A Traffic Dispersion & Environmental Data.
PIR Items 34a (density plots), 34b (lateral and vertical analysis), 34c (weather impacts), 34d (fleet mix), 43a (proportions of flights using the procedures), 49f (local air quality), 49g-o (noise metrics and methodology), 49p-t (fuel and CO2 emissions), 49u (tranquillity) and 49v (biodiversity).

9.1 Traffic Dispersion: Conclusion

9.1.1 The radar data evidence shows that the vast majority of flightpath behaviour of LLA arrivals is consistent with our predictions. There was one area where a small number of flights occur where we did not predict them to occur; we explain above that the impacts this might cause are not considered significant. There was another area where a partial flow of flights were within the originally-predicted overflight area but spread slightly outside the main concentrated area. We contend this is within acceptable tolerances of the original prediction. In most cases it is better than predicted, e.g. improved shortcuts at high levels and increased altitude at lower levels. This is described in Annex A Traffic Dispersion, from p.20 of that separate document.

10. Operational feedback including Letters of Agreement and impact on Ministry of Defence operations

For full details including feedback summaries and our responses, see separate Annex B Operational Feedback document.
PIR Items 37a (Operational Feedback), 37b (Feedback from LLA and Stansted Flight Operations Committee), Items 46a/b (Letters of Agreement), Item 55a (Impact on Ministry of Defence Operations) and Item Other-d (Stakeholder Feedback – received from other airspace users)

10.1 Operational feedback: Conclusion

10.1.1 We received feedback from a variety of operational stakeholders, including the MoD and the United States Air Forces in Europe (USAFE). Opportunities to improve certain LoA procedures were taken and have been implemented, with an additional improvement opportunity expected in 2024. Overall a successful implementation.

11. Denied access

11.1 Refusals of access data PIR Items 40a and 40b

Data concerning the refusals of access (month on month/before and after the change), and reasons for individual refusals of access.

11.1.1 This section applies to General Aviation (GA) pilots who believe they were refused access to controlled airspace (CAS).

11.1.2 Complaints from GA pilots regarding refusals of access are formally recorded by the CAA via an electronic form known as FCS1522 (link to CAA form). We asked the CAA if they had received any FCS1522 forms, relating to the new CAS volumes known as CLN CTA10/11/12 and DTY CTA21/25.

11.1.3 The CAA examined their FCS1522 reports and found none were relevant.

11.2 Denied access: Conclusion

11.2.1 There were no refusals of access relevant to this airspace change.

12. Utilisation of SIDs/STARs/IAPs

12.1 Data on proportions of flights using procedures PIR Item 43a

Data on the % of flights that actually flew the procedure(s) vs. the total number of flights (departing or arriving), compared for the relevant time periods before and after the change.

12.1.1 See separate Annex A Traffic Dispersion document for this data.

13. Impact on Environmental Factors

In this document we will refer to (or briefly summarise) specific PIR Items.
For full details including aircraft track maps and charts, please see the separate Annex A Traffic Dispersion and Environmental Data, and the Technical Appendix for noise metrics.

13.1 Local air quality PIR Items 49a-49f

13.1.1 Items 49a-49e are not required for this PIR. Item 49f (track data confirming no changes below 1,000ft) is provided in the separate Annex A Traffic Dispersion and Environmental Data.

13.2 Noise metrics and supporting material PIR Items 49g-49o

13.2.1 Section 6 of the separate Annex A Traffic Dispersion and Environmental Data includes an extract from the conclusion of our noise modelling technical report, published separately as the Technical Appendix to Annex A.

13.2.2 In summary, the technical report concludes that, based on the policy-compliant environmental analysis that has been carried out for the PIR, there are no significant differences between the pre and post implementation of this airspace change (known as AD6) for the metrics and thresholds indicated in those policies (i.e. 51dB LA_{eq16h} and 45dB LA_{eq8h}).

13.3 Fuel and CO_2 emissions PIR Items 49p-49t

13.3.1 Section 7 of the separate Annex A Traffic Dispersion and Environmental Data provides information on the originally-predicted fuel and CO_2e[9] emissions per flight, and how it compares with a year of actual operational fuel and CO_2e data. In summary:

13.3.2 For LLA, the expected disbenefit was halved, compared with our prediction.

- We predicted a fuel disbenefit of 34.2kg per LLA arrival
  The actual fuel disbenefit was 16.5kg per LLA arrival, less than half our prediction
- We predicted a CO_2e disbenefit of 109kg per LLA arrival
  The actual fuel disbenefit was 52.6kg per LLA arrival, less than half our prediction

13.3.3 For Stansted, the expected benefit was more than doubled, compared with our prediction.

- We predicted a fuel benefit of 4.8kg per Stansted arrival
  The actual fuel benefit was 9.9kg per Stansted arrival, more than double our prediction
- We predicted a CO_2e benefit of 15kg per Stansted arrival
  The actual CO_2e benefit was 31.5kg per Stansted arrival, more than double our prediction

13.3.4 Thus the operation of the airspace change is significantly better than we predicted, in terms of fuel and CO_2e emissions.

13.3.5 For full evidence regarding PIR Items 49p-49t please see the separate Annex A Section 7.

13.4 Tranquillity and biodiversity PIR Items 49u-49v

13.4.1 For the above, evidence is provided in the separate Annex A Traffic Dispersion and Environmental Data.

13.4.2 In summary, there would be a small improvement regarding impacts on tranquillity due to a proportion of arrivals remaining higher than predicted, and no change of impacts on biodiversity following no changes to ground based infrastructure as part of this airspace change.

14. Impact on International Obligations

14.1 Feedback from operators or neighbouring states PIR Item 52a

Not required, as there are no international obligations associated with this airspace change.

[9] CO_2e is Carbon Dioxide Equivalent. Burning aviation fuel produces water, CO_2 and other greenhouse gases. The fuel-to-CO_2e conversion takes the complex mixture of non-CO_2 greenhouse gases and calculates the metric as if all the gases were CO_2.

15. Stakeholder feedback and complaints

15.1 Feedback and complaints PIR Item 58a and details of locations of complaints PIR Item 58b

Feedback/complaints received by the change sponsor and CAA in the period between implementation and post-implementation review from all relevant stakeholders. Narrative evidenced by supporting data (table format). Details of location of complaints (Under the ZAGZO Hold and between 7,000-5,000ft in clusters of >10 respondents). Ordnance Survey map (or equivalent) identifying pinned locations.

15.1.1 Typically, feedback and complaints are received from those experiencing a noise or visual impact due to the airspace change; the respondents may live, work or spend leisure time in the airspace change region. See separate Annex D Stakeholder Feedback and Complaints Data.

15.1.2 In summary, we received a lot of airspace-change-related complaints, mainly concentrated in five hotspots under newly-overflown areas. The top three individual complainants accounted for more than half of the total complaints received. In those five newly-overflown areas, aircraft were at or above 7,000ft (two hotspots), at or above 8,000ft (two hotspots) and at or above 10,000ft (one hotspot). There were very few complaints from under or close to the new holding pattern. The rate of complaints significantly reduced after the notified PIR period ended.

