Changes to

London Luton Airport Arrivals

CAP1616 Stage 7 Post-Implementation Review

Annex C: Stansted SID Climb Evidence

Photo © Graham Custance

Roles

Action	Role	Date
Produced	**Airspace Change Expert** NATS Airspace and Future Operations	11/07/2024
Reviewed Approved	**ATC Lead** NATS Swanwick Development	11/07/2024
Reviewed Approved	**Head of Airspace Development** NATS Swanwick Development	11/07/2024
Reviewed Approved	**ATC Requirements & Acceptance Manager** NATS Swanwick Operations	11/07/2024
Reviewed Approved	**Senior Manager Public Policy and Community Engagement** NATS Corporate Communications	11/07/2024

Drafting and Publication History

Issue	Month/Year	Changes this issue
Issue 1.0	11/07/2024	Published

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

Contents

1. About this document: PIR item Other-a.

1.1 Introduction

1.1.1 This document is part of the NATS-London Luton Airport (LLA) co-sponsored airspace change proposal post-implementation review (ACP PIR). It should be read in conjunction with the PIR Main Document which provides the structure, the majority of the evidence, and details the regulatory requirements for the PIR.

1.1.2 This document provides the evidence demonstrating that the technical changes to eight Stansted departure routes (SIDs) were effective. These technical changes allowed for two volumes of controlled airspace CAS to be reduced or removed, giving greater flexibility to General Aviation (GA) flights and reducing the likelihood of infringements (see Master PIR document Section 7.3 which describes the CAS removal as having made a significant improvement to the number of infringements in that region).

1.1.3 The CAA's specific requirement for PIR Item Other-a reads:

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 any unexpected lateral deviations. Same format as the supplement (v1.4) provided, so that a direct comparison can be made.

1.1.4 Stansted SID climb performance analysis data period was originally agreed to be 1st June to 30th September 2023, the equivalent 121-day period used for the original proposal. However, there was a period of disruption from 28th to 31st August 2023 due to an air traffic control system failure. The CAA agreed that the period of disruption should be removed from this dataset because it would not be representative of the typical air traffic operation.

1.1.5 The data analysed is 117 days:
01 Jun 2023…27 Aug 2023…[disruption excluded]…1 Sep 2023…30 Sep 2023.

1.1.6 Images in this document were created using radar data for Stansted departures up to 7,000ft (FL70) for the period 01-27 August 2023 inclusive; these illustrate the evidence but do not show the complete 117-day dataset. This is consistent with the original supplementary document published as part of the proposal on the CAA's airspace change portal, downloadable at this link; the original study used 01-31 August 2019 data to representatively illustrate the full 121-day dataset.

1.1.7 The methodology is the same as the methodology described in that supplement; it is not repeated here, see the original document for details.

1.1.8 Note that the colours and transparencies in the post-change diagrams could not be reproduced perfectly due to certain radar analysis tool limitations, please take this into account when comparing the pre-change radar track diagrams with the post-change equivalents.

2. Evidence

2.1 Gate analysis of radar data

2.1.1 The original study identified radar data of flights eligible for inclusion in the study, i.e. Stansted departures mainly using Clacton CLN and Detling DET SIDs, with a small number using Lambourne LAM SIDs.

2.1.2 The equivalent study was repeated using the same methodology[1] for the PIR period (paragraphs 1.1.5-1.1.6 above).

2.1.3 Radar data was analysed as it passed through the same gates[2], its vertical reference was adjusted using the local pressure setting, and those altitudes were compared against the gate criteria (to determine if it was 400ft[3] or more above the altitude restriction, or not).

2.1.4 In the original data sample for 121 days in 2019 there were 19,543 eligible Stansted departures for analysis.

2.1.5 In the PIR data sample over 117 days in 2023 there were 19,739, making the two data samples very similar in size.

[1] There was a format change in the radar data recording system (pre-change using the NODE format, post-change using the ARTAS format). This is simply a different way of recording radar data, and does not affect the study itself.
[2] One of the gates, Gate 6, was used to determine the eligibility of flights through another gate and was not designed to provide an output.
[3] In ATC terms, an aircraft's altitude must show on radar as being 400ft or more above an altitude, for a controller to consider the aircraft as having 'passed' that altitude. This is the same methodology used in the original study. For example, to confirm an aircraft met a 4,000ft altitude restriction, the radar would need to indicate 4,400ft or more (4,400+ in the data tables below). If it did not, then it would fall into the bracket of 4,300 or below (4,300– in the data tables below).