16. Other Information of Relevance

16.1 PIR Item Other-a: Stansted SIDs

The same 121-day period[10] as used in the supplement data set, to show how many aircraft utilising the 8 impacted EGSS SIDs are making the new vertical restrictions at the Gates, plus relevant dispersion plots to show no unexpected lateral deviations.

16.1.1 See separate Annex C Stansted SID Climb Evidence. In summary, the proportions are extremely similar, there were no unexpected lateral deviations or impacts, and operations continue as normal.

16.2 PIR Item Other-b: Holding data (for Stansted arrivals)

16.2.1 For data on arrivals holding for LLA, see separate Annex A: Traffic Dispersion, section 3.3.

16.2.2 As described in the airspace change and this PIR, LLA and Stansted previously shared arrival routes to two holding patterns known as ABBOT (Sudbury in Suffolk) and LOREL (Royston in Hertfordshire). The intent of this airspace change was to decouple LLA arrivals from Stansted arrivals; this was achieved via the introduction of the ZAGZO hold dedicated to LLA, leaving the routes and holds at ABBOT and LOREL for Stansted's exclusive use.

16.2.3 Due to this decoupling, we expected there to be a consequential reduction in the overall holding for Stansted arrivals via ABBOT and LOREL, and this was also achieved.

16.2.4 In the PIR period, Stansted had 95,535 arrivals, vs. 98,998 in 2019. This means Stansted had recovered to approximately 96.5% traffic levels after the global air impacts of the COVID-19 pandemic. Although holding is not always directly proportional to the amount of arrival traffic, the difference between the two annual totals is relatively small (3.5%). Therefore, it is reasonable to make an illustrative comparison.

In 2019 there were:

- 2,535 arrivals to Stansted via ABBOT that held for 5 minutes or more[11]; and
- 1,283 arrivals to Stansted via LOREL that held for 5 minutes or more.

In the PIR period there were:

- 2,029 arrivals to Stansted via ABBOT that held for 5 minutes or more[11], and
- 900 arrivals to Stansted via LOREL that held for 5 minutes or more.

16.2.5 Proportionally, if ABBOT holding had also reduced to 96.5% of the pre-implementation traffic levels, we would expect c.2,446 arrivals to have held. There were actually only 2,029, which is 417 fewer than the proportionate equivalent. This is a c.16% decrease in ABBOT holding (417/2,535).

16.2.6 Likewise, if LOREL holding had also reduced to 96.5% of the pre-implementation traffic levels, we would expect c.1,238 arrivals to have held. There were actually only 900, which is 338 fewer than the proportionate equivalent. This is a c.26% decrease in LOREL holding (338/1,283).

16.2.7 We conclude that the airspace change is likely to have reduced the number of Stansted aircraft holding by 755 flights in the PIR period. Amalgamating the ABBOT and LOREL holding differences, this is a c.20% reduction (417+338)/(2,535+1,283), a significant improvement.

[10] As agreed with the CAA, in the PIR period we excluded unrepresentative data caused by the ATC technical issue in August 2023.
[11] Comparisons made of stack entry and exit time differences of 5 minutes, approximating to arriving via the holding fix, entering the holding pattern and overflying the holding fix again at least once.

16.3 PIR Item Other-c: Resilience

Evidence to show that the claimed increase of c.30% resilience (see Final Options Appraisal) is met. Narrative and redacted raw data.

16.3.1 During the development of this airspace change, ATC Subject Matter Experts (SMEs) considered the typical number of radio exchanges between controllers and pilots during the intermediate approach phase of flight. See Figure 5 below for an explanatory illustration.

The lower the need for radio exchanges per flight, the more resilient the airspace system because controllers can spend more time managing the overall flows and recovering from the disruptive event, and less time making constant adjustments to individual flights. Should there be any disruption, the lower the complexity, the easier it is to recover.

16.3.2 Pre-change, the typical total number of radio exchanges for two flights (one to LLA and one to Stansted) would be 21-28. Intermediate approach would require 6-8 radio exchanges per flight (i.e. 12-16 for two flights), with 5-6 on final approach for LLA and 4-6 on final approach for Stansted.

16.3.3 We predicted that the airspace change would reduce the typical number of radio exchanges for the equivalent pair of flights in the intermediate approach phase of flight. The intermediate approach would require half as many exchanges (3-4) per flight, there would still be 5-6 on final approach for LLA and 4-6 on final approach for Stansted.

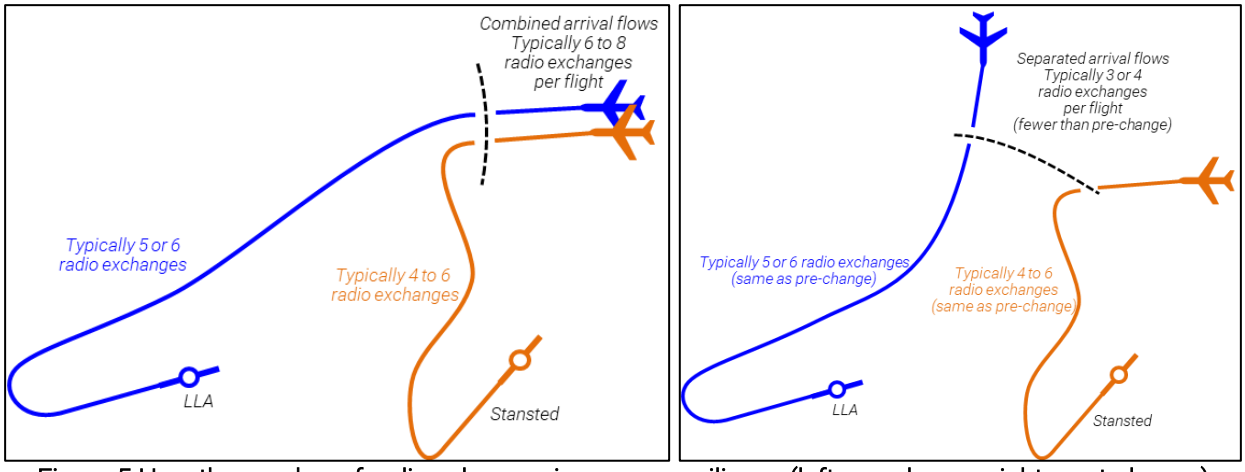

Figure 5 How the number of radio exhanges increases resilience (left: pre-change, right: post-change)
(Easterly operation for both LLA and Stansted is shown. Westerly operation is similar.)

16.3.4 Typically, pre-change for these two flights, a total of **21-28** radio exchanges would be expected. Post-change for the same scenario, we predicted this would reduce to **15-20** radio exchanges.

Comparing the number of radio exchanges, pre- and post-change, 15 vs. 21 would be a 29% improvement and 20 vs. 28 would also be a 29% improvement.

Our airspace change prediction was that we would gain a c.30% increase in resilience.

16.3.5 In order to check this prediction, ATC SMEs were polled during the PIR period. Their opinion was that the typical number of radio exchanges is consistent with the prediction, i.e. that the number of radio exchanges on intermediate approach was halved, with the number for final approach remaining similar.

The prediction has therefore been confirmed, and the airspace resilience has indeed increased by c.30%.

16.3.6 An additional resilience benefit is that, pre-change, the intermediate approach task was performed by a single sector controller. In the above scenario, the same intermediate approach controller would have issued 6-8 instructions to the LLA arrival and also to the Stansted arrival while both flights were on the same radio frequency, because the flows were combined and in a complex, cramped airspace region.

This controller was the first step in splitting the single combined arrival flow into two separate flows, one for each airport. The task could not be separated into LLA and Stansted flows earlier because the airspace arrangement did not allow it (see also sections 5.3 and 5.4 on p.15).

16.3.7 This airspace change means that the airport flows are segregated further out and higher up, before reaching the intermediate approach phase of flight. When necessary, the task can be split into separate airport flows much earlier. It is now possible for two separate sector controllers (Luton Radar and Stansted Radar) to issue the 3-4 intermediate approach instructions on separate radio frequencies,

rather than a single controller (formerly TC Essex operating a combined sector group) issuing 12-16 instructions.

This additional benefit is not quantified; it is provided for greater context regarding the improved resilience of the region's air traffic should there be any disruption.

16.3.8 Additionally section 5.2 on p.12 (see Table 5) describes a 45% reduction in the number of occurrences that a delay regulation was applied, and a 27% reduction in the number of minutes delay accrued over the PIR period when compared with the pre-change period. We consider this data to be a proxy for a corresponding increase in resilience (see paragraph 5.2.8 on p.13).

16.3.9 In conclusion, the airspace change has led to a c.30% increase in resilience due to fewer radio exchanges, the ability for ATC resource to be allocated more effectively, and is evidenced by fewer minutes delay and fewer occurrences of delay regulation.

16.4 PIR Item Other-d: Feedback from other airspace users

Feedback received from other airspace users impacted by the changes. Narrative and redacted raw data.

16.4.1 See separate Annex B Operational Feedback and Letters of Agreement. In summary, this was regarded as a successful implementation with one airline reporting a fuel disbenefit greater than expected. Some minor procedural /coordination changes have been made to address interfaces with military controllers.

16.5 PIR Item Other-e: Human Performance (HP)

Human Performance Monitoring information on controller performance. Narrative and redacted raw data.

16.5.1 The CAA was sent HP data as part of the safety assurance for this airspace change during the main ACP process.

16.5.2 There is, however, a confidentiality issue with the PIR requirement to publish the data.

16.5.3 In order to foster complete trust in the HP process, absolute confidentiality is required even where data has been aggregated and anonymised. This confidentiality is part of the formal agreement between NATS' HP practitioners and those they survey, such as air traffic controllers (ATCOs) who openly and honestly describe their experiences of operating the new airspace arrangements in complete confidence.

Before the PIR data gathering process began, the confidentiality agreement was already in place and could not be reversed.

16.5.4 This causes a conflict; the PIR requires publication of HP information, and the NATS HP department cannot authorise its publication.

NATS convened a meeting with the CAA regarding this confliction; a redacted copy of the text follows paragraph 16.5.7 below.

16.5.5 The group agreed that HP could make the following statement:

Human Performance Monitoring data collected post AD6 implementation has shown that controllers are able to maintain good Human Performance in all conditions.

16.5.6 The CAA agreed that appropriate HP assurance data was supplied and they were satisfied all was in order. Additionally, all CAA attendees of the meeting were sent a confidential data summary after that meeting and there were no subsequent queries.

Therefore no data is published in the PIR, and the statement above is the only narrative.

16.5.7 The redacted meeting record between NATS and the CAA:

2024-04-10 AD6 NATS-CAA PIR Human Performance - meeting 10th April 2024 1430-1500

Attendees (REDACTED):

NATS:	XXX	XXX	AD6 ACP and PIR Lead
	XXX	XXX	Airspace Change Team Manager
	XXX	XXX	Senior Human Performance Practitioner
CAA:	XXX	XXX	AD6 ACP Technical Regulator
	XXX	XXX	ATS Inspector En Route Operations
	XXX	XXX	PIR Regulatory Expert

1430 NATS welcome, introductions

1435 NATS problem statement: confliction between the CAA PIR data requirement for publication of Human Performance data, vs. the HF requirement for absolute confidentiality in order to foster complete trust, even where data has been anonymised.

The CAA's PIR requirement is:

Other-e: Human Performance Monitoring information on controller performance via narrative and redacted raw data.

1437 NATS explains general HF data gathering and the requirement for trust during the assurance process.

1442 CAA is there any anonymised summary data that can be published?

1443 NATS NATS Human Factors can supply a statement regarding human performance, but no data, even anonymised. That statement is:

Human Performance Monitoring data collected post AD6 implementation has shown that controllers are able to maintain good Human Performance in all conditions.

1447 CAA will future questionnaires contain a statement for ATCOs re: potential for publishing anonymised, aggregated data summaries? NATS yes, not for every project but certainly NATS could look into this where it may be required for PIR.

1450 NATS in order to comply with the PIR requirements, NATS intends to state in the PIR material that CAA staff have read the Human Performance data report, and are satisfied with the contents, followed by the statement above.

1453 NATS does CAA want to run through the final HP assurance report now?

1454 CAA all agree that they are content that the correct process was followed and appropriate assurance data was supplied. The CAA attendees would appreciate direct sight of the report.

1455 NATS the relevant PIR section will therefore contain a reference to this meeting, the CAA's satisfaction with the data and the statement itself. The primary purpose of this meeting is concluded.

1500 NATS Thanks to all CAA attendees, meeting closed.

ACTION 1 NATS investigate questionnaire wording and implementation, for future projects where anonymised, aggregated summary data may need to be published [ongoing task].

ACTION 2 NATS supply a copy of the final assurance report to the attendees, reminding all of its confidentiality [Closed, copy sent 15th April 2024].

End of notes [NATS, 10/04/2024]

16.5.8 We conclude that the HP information and data process was satisfactory, and can state that the CAA concurs. As noted above, Human Performance Monitoring data collected post AD6 implementation has shown that controllers are able to maintain good Human Performance in all conditions.

17. Overall Conclusion

17.1.1 This airspace change has met and delivered its objectives successfully. The PIR material in the documents provides the evidence.

17.1.2 This airspace change was implemented on time. Safety data shows that there has been a demonstrable improvement. Service provision data shows that delays were reduced and ATC resources are better balanced. Continuous descent operations have improved. Infringements have significantly reduced. Air traffic movement recovery is underway; LLA is operating at over 89% of the pre-change traffic volumes.

17.1.3 The location and height of aircraft has generally matched predictions, except where shorter routes have been found and most LLA arrivals are higher than predicted, saving fuel and reducing noise impacts. There are two places where our prediction was not quite correct but we contend this is within acceptable tolerances. Overflight of tranquil areas was either unchangeable due to its location directly under final approach, or other tranquil areas were overflown slightly higher than pre-change; there was no increase in those impacts. There was no evidence of changes to impacts on biodiversity.