2.1.6 See Figure 1 for an overview of the pre-change and post-change radar data illustrations:

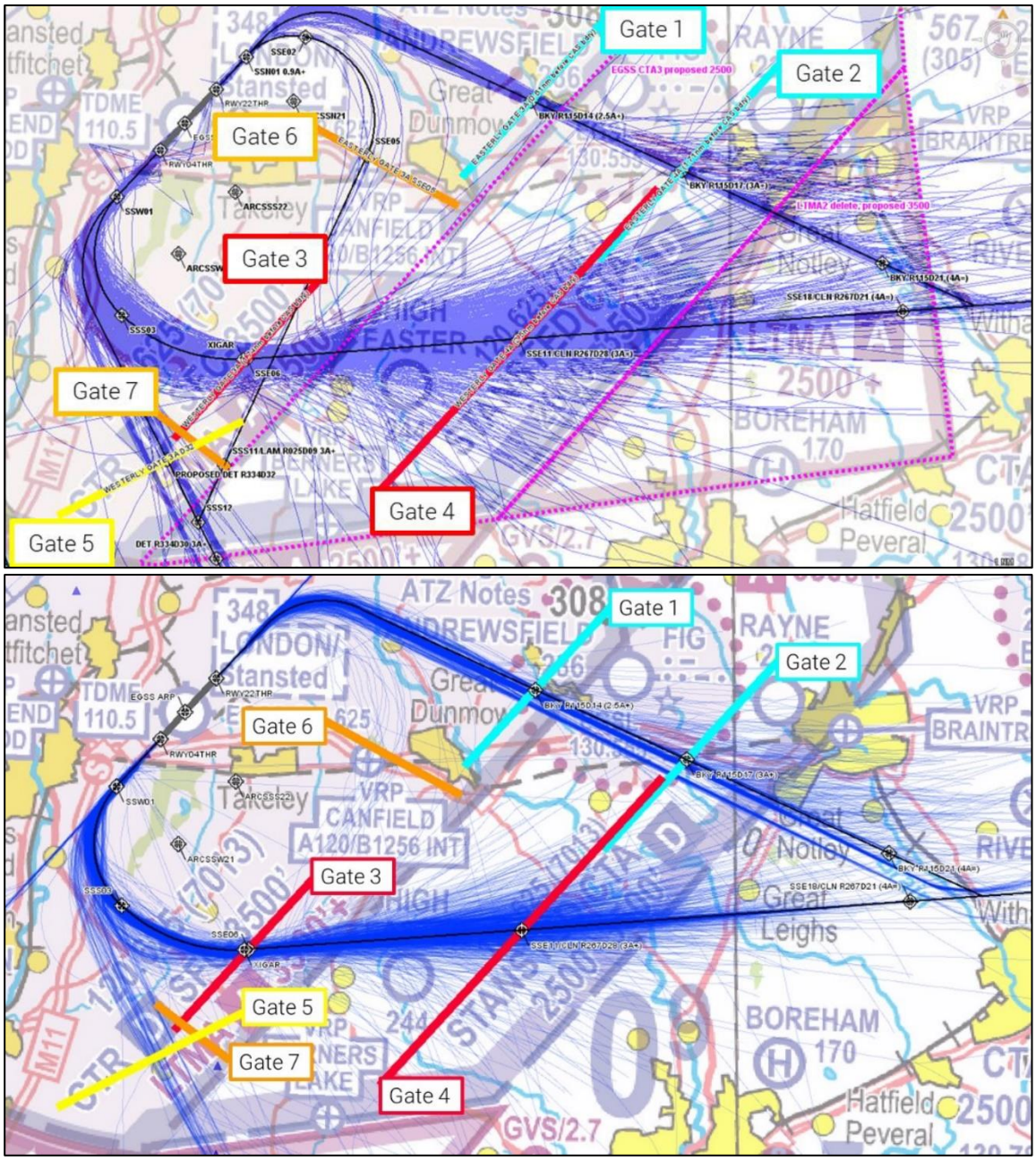


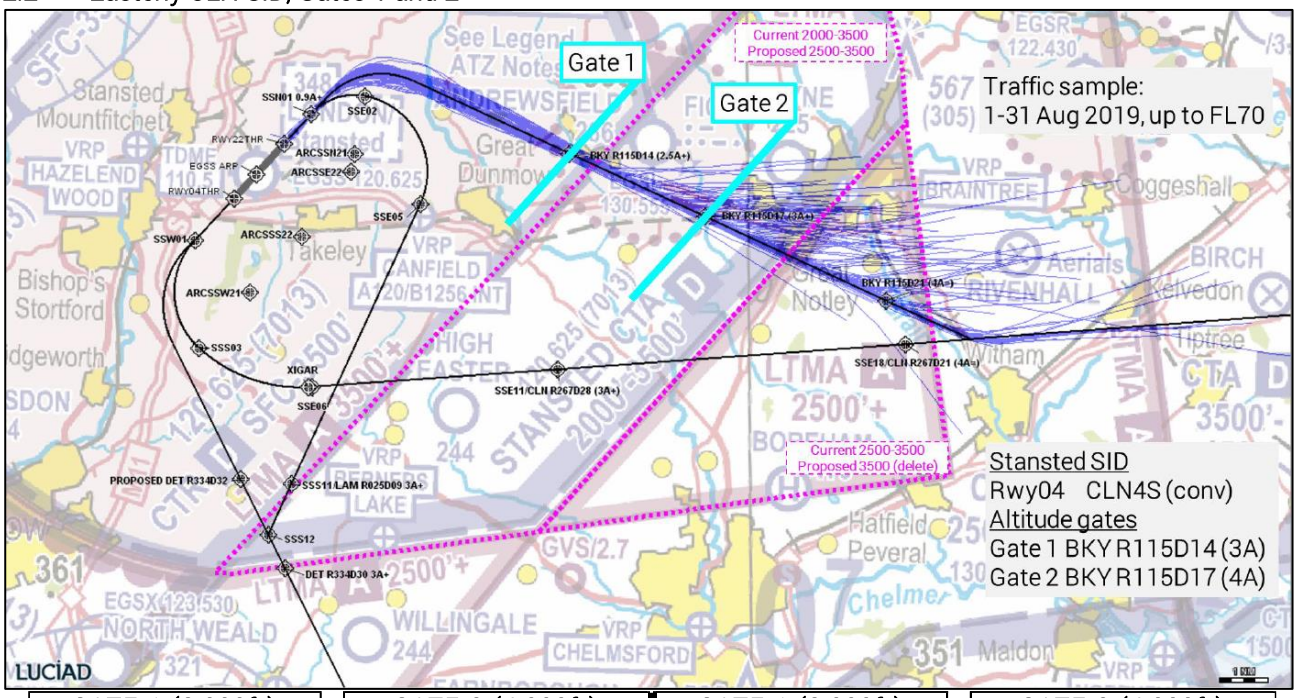
Figure 1 Analysis gates, and overview of radar track data 1-31 Aug 2019 (top) 1-27 Aug 2023 (above)

2.1.7 Comparing the track illustrations and allowing for differences in the radar analysis tool display settings, the two pictures are comparable, i.e. there is a similar dispersion with some concentration around the main SID lines, and there are similar proportions using each SID.

2.1.8 In the following subsections, each route will be illustrated and compared.

2.1.9 Note that the SID version numbers changed as part of the ACP in order to add the altitude restrictions required by the original study document, e.g. CLN4S is now CLN5S. The latter are equivalent to the former for this analysis.

2.2 Easterly CLN SID, Gates 1 and 2



GATE 1 (3,000ft)		
	%	Flights
3,300-	0.90%	42
3,400+	99.10%	4,779
TOTAL	100.00%	4,821

GATE 2 (4,000ft)		
	%	Flights
4,300-	5.60%	268
4,400+	94.40%	4,523
TOTAL	100.00%	4,791

GATE 1 (3,000ft)		
	%	Flights
3300-	1.48%	86
3400+	98.52%	5,715
TOTAL	100.00%	5,801

GATE 2 (4,000ft)		
	%	Flights
4300-	5.29%	343
4400+	94.71%	6,140
TOTAL	100.00%	6,483