17.1.4 Operational feedback (from airspace user stakeholders and Letter of Agreement holders) was positive. From a Ministry of Defence point of view, in two cases their feedback resulted in procedural changes to further improve interfaces with our military ATC colleagues.

17.1.5 There was no evidence of denied access to the new airspace. The utilisation of STARs shows that proportions of LLA arrivals from each major direction was consistent with the pre-change airspace.

17.1.6 We had a noise technical report prepared by acoustic modellers, which concluded that the post-change policy-based noise metrics are consistent with the pre-change metrics.

17.1.7 Fuel and CO_2 emissions were better in practice than our model predicted; where we expected disbenefit, it was halved, where we expected benefit, it was doubled. Holding for both LLA and Stansted was reduced.

17.1.8 We received a lot of airspace-change-related complaints, mainly concentrated in five hotspots under newly-overflown areas. The top three individual complainants accounted for more than half the total complaints. In those five newly-overflown areas, aircraft were at or above 7,000ft (two hotspots), at or above 8,000ft (two hotspots) and at or above 10,000ft (one hotspot). There were very few complaints from under or close to the new holding pattern. The rate of complaints significantly reduced after the notified PIR period ended.

17.1.9 Part of this airspace change was to remove CAS volumes; doing so required minor changes to some of Stansted's SID climb gradients. We analysed that change, and the proportions were as expected with no lateral deviations. This CAS removal resulted in a significant reduction in infringements.

17.1.10 Resilience increased by c.30% as expected. Human performance monitoring data showed that controllers are able to maintain good performance in all conditions.

17.1.11 In most areas of the PIR, the evidence shows the airspace change performance exceeded expectations.

18. Appendix: CAA PIR Data Request

The following pages contain extracts from the CAA's data request document (Ref 3).

Safety and Airspace Regulation Group

Civil Aviation Authority

Airspace Change Process
Post Implementation Review Data Request

ACP Project Reference:	2018-65		
Title of Airspace Change:	Swanwick Airspace Improvement Programme – Airspace Deployment 6		
Change Sponsor:	NATS En-Route Ltd and London Luton Airport (LLA)		
CAA Decision Document:	CAP2288		
CAA Decision Date:	24 Nov 2021	**AIRAC Date(s):**	24 Feb 2022
PIR Data Submission Requested:	27 Mar 2022	**PIR Data Submission Required by[1]:**	24 Apr 2023

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[1] A 28-day period to collate the data is usually requested, however an extension to the 28-day response period may be granted if sufficiently justified.

Safety and Airspace Regulation Group

Introduction

1. The CAA's airspace change process is a seven-stage mechanism that is set out in detail in CAP 1616. Stage 7 of this process is a Post Implementation Review (PIR) that normally begins one year after implementation of the change. The PIR is an assessment of whether the anticipated impacts and benefits in the approved change and published decision are as expected and where there are differences, what steps (if any) the CAA requires to be taken.

2. Irrespective of whether the CAA decision to approve the change was made under the previous process (set out in CAP 725), all PIRs should normally be in accordance with the process requirements of CAP1616. However, when assessing the expected impacts against the actual impacts, the methodology adopted at the time of the original CAA decision should be used.

3. Once the change sponsor's PIR data submission is published on the portal, there will be a 28-day window during which any stakeholder may provide any feedback when carrying out this review about whether the impacts of the change are those expected, 12 months on.

What does this activity entail?

4. Before the CAA can commence the PIR of an airspace change, the change sponsor must provide the CAA with a PIR submission that includes data pre-requested by the CAA. This data would normally be stipulated within the decision document at Stage 5 although this is not the case for changes pre-2018 (CAP 725). This PIR data request form sets out that list of data required in order for the CAA to complete the PIR assessment. If required, the CAA may request data additionally to the data that was requested within the regulatory decision.

5. This list is not exhaustive, and some requirements will not apply in every case. Where a data request is required, it will be clearly marked with a cross in the relevant 'Yes' field.

Data requests

6. Where the data illustrates impacts other than those anticipated, the change sponsor is to provide (and evidence) their analysis of why this is the case.

7. If certain data is unavailable or is disproportionately burdensome to provide, the CAA will consider any justifications explaining the reasons for not providing the data and the CAA may adjust the requirements on this basis. Additionally, the CAA reserves the right to follow up with additional requests for data throughout the review period.

8. Any other data that would provide evidence of other benefits or impacts should also be included in an appropriate format.

Safety and Airspace Regulation Group

Format of data

9. The format of each data request required will be stipulated below in the associated column.

10. Where data is provided to the CAA as part of the change sponsor's PIR submission, it must be in a format that is consistent with, and comparable to, data provided as part of the original consultation and formal ACP, if possible. Scaling of the data should be consistent throughout to enable a like-for-like comparison.

11. The PIR submission must be in a suitable format for publishing onto the CAA's Airspace Portal.

Instructions for the Change Sponsors

12. The change sponsor is required to commence monitoring and gathering of data on the impacts of the change as soon as the change has been implemented[2]. On receipt of this data request form, the change sponsor should begin to collate the data required, analyse each data request (summarising the conclusions of the analysis), and submit it via email to the assigned AR Project Officer in a Post Implementation Review Submission. The date on which the CAA requires the data to be submitted is stipulated at the top of this document.

13. If for any reason, the change sponsor is unable to support this data request at the time requested by the CAA, justification as to why must be submitted to the AR Project Officer. Such requests for a delay in submitting the data must be agreed with the CAA, including an agreement of an appropriate time that this activity can take place.

General Observations

14. The following general observations are to enable an overview of the effectiveness of the airspace change.

15. The change sponsor is required to submit a qualitative statement against each data request which supports the conclusion reached in each case.

16. The CAA will review the analysis of the data submitted to ensure the anticipated impacts and benefits in the approved change were as expected.

		Required for the review?	Format of the data required.	Information of relevance in support of the request.
a)	An overview statement on whether, in the change sponsor's view, the original proposal met the intended objectives as described on the	Yes☒	Narrative.	

[2] Subject to the impacts of COVID-19 pandemic: Airspace Change Proposals Post-Implementation Reviews (PIRs) impacted by COVID 19 - Update February 2022

	CAA's decision to approve the change.			
b)	On overview statement on whether, in the change sponsor's view, the original proposal met any conditions described on the CAA's decision to approve the change (if applicable).	Yes☒	Narrative.	
c)	Confirm that implementation occurred on the dates identified in the Decision Letter. If no implementation date was specified in the Decision, please state so.	Yes☒	Narrative.	
d)	If there was a significant delay between the planned and actual implementation date, please provide an explanation.	NO	Narrative.	
e)	Identify whether any other issues of significance have occurred during the period 12 months after date of implementation[3].	Yes☒	Narrative.	
f)	Other than normal promulgation activity (e.g. NOTAM, AIC etc.), identify what steps were undertaken to notify local aviation stakeholders that the airspace change was about to be implemented.	Yes☒	Narrative.	**There were 2 recommendations stated in the Op Assessment.**

Safety Data

17. The following safety data is required to enable an assessment that the new airspace design is at least as safe as the original design, if not safer.

18. The change sponsor must collate the data requests below, analyse and submit a qualitative statement against each data request which supports the conclusion reached in each case.

19. The CAA will review the statistics submitted concerning these events and assess whether the revised airspace design is a contributory factor in any incidents which have occurred. If there have been no reported events, the sponsor should articulate this in their PIR submission.

		Required for the review?	Format of the data required.	Information of relevance in support of the request.
a)	Data concerning any recurring instances of Instrument Flight Procedures (IAPs, SIDs, STARs, Holds) not being flown correctly.[4]	Yes☒ No☐	Narrative evidenced by data (flight data).	**See specific requirement 5 in the Op Assessment.**

[3] CAP 1616 Part 1 The Airspace Change Process: Paragraph 270.
[4] Any instances of IFPs not being flown correctly must be notified to the CAA.

b)	Report concerning any known Mandatory Occurrence Reports (MORs).	Yes☒ No☐	Narrative supported by copies of the original MOR Report(s).	
c)	Report concerning any known AIRPROX reports.	Yes☒ No☐	Narrative supported by copies of the original AIRPROX Report(s).	
d)	Report concerning any known Air Safety Reports (ASR)[5].	Yes☒ No☐	Narrative supported by copies of the original ASR Report(s).	

Service provision/ resource issues

20. The change sponsor will need to demonstrate that adequate resources are in place to facilitate the operation of the new airspace design, and that air traffic services are being provided as forecast in the approved change without unanticipated negative impact on other airspace users.

21. The change sponsor must collate the data requests below, analyse and submit a qualitative statement against each data request which supports the conclusion reached in each case.

22. The CAA will assess whether there is adequate resource in place to support the operation comparing the change sponsor's data with the approved change.

		Required for the review?	Format of the data required.	Information of relevance in support of the request.
a)	Data on refusals of service.	Yes☒ No☐	Narrative evidenced by supporting data (table format).	**See specific requirements 2 and 7 in the Op Assessment.**
b)	Data regarding air traffic delays. Dates/times that flow restriction measures are applied.	Yes☒ No☐	Narrative evidenced by supporting data (table format).	
c)	Details of additional resource allocated, considering daily and seasonal traffic patterns.	Yes☒ No☐	Narrative evidenced by supporting data (table format).	

Utilisation of Continuous Climb Operations (CCO) and Continuous Descent Operations (CDO)

23. Where the original change cited improvements in CCO/CDO utilisation, the change sponsor will need to provide data to demonstrate any subsequent improvement.

24. The change sponsor must collate the data requests below, analyse and submit a qualitative statement against each data request which supports the conclusion reached in each case.

[5] This may include relevant reports submitted through CHIRP.

25. The CAA will assess whether the anticipated benefit has been delivered by comparing the change sponsor's data against the approved change.

		Required for the review?	Format of the data required.	Information of relevance in support of the request.
a)	The % of traffic achieving CCO and/or CDA, compared monthly before and after the change (e.g. comparing the month of July before and after the change).	Yes☒ No☐	Narrative evidenced by supporting data (flight data).	CDA/CCO should be analysed using the standard definition set out by Sustainable Aviation in their Arrivals and Departures Code of Practice.

Infringement statistics

26. Where the revised airspace design changes the dimensions of controlled airspace, the change sponsor will need to provide an analysis of airspace infringements.

27. The change sponsor must collate the data requests below, analyse and submit a qualitative statement against each data request which supports the conclusion reached in each case.

28. The CAA will assess whether the airspace design was a contributory factor in any increase in infringements[6]. Was an infringement risk identified in the approved change and has it been mitigated?

		Required for the review?	Format of the data required.	Information of relevance in support of the request.
a)	Data on the % change in infringements, compared on a monthly basis before and after the change.	Yes☒ No☐	Narrative evidenced by supporting data (table format).	**New and amended CTAs (DTY 21, 25 and CLN 10, 11, 12) and airspace south east of EGSS (what was EGSS CTA3)**

Traffic figures (air transport movements)

29. Traffic figures over the period will give a general overview of the nature of the operation following the implementation of the change. In addition, where the change was predicated on a forecast increase in traffic numbers, the change sponsor will need to confirm whether or not the increase forecast in the approved change has been realised.

30. The change sponsor must collate the data requests below, analyse and submit a qualitative statement against each data request which supports the conclusion reached in each case.

31. The CAA will consider the extent of any difference between the predicted and actual traffic figures and the extent to which the impacts of the change can be explained by those differences.

[6] A review of any relevant data from the CAA's safety intelligence database will also be conducted.

		Required for the review?	Format of the data required.	Any information of relevance in support of the request.
a)	Data on the actual traffic volumes Vs. forecast.	Yes☒ No☐	Narrative evidenced by supporting data (table format).	
b)	Data on the % change compared monthly before and after the change.	Yes☒ No☐	Narrative evidenced by supporting data (table format).	
c)	Confirmation that there are no factors over the 10-year forecast period that would cause a material change to the traffic forecasts provided in support of the original proposal, i.e. that the original forecasts are still reasonable.[7]	Yes☒ No☐	Narrative.	

Traffic dispersion comparisons

32. It is necessary to establish whether aircraft (major aircraft types as defined by CAP2091) are flying routes and/or utilising airspace forecast in the CAA's decision to approve the change. A key part of the CAA's post-implementation review will be to analyse the 'before and after' dispersal of aircraft to understand whether the new airspace design is being operated as anticipated.

33. The change sponsor must collate the data requests below, analyse and submit a qualitative statement against each data request which supports the conclusion reached in each case.

34. The CAA will assess whether there have been any unforeseen or unintended operational impacts of the approved change.

		Required for the review?	Format of the data required.	Any information of relevance in support of the request.
a)	Density plots that show concentration. **Colour coded for segments of the STARs to show when an aircraft left the STAR to be vectored. (example - From JUMZI, ZAGZO and COCCU to 7000ft and 7000ft to touchdown for each RWY. ZAGZO Hold density plot showing aircraft at FL80 to FL140.)**	Yes☐ No☐	Narrative supported by heat/density plots showing where aircraft have concentrated within the acceptable tolerances of the procedure design.	The density plots should be overlaid on the same maps/charts as the lateral vertical plot analysis. The maps/charts should be suitable such that they can be understood by non-aviation stakeholders. The individual lateral plots will be governed by the data. The vertical plots can be colour coded and broken down into 1000, 2000 or 3000ft swathes depending on the procedure being considered and can be combined with the individual track plots.
b)	Lateral and vertical analysis. **From 7000ft to touchdown.**	Yes☒ No☐	Narrative supported by traffic density plots per 1000ft climbed, that shows aircraft dispersion along	

[7] Includes the impacts of COVID-19 pandemic.

			with height gained or lost for each plot.	
c)	Weather/MET impacts.	Yes☒ No☐	Should be considered if there was a significant weather event that can explain an anomaly in the plots.	
d)	Any changes to operating fleet mix. That have occurred since implementation for comparison with pre-implementation.	Yes☒ No☐	Narrative evidenced by supporting data (table format). Explain why, if required, that the main aircraft types used in the analysis might have changed (ie airline no longer operating).	