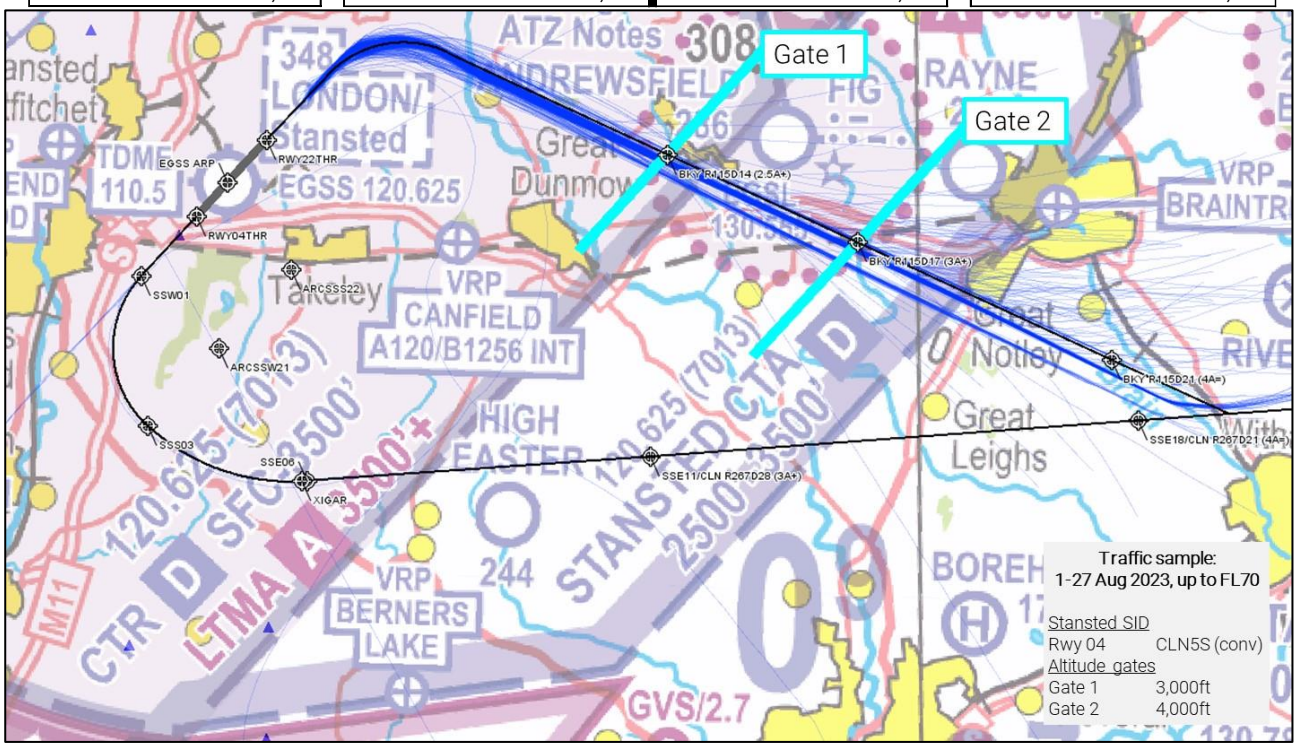
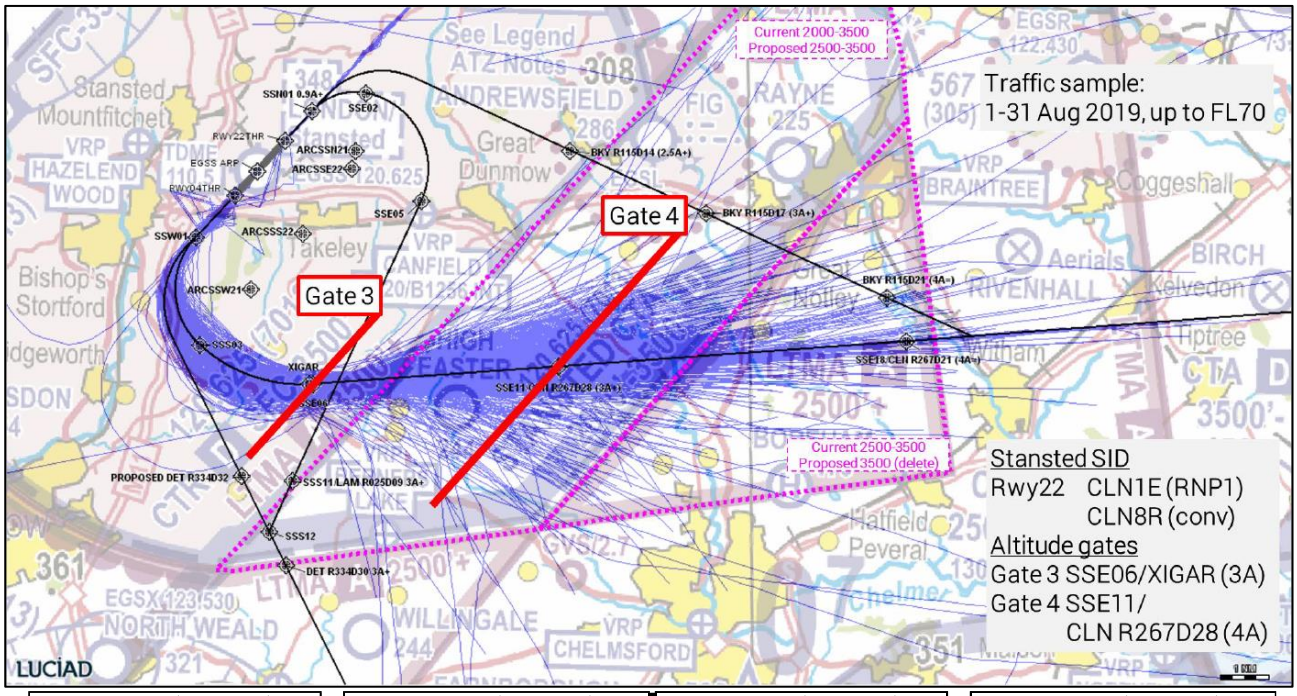


Figure 2 Easterly CLN SID comparison pre-change (top), post-change (above)

2.2.1 The flight dispersions shown in the two diagrams are comparable; most follow the main track, several disperse to the left (east) while following the main track, occasional flights turn right (southeast). It is slightly more difficult to see some of the blue whiskers in the latter diagram. The slight differences in the central track of the post-change SID are most likely due to a combination of magnetic drift (the earth's molten-iron core moves slowly over time, the world's magnetic field moves also) and minor coding differences in different airlines' flight management computers; they are unrelated to the airspace change. There are no unexpected lateral deviations. The proportions of flights meeting or exceeding the gate altitude plus 400ft are effectively the same pre and post-change.

2.3 Westerly CLN SIDs, Gates 3 and 4



GATE 3 (3,000ft)		
	%	Flights
3,300-	3.80%	533
3,400+	96.20%	13,537
TOTAL	100.00%	14,070

GATE 4 (4,000ft)		
	%	Flights
4,300-	1.80%	260
4,400+	98.20%	13,839
TOTAL	100.00%	14,099

GATE 3 (3,000ft)		
	%	Flights
3300-	3.60%	486
3400+	96.40%	13,020
TOTAL	100.00%	13,506

GATE 4 (4,000ft)		
	%	Flights
4300-	1.20%	161
4400+	98.80%	13,285
TOTAL	100.00%	13,446

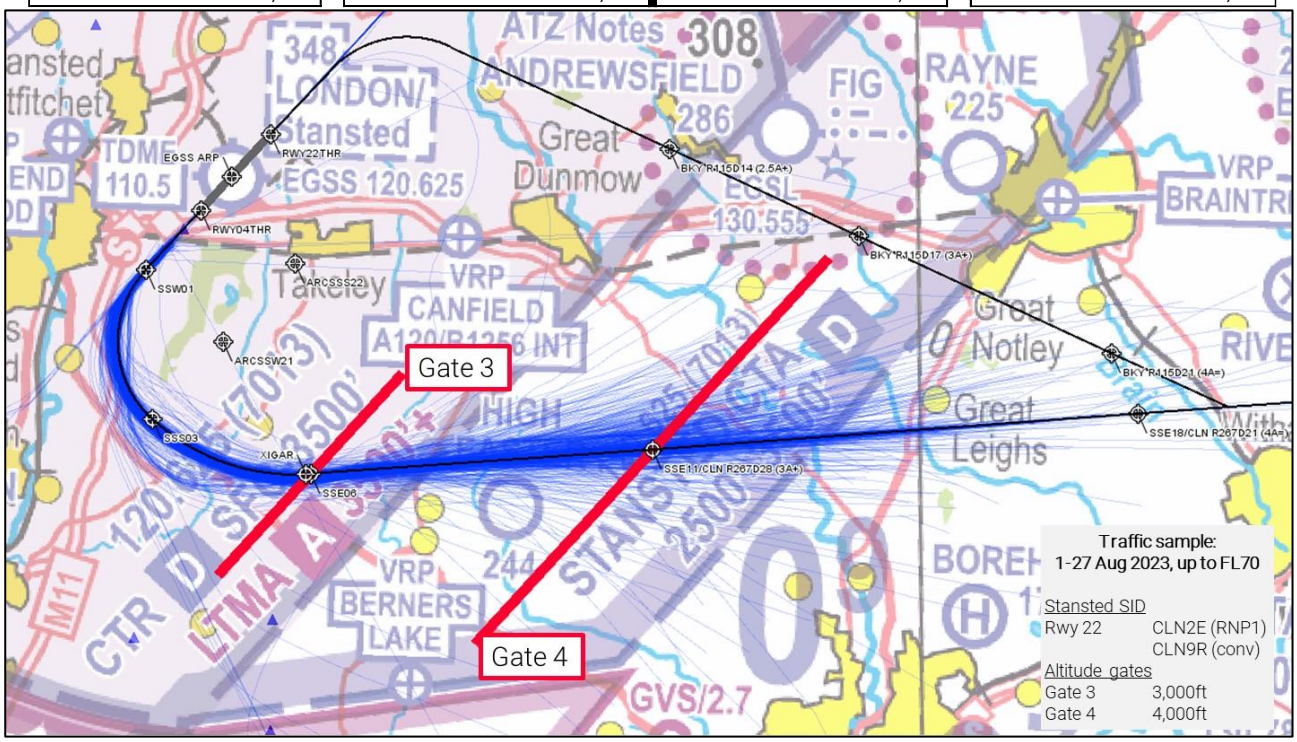
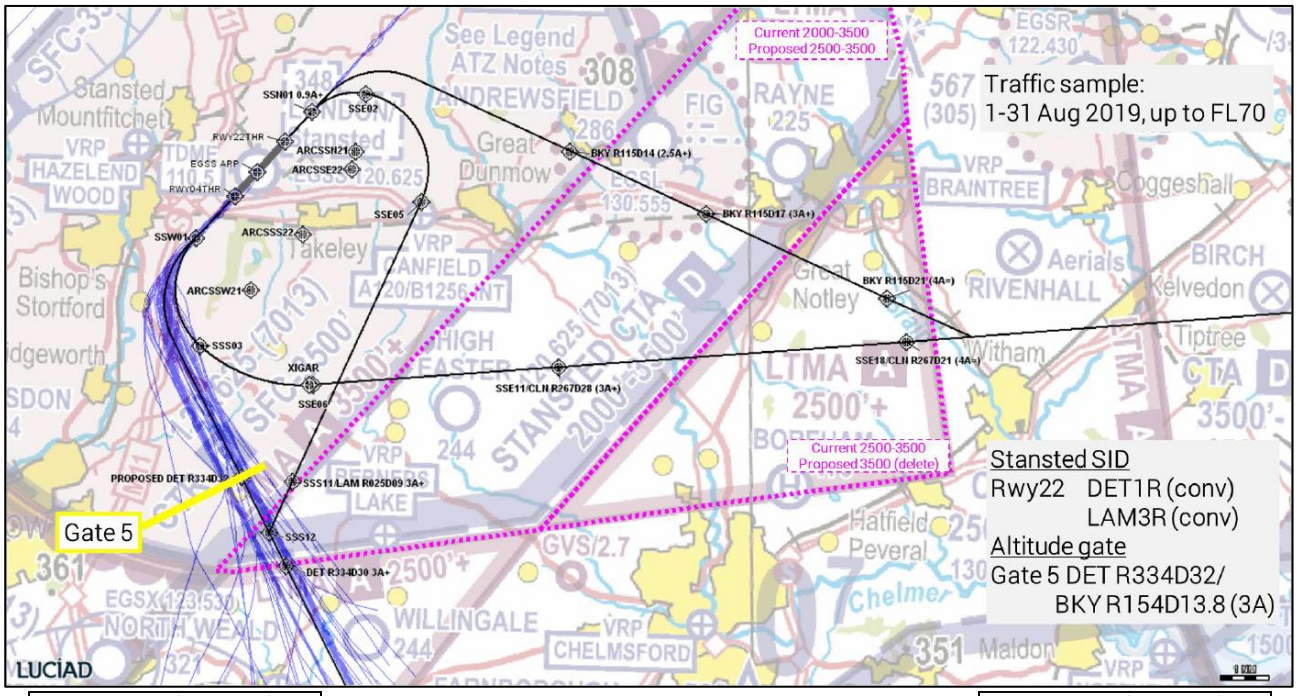