Operational Feedback

35. The change sponsor will have to present any feedback directly received by aviation stakeholders operating in, or affected by, the revised airspace design.

36. The change sponsor must collate the data requests below, analyse and submit a qualitative statement against each data request which supports the conclusion reached in each case.

37. The CAA will assess whether there have been any unforeseen or unintended operational impacts of the approved change.

		Required for the review?	Format of the data required.	Any information of relevance in support of the request.
a)	Any direct feedback from airlines/ air traffic controllers.	Yes☒ No☐	Narrative supported by a table showing the feed-back in relation to the change and explaining what the change sponsor has done to address the feed-back.	This is not just negative feedback. The presented format must make it clear that the change sponsor has dealt with the feedback within the context of the implemented change. **See specific requirement 7 in the Op Assessment.**
b)	Any additional feedback from relevant flight operation sub-committee (e.g. sub-group of airport consultative committee). For both Luton and Stansted.	Yes☒ No☐	Narrative supported by evidence of minutes or notes of actions from meetings.	

Denied Access

38. This links to service provision/resources mentioned above. The change sponsor should provide data on refusals of access to the revised airspace design and any underlying factors.

39. The change sponsor must collate the data requests below, analyse and submit a qualitative statement against each data request which supports the conclusion reached in each case.

40. The CAA will assess whether other airspace users are being impacted other than as anticipated as a result of the change[8].

		Required for the review?	Format of the data required.	Any information of relevance in support of the request.
a)	Data concerning the refusals of access (month on month/ before and after the change).	Yes☒ No☐	Narrative evidenced by logged refusals. (table format).	
b)	Reasons for individual refusals of access.	Yes☒ No☐	Narrative evidenced by logged refusals. (table format).	

Utilisation of SIDs/STARs/IAPs

41. Information concerning the utilisation of the various procedures implemented as part of the change. The information may highlight areas of unforeseen consequence, for example where a particular procedure is being used more than anticipated with a subsequent impact.

42. The change sponsor must collate the data requests below, analyse and submit a qualitative statement against each data request which supports the conclusion reached in each case.

43. The CAA will assess whether the utilisation data is other than expected.

		Required for the review?	Format of the data required.	Any information of relevance in support of the request.
a)	Data on the % of flights that actually flew the procedure(s) vs the total number of flights (departing or arriving), compared for the relevant time periods before and after the change.	Yes☒ No☐	Narrative evidenced by supporting data (table format).	The utilisation figures must match the figures in the density, lateral and vertical plots in order to see only the aircraft that flew the new procedures; the data would be skewed by VFR departures for example.

Letters of Agreement (LoAs)

44. Where a Letter of Agreement detailing specific procedures was a specific condition of the CAA approval, the change sponsor will need to evidence the level of use of that agreement.

45. The change sponsor must collate the data requests below, analyse and submit a qualitative statement against each data request which supports the conclusion reached in each case.

[8] A review of any relevant data from the CAA's safety intelligence database will also be conducted.

46. The CAA will assess whether the LoA is being utilised and that it is working as expected.

		Required for the review?	Format of the data required.	Any information of relevance in support of the request.
a)	Evidence of usage of operational agreements between ANSPs and airspace users.	Yes☒ No☐	Narrative.	**Information relating to the application of the LoAs listed in the ACP.**
b)	Data concerning the activation/ utilisation of LoA procedures.	Yes☒ No☐	Narrative evidenced by supporting data (table format).	

Impact on environmental factors

47. Typically, change sponsors will undertake an updated assessment of the environmental impacts that were presented within the airspace change proposal. This updated assessment will be informed by actual flight behaviours following implementation and presented in a comparable format to that used for the change proposal. All assessments must be consistent with those presented in the consultation and the final submission to the CAA. When using data samples to represent periods of operation, sample periods after implementation must be comparable with any sample periods used before the change.

    Depending on the scaling level of the change, updated assessments may include:

    - Local air quality
    - Noise
    - Fuel and CO_2 emissions
    - Tranquillity
    - Biodiversity

    The change sponsor will have to either;

    a) Provide supporting evidence to confirm that the impacts presented in the approved airspace change proposal are as anticipated and the conclusions remain unchanged; or
    b) Undertake an updated assessment of the impacts presented in the airspace change proposal using actual data collected post-implementation.

48. Should the change sponsor be required to undertake an updated assessment and depending on the scaling level, the change sponsor must collate the data requests below, analyse and submit a qualitative statement against each data request which supports the conclusion reached in each case.

49. The CAA will review and assess the Change Sponsors' assessment and determine the extent to which the CAA agrees.

Safety and Airspace Regulation Group

		Required for the review?	Format of the data required.	Any information of relevance in support of the request.
Local Air Quality – required where: • there is a change in aviation emissions (by volume or location) below 1,000 feet; and • the location of the emissions is within or adjacent to an identified AQMA.				
a)	Ambient air quality limit concentrations (in µg.m-3).	Yes☐ No☒	Narrative describing impact on AQMA with supporting concentration data (table format).	
b)	TAG Local Air Quality workbook outputs.	Yes☐ No☒	Workbook outputs (table format).	
c)	TAG Air Quality Valuation Workbook outputs.	Yes☐ No☒	Workbook outputs (table format).	
d)	Description of prediction model and version number.	Yes☐ No☒	Narrative.	
e)	Supporting input data (for example movement logs).	Yes☐ No☒	Narrative evidenced by supporting data (table format).	
f)	Aircraft track data to confirm there are no changes below 1,000ft	Yes☒ No☐	Narrative.	
Noise – required where: • There is a change which alters lateral aircraft tracks or dispersion, or changes aircraft height, below 7,000 feet (above mean sea level) over an inhabited area (Level 1).				
g)	N60 (night-time) / N65 (daytime) contours.	Yes☒ No☐	Noise contour figures overlaid on Ordnance Survey maps (or similar).	As noted within the CAA's Annex E Environmental Assessment the TAG assessment reported impacts below the defined LOAEL used for Air Navigation purposes. The PIR assessment should use corrected workbooks for pre and post implementation. Assessments need to consider impacts at both Luton Airport (quantitative) and Stansted Airport (qualitative).
h)	Leq contours (down to 51 dB LAeq,16h / 45 dB LAeq,8h).	Yes☒ No☐	Noise contour figures overlaid on Ordnance Survey Maps (or similar).	
i)	Leq contour population counts (in thousands), area counts (in km2) and noise sensitive area counts.	Yes☒ No☐	Table format.	
j)	TAG Noise Workbook – Aviation outputs.	Yes☒ No☐	Workbook outputs (table format).	
k)	Operational diagrams (for example, radar track diagrams and track density diagrams).	Yes☒ No☐	Operational diagrams overlaid on Ordnance Survey maps (or similar).	
l)	Confirmation of CAA CAP 2091 noise modelling category.	Yes☒ No☐	Narrative.	
m)	Description of prediction model and version number.	Yes☒ No☐	Narrative.	