Figure 3 Westerly CLN SIDs comparison pre-change (top), post-change (above)

2.3.1 The flight dispersions shown in the two diagrams are comparable; most follow the main track with some dispersion either side. After completing the left turn through Gate 3 there is an increase in dispersion, a slight fanning out of flights either side of the main track, for both diagrams. It is slightly more difficult to see some of the blue whiskers in the latter diagram. There are no unexpected lateral deviations.

2.3.2 The proportions of flights meeting or exceeding the gate altitude plus 400ft are effectively the same pre- and post-change.

2.4 Westerly DET and LAM SIDs, Gate 5



GATE 5 (3,000ft)		
	%	Flights
3,300-	0.00%	-
3,400+	100.00%	462
TOTAL	100.00%	462

GATE 5 (3,000ft)		
	%	Flights
3300-	0.22%	1
3400+	99.78%	462
TOTAL	100.00%	463

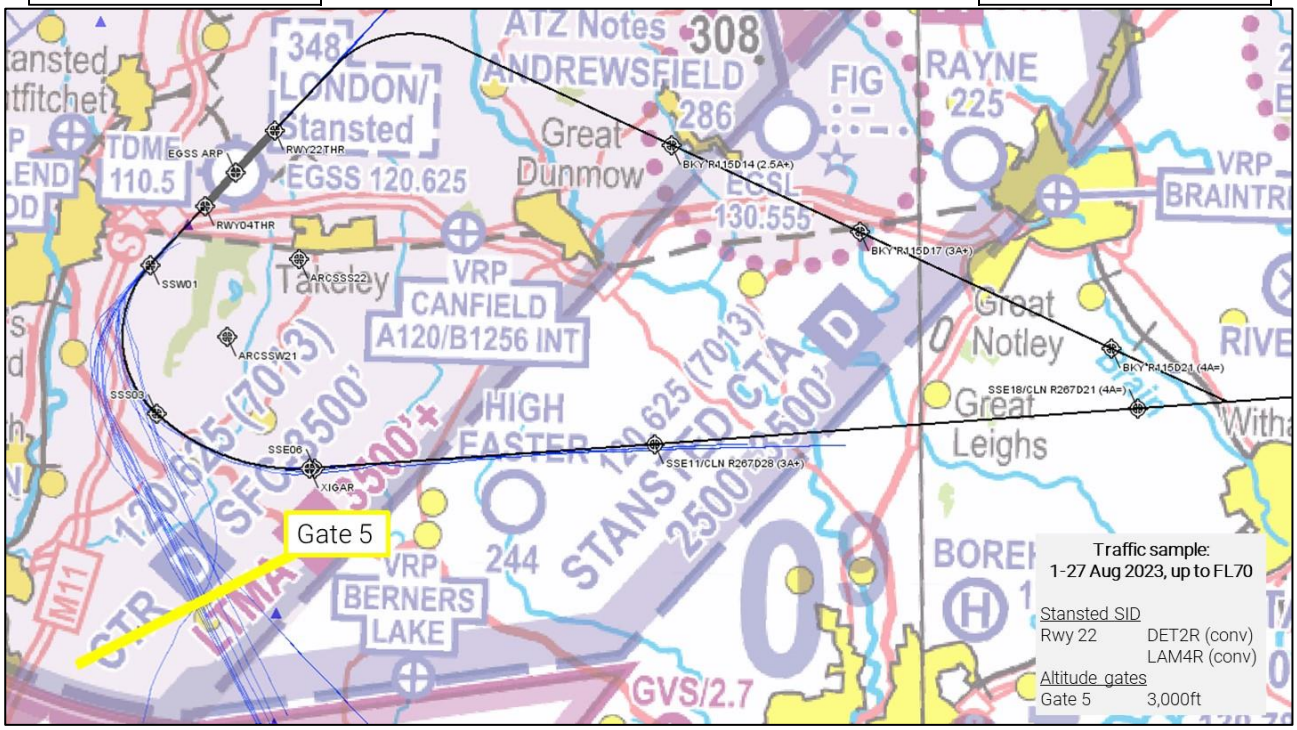


Figure 4 Westerly DET and LAM SIDs comparison pre-change (top), post-change (above)

2.4.1 These SIDs are infrequently used. The flight dispersions shown in the two diagrams are still generally comparable; most follow the main track with some dispersion either side. There are no unexpected lateral deviations.

2.4.2 The proportions of flights meeting or exceeding the gate altitude plus 400ft are effectively the same pre- and post-change.

2.5 Easterly DET and LAM SIDs, Gate 7

Note: Gate 6 was used to determine the eligibility of flights through another gate and was not designed to provide an output, which is why the data jumps from Gate 5 to Gate 7.