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n)	Description of modelling assumptions, for example modal split, route utilisation and respite.	Yes☒ No☐	Narrative evidenced by supporting data (table format).	
o)	Supporting input data (for example movement logs).	Yes☒ No☐	Narrative evidenced by supporting data (table format).	
Fuel and CO2 emissions:				
p)	Annual fuel and CO_2 usage (tCO2).	Yes☒ No☐	Table format.	Impacts for both Luton Airport and Stansted Airport should be reported.
q)	Per flight fuel and CO_2 usage (tCO2).	Yes☒ No☐	Table format.	
r)	TAG Greenhouse Gases Workbook outputs.	Yes☒ No☐	Workbook outputs (table format).	
s)	Supporting input data	Yes☒ No☐	Narrative evidenced by supporting data (table format).	
t)	Description of prediction model and version number.	Yes☒ No☐	Narrative.	
Tranquillity:				
u)	Operational diagrams clearly identifying AONBs, National Parks, designated quiet areas and any noise sensitive areas identified during Stage 1 (1B Design Principles).	Yes☒ No☐	Narrative and Operational diagrams overlaid on Ordnance Survey maps (or similar).	
Biodiversity:				
v)	Assessment of biodiversity factors including any identified during Stage 1 (Step 1B Design Principles).	Yes☒ No☐	Narrative.	

Impact on International obligations

50. The change sponsor will need to demonstrate that any international obligations identified at the time of the change have been discharged.

51. The change sponsor must collate the data requests below, analyse and submit a qualitative statement against each data request which supports the conclusion reached in each case.

52. The CAA assesses whether the obligations have been met.

	Required for the review?	Format of the data required.	Any information of relevance in support of the request.

a)	Details on any feedback from operators or neighbouring States.	Yes☐ No☒	Narrative.	

Impact on Ministry of Defence operations

53. The change sponsor will need to demonstrate that there has been no unforeseen impact on Ministry of Defence operations.

54. The change sponsor must collate the data requests below, analyse and submit a qualitative statement against each data request which supports the conclusion reached in each case.

55. The CAA assesses whether there has been any unforeseen impact on the Ministry of Defence that would need rectifying.

		Required for the review?	Format of the data required.	Any information of relevance in support of the request.
a)	Details on any feedback from Ministry of Defence.	Yes☒ No☐	Narrative.	**Should be provided under the LoA feedback from 78 Sqn Swanwick Mil and USAFE**

Stakeholder feedback

56. Feedback is needed to identify any issues from a community perspective that were not anticipated a part of the approved change; monthly data over the course of a year is needed so that seasonal traffic changes are taken into account.

57. The change sponsor must collate the data requests below, analyse and submit a qualitative statement against each data request which supports the conclusion reached in each case.

58. A review is made by the CAA of the change sponsors conclusions in identifying any unforeseen or unintended impacts of the change.

		Required for the review?	Format of the data required.	Any information of relevance in support of the request.
a)	Feedback/complaints received by the change sponsor and CAA in the period between implementation and post-implementation review from all relevant stakeholders.	Yes☒ No☐	Narrative evidenced by supporting data (table format).	**(Anonymised as required).**
b)	Details of location of complaints(Under the ZAGZO Hold and between 7000-5000ft in clusters of >10 respondents).	Yes☒ No☐	Ordinance Survey map identifying pinned locations.	

Other information of relevance (if appropriate)

Safety and Airspace Regulation Group

		Required for the review?	Format of the data required.	Any information of relevance in support of the request.
a)	The same 121-day period as used in the supplement data set, to show how many aircraft utilising the 8 impacted EGSS SIDs are making the new vertical restrictions at the Gates, plus relevant dispersion plots to show now unexpected lateral deviations	Yes☒ No☐	**Same format as the supplement (v1.4) provided, so that a direct comparison can be made.**	
b)	How often have the new holds been used; ZAGZO, WOBUN and MUCTI.	Yes☒ No☐	**Time periods that the holds have been used and the total number of EGGW arrivals that completed at least 1 hold.**	
c)	Evidence to show that the claimed increase of c.30% resilience (see Final Options Appraisal) is met.	Yes☒ No☐	**Narrative and redacted raw data.**	
d)	Feed-back received from other airspace users impacted by the changes.	Yes☒ No☐	**Narrative and redacted raw data.**	
e)	Human Performance Monitoring information on controller performance.	Yes☒ No☐	**Narrative and redacted raw data.**	

Airspace Regulation Project Officer
Signed: [redacted]
Name: [redacted] (Technical Regulator)
Date: 21/02/2022

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19. Glossary

Airspace Modernisation Strategy AMS	UK Government has tasked the aviation industry to modernise airspace in the whole of the UK. The long-term strategy of the CAA and the UK Government is called the Airspace Modernisation Strategy (AMS). The AMS identifies fifteen initiatives to modernise airspace. Its CAA document reference number is CAP1711.
Altitude	The distance measured in feet, above mean sea level. Due to variations in terrain, air traffic control measures altitude as above mean sea level rather than above the ground. If you are interested in the height of aircraft above a particular location to assess potential noise impact, then local elevation should be taken into account when considering aircraft heights; for example an aircraft at 6,000ft above mean sea level would be 5,500ft above ground level if the ground elevation is 500ft.
AMSL	Above Mean Sea Level, see Altitude.
AONB	Area of Outstanding Natural Beauty (renamed National Landscapes)
ATC	Air traffic control
ATC intervention	This is when ATC instruct aircraft off their planned route, for example, in order to provide a shortcut, they may be instructed to fly directly to a point rather than following the path of the published route
CAA	Civil Aviation Authority, the UK Regulator for aviation matters
CAP1616	Civil Aviation Publication 1616, the airspace change process regulated by the CAA
Capacity	A term used to describe how many aircraft can be accommodated within an airspace area without compromising safety or generating excessive delay
CAS	See Controlled Airspace
Centreline	The nominal track for a published route (see Route)
CO_2, CO_2e	Carbon dioxide, and carbon dioxide equivalent – the latter is a representative of all greenhouse gas emissions.
Concentration	Refers to a density of aircraft flight paths over a given location; generally refers to high density where tracks are not spread out; this is the opposite of Dispersal
Continuous descent	A climb or descent that is constant, without long periods of level flight
Controlled airspace (CAS)	Generic term for the airspace in which an air traffic control service is provided as standard; note that there are different sub classifications of airspace that define the particular air traffic services available in defined classes of controlled airspace. Abbreviated to CAS.
Conventional navigation	The historic navigation standard where aircraft fly with reference to ground based radio navigation aids
Conventional routes	Routes defined to the conventional navigation standard, i.e. using ground based radio navigation beacons to determine their position.
Dispersal	Refers to the density of aircraft flight paths over a given location; generally refers to lower density – tracks that are spread out; this is the opposite of Concentration
Easterly operation	When a runway is operating such that aircraft are taking off and landing in an easterly direction
Final approach path	The final part of a flightpath that is directly lined up with the runway.

Flightpath	The track flown by aircraft when following a route, or when being directed by air traffic control (see also Vector)
ft, feet	The standard measure for vertical distances used in air traffic control
Future Airspace Implementation Strategy South (FASI-S)	Under the Government's Airspace Modernisation Strategy airports in the southern UK are required to update their airspace and routes in a coordinated way. LLA is a part of FASI-S and accordingly has a separate longer term airspace change proposal.
General Aviation (GA)	All civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire. The most common type of GA activity is recreational flying by private light aircraft and gliders, but it can range from paragliders and parachutists to microlights, balloons and private corporate jet flights.
Holds/Holding Stacks	An airspace structure where aircraft circle in a racetrack-shaped pattern above one another at 1,000ft intervals when queuing to land. A way of absorbing delays and smoothing out the arrival flow.
LLA	London Luton Airport, a general reference to the airport itself
LLAOL	London Luton Airport Operations Ltd, the operators who run the airport, a separate company from Luton Rising (previously known as LLAL).
Lower airspace	Airspace in the general vicinity of the airport containing arrival and departure routes below 7-8,000ft. Airports have the primary accountability for the design of this airspace, as its design and operation is largely dictated by local noise requirements, airport capacity and efficiency
Luton Rising	The owners of the airport, a separate company from LLAOL. Luton Rising was previously known as London Luton Airport Ltd, or LLAL.
NATS: NATS NERL and NATS NSL	NATS NERL - The UK's licenced air traffic service provider for the en route airspace that connects our airports with each other, and with the airspace of neighbouring states. NATS NSL - the air navigation service provider at LLA, under commercial contract for the aerodrome control provision and via the London Licence for the approach control function.
Nautical Mile	Aviation measures distances in nautical miles. One nautical mile (nm) is 1,852 metres. One road mile ('statute mile') is 1,609 metres, making a nautical mile about 15% longer than a statute mile.
Network airspace	En route airspace above 7,000ft in which NATS has accountability for safe and efficient air traffic services for aircraft travelling between the UK airports and the airspace of neighbouring states
PBN	See Performance Based Navigation
Performance Based Navigation (PBN)	Referred to as PBN; a generic term for modern standards for aircraft navigation capabilities including satellite navigation (as opposed to 'conventional' navigation standards).
Post-implementation review PIR	The final stage of the airspace change process. The CAA reviews how the airspace change has performed, including whether anticipated impacts and benefits in the original proposal and decision have been delivered, typically started after a full year of operation of the new airspace.

Radar, radar blip, radar target, radar return	Generic terms covering how ATC 'sees' the air traffic in the vicinity. One type of radar (Primary) sends out radio pulses that are reflected back to the receiver (the 'return'), defining the target's position accurately and displaying a marker on the controller's screen ('blip' or 'target'). The other type of radar (Secondary, often attached to the Primary and rotating at the same speed) sends out a request for information and receives coded numbers by return (see Transponder). These numbers are decoded and displayed on top of the Primary return, showing an accurate target with callsign identity and altitude.
RFL	Requested Flight Level. This is the term used for the flight level that the aircraft is formally requesting, when it files a flightplan.
RNAV	Short for aRea NAVigation. This is a generic term for a particular specification of Performance Based Navigation
RNAV1	See RNAV. The suffix '1' denotes a requirement that aircraft can navigate to with 1nm of the centreline of the route 95% or more of the time. In practice the accuracy is much greater than this.
RNP1+RF	Required Navigation Performance 1. An advanced navigation specification under the PBN umbrella. The suffix '1' denotes a requirement that aircraft can navigate to with 1nm of the centreline 95% or more of the time, with additional self-monitoring criteria. In practice the accuracy is much greater than this. The RF means Radius to Fix, where airspace designers can set extremely specific curved paths to a greater accuracy than RNAV1.
Route	Published routes that aircraft plan to follow. These have a nominal centreline that give an indication of where aircraft on the route would be expected to fly; however, aircraft will fly routes and route segments with varying degrees of accuracy based on a range of operational factors such as the weather, ATC intervention, and technical factors such as the PBN specification. RNAV1 routes and RNP1 routes are flown accurately.
Route system or route structure	The network of routes linking airports to one another and to the airspace of neighbouring states.
Separation	Aircraft under Air Traffic Control are kept apart by standard separation distances, as agreed by international safety standards. Participating aircraft are kept apart by at least 3nm or 5nm lateral separation (depending on the air traffic control operation), or 1,000ft vertical separation.
Sequence	The order of arrivals in a queue of airborne aircraft waiting to land
SID	See Standard Instrument Departure
Standard Arrival Route (STAR)	The published routes for arriving traffic. In today's system these bring aircraft from the route network to the holds (some distance from the airport at high levels), from where they follow ATC instructions (see Vector) rather than a published route. Under PBN it is possible to connect the STAR to the runway via a Transition.
Standard Instrument Departure SID	Usually abbreviated to SID; this is a route for departures to follow straight after take-off
STAR	See Standard Arrival Route
Statute mile	A standard mile as used in normal day to day situations (e.g. road signs) but not for air traffic where nautical miles are used
Stepped descent	A descent that is interrupted by periods of level flight required to keep the aircraft separated from another route in the airspace below

Systemisation	The process of reducing the need for human intervention in the air traffic control system, primarily by utilising improved navigation capabilities to develop a network of routes that are safely separated from one another so that aircraft are guaranteed to be kept apart without the need for air traffic control to intervene so often
Tactical methods	Air traffic control methods that involve controllers directing aircraft for specific reasons at that particular moment (see Vector)
Terminal airspace, including Terminal Manoeuvring Area (TMA)	An aviation term to describe a designated area of controlled airspace surrounding a major airport or cluster of airports where there is a high volume of traffic; a large part of the airspace above London and the South East is defined as terminal airspace (or Terminal Manoeuvring Area – TMA). This is the airspace that contains all the arrival and departure routes for London Heathrow, London Gatwick, London Stansted, LLA and London City from around 2,000ft-3,000ft up to approximately 20,000ft.
Tonne, t	Metric Tonne (1,000kg), coincidentally almost identical to a British Imperial ton (2,240lbs, 1,016kg)
Transition	The part of a PBN arrival route, defined to either RNAV1 or RNP1 standard, between the last part of the hold and the final approach path to the runway. Typically followed accurately in three dimensions by an aircraft's flight management system (autopilot).
Transponder	An electronic device on board aircraft which sends out coded information which is picked up by radar and other systems. Most importantly the aircraft altitude, and identity code, by which the aircraft can be identified on the radar screen.
Uncontrolled Airspace	Generic term for the airspace in which no air traffic control service is provided as standard, also known as Class G
Unknown traffic	Aircraft not participating in ATC services. They may show on radar with altitude information (if they are operating with a Transponder) or in the worst case they will only show as a blip on the radar screen (a radar primary return) with no other information.
Vector, Vectoring, Vectored	An air traffic control method that involves directing aircraft off the established route structure or off their own navigation – ATC instruct the pilot to fly on a compass heading and at a specific altitude. In a busy tactical environment, these can change quickly. This is done for safety and for efficiency.
Westerly operation	When a runway is operating such that aircraft are taking off and landing in a westerly direction

End of PIR Main Document