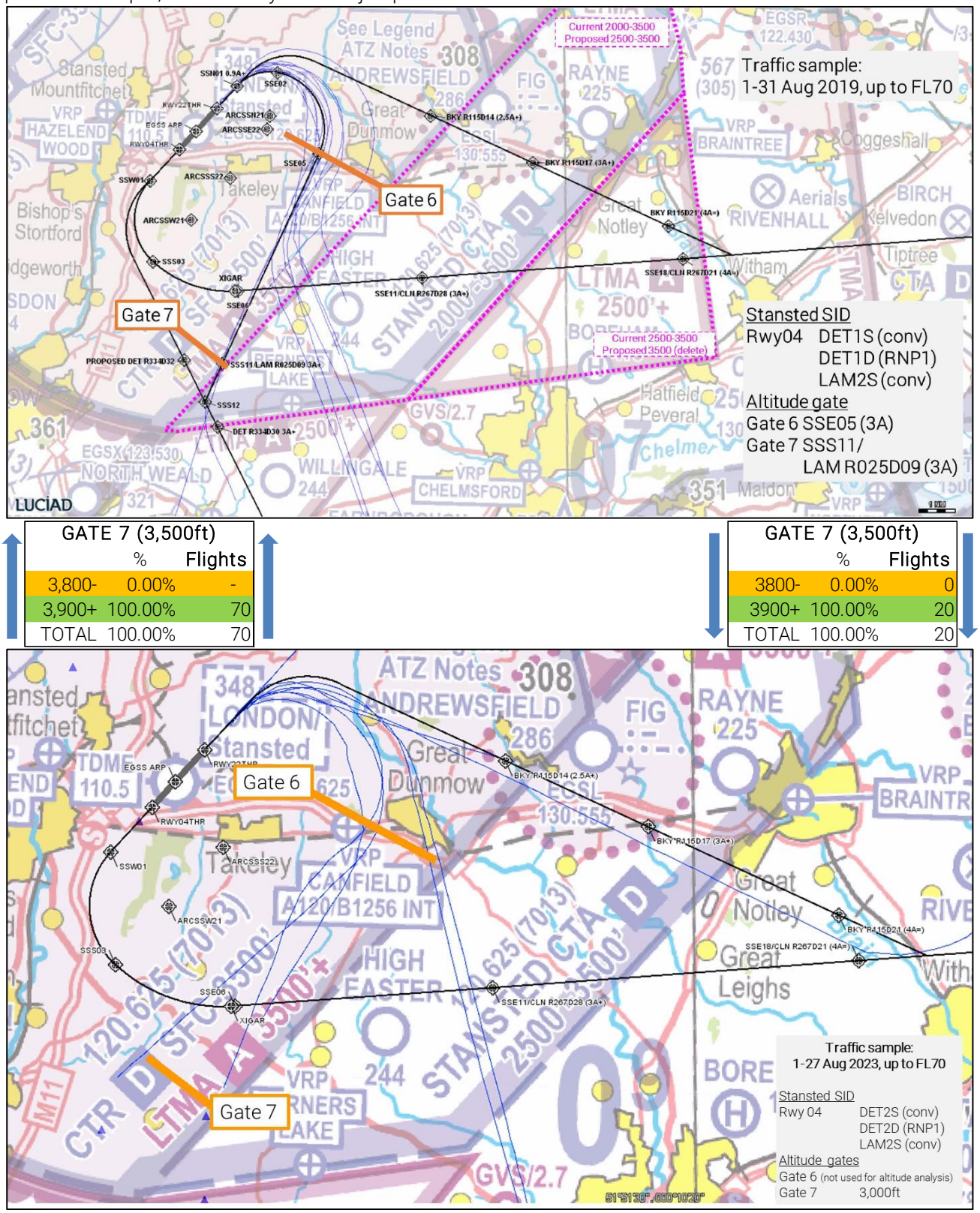


Figure 5 Westerly DET and LAM SIDs comparison pre-change (top), post-change (above)

2.5.1 These SIDs are very rarely used. The data in this radar sample does not indicate unexpected lateral deviations. Three flights exceeded FL70 in the vicinity of Gate 7 (the lines end at that level), two were given a shortcut to the south similar to several flights in the upper diagram, and there were two CLN-SID flights that are unintentionally displayed heading east.

2.5.2 All of the (very few) eligible flights met or exceeded the gate altitude plus 400ft pre and post-change.

3. Results summary and conclusion

3.1 Gate analysis and comparison data

3.1.1 Over these periods, the number of departures meeting or exceeding the gate altitude plus 400ft are extremely similar[4].

GATE 1 (3,000ft)		
	%	Flights
3,300-	0.90%	42
3,400+	99.10%	4,779
TOTAL	100.00%	4,821

GATE 2 (4,000ft)		
	%	Flights
4,300-	5.60%	268
4,400+	94.40%	4,523
TOTAL	100.00%	4,791

GATE 1 (3,000ft)		
	%	Flights
3300-	1.48%	86
3400+	98.52%	5,715
TOTAL	100.00%	5,801

GATE 2 (4,000ft)		
	%	Flights
4300-	5.29%	343
4400+	94.71%	6,140
TOTAL	100.00%	6,483

GATE 3 (3,000ft)		
	%	Flights
3,300-	3.80%	533
3,400+	96.20%	13,537
TOTAL	100.00%	14,070

GATE 4 (4,000ft)		
	%	Flights
4,300-	1.80%	260
4,400+	98.20%	13,839
TOTAL	100.00%	14,099

GATE 3 (3,000ft)		
	%	Flights
3300-	3.60%	486
3400+	96.40%	13,020
TOTAL	100.00%	13,506

GATE 4 (4,000ft)		
	%	Flights
4300-	1.20%	161
4400+	98.80%	13,285
TOTAL	100.00%	13,446

GATE 5 (3,000ft)		
	%	Flights
3,300-	0.00%	-
3,400+	100.00%	462
TOTAL	100.00%	462

GATE 7 (3,500ft)		
	%	Flights
3,800-	0.00%	-
3,900+	100.00%	70
TOTAL	100.00%	70

GATE 5 (3,000ft)		
	%	Flights
3300-	0.22%	1
3400+	99.78%	462
TOTAL	100.00%	463

GATE 7 (3,500ft)		
	%	Flights
3800-	0.00%	0
3900+	100.00%	20
TOTAL	100.00%	20

Table 1 Results summary of gate analysis (L) for pre-change, (R) for post-change

3.2 Conclusion

3.2.1 Pre-change, the proportions meeting or exceeding the vertical restrictions by 400ft or more was greater than 94% in all cases. The busiest SIDs had a >96% meet/exceed rate.

3.2.2 Post-change there were negligible differences in proportions.

3.2.3 No unexpected lateral deviations occurred.

3.2.4 The eight Stansted SIDs relevant to this airspace change have not caused any unexpected impacts, operations continue as normal.

End of Annex C: Stansted SID Climb Evidence

[4] As per original methodology, Gate 6 was not used for altitude analysis, it was used to determine which tracks should be allocated to which gate for subsequent altitude analysis, i.e. ruling in or ruling out specific flights.