Proposed changes to

London Luton Airport Arrivals

SAIP AD6 Supplement:

Stansted Airport SID climb performance evidence supporting technical changes to altitude restrictions enabling the raising of CAS base levels

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Roles

Action	Role	Date
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Issue 1.0	25/10/2021	Published to CAA Portal
Issue 1.1	05/11/2021	Updated following CAA clarification requests Published to CAA Portal (see Portal document Clarifications Q&A Additional 4 for details)
Issue 1.2	09/11/2021	Updated following further CAA clarification requests Published to CAA Portal (see Portal document Clarifications Q&A Additional 5 for details)
Issue 1.3	11/11/2021	Updated following further CAA clarification requests Published to CAA Portal (see Portal document Clarifications Q&A Additional 7 for details)
Issue 1.4	17/11/2021	Analysis updated and data transparency clarification. Previous issues of this supplement used the analysis of flight data points to illustrate the proportions of flights that would meet, and those that may not meet, proposed climb restrictions without changing engine power settings. This issue simplifies the output data by removing the complexity of the differences between 'flight data points' and 'number of flights', while retaining the relative proportions. We also improved the data extraction method and removed redundant gate data. The phrase 'flight data points' was included in the previous issue, but the difference from 'number of flights' was not explicit and could cause confusion. See Section 11 Annex on p.34 for more details on the analysis data. Published to CAA Portal (See Portal document Clarifications Q&A Additional 8 for details)

Contents

1. Introduction – SAIP AD6 Controlled Airspace Southeast of Stansted

1.1 The SAIP AD6 Airspace Change Proposal (ACP) consulted on the reduction of low-altitude controlled airspace (CAS) to the southeast of Stansted, for the benefit of other airspace users known as General Aviation (GA), given that the ACP requires additional CAS albeit at much higher flight levels.

1.2 The release of CAS was agreed with Stansted Airport, and we confirmed that there would be no impact on aircraft flying the standard instrument departure (SID) routes through these volumes.

1.3 The ACP was formally submitted with the following proposed technical amendments to CAS:

1.3.1 Stansted CTA3, raise CAS base by 500ft to 2,500ft, to the same altitude as the southern-adjacent CAS volume known as LTMA1.

1.3.2 Delete the triangular volume known as LTMA2, SE of Stansted.

1.3.3 LTMA3, expand to infill the 'gap' left by the removal of LTMA2, making a single CAS base of 3,500ft with no unnecessary lines on aeronautical charts.

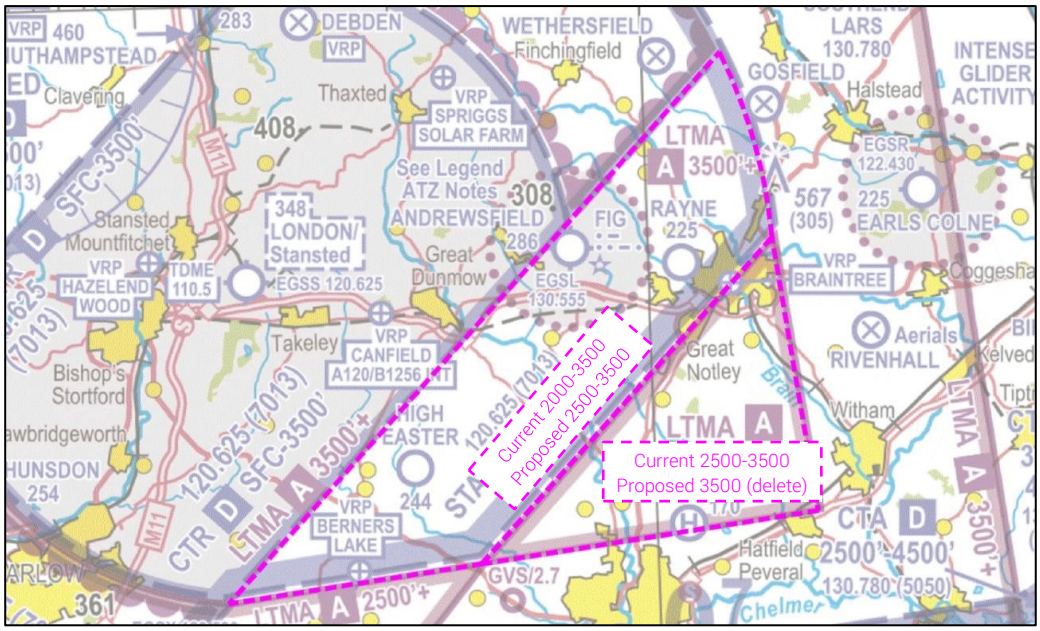

Figure 1 Controlled Airspace (CAS) arrangements SE of Stansted: Current and Proposed

2. Controlled Airspace Containment Circumstances

2.1 In mid/late August 2021, several weeks after the submission of the ACP and supporting documentation, we became aware that the SIDs routeing through these volumes had altitude restrictions that may not comply with the CAA's Controlled Airspace Containment Policy 2014.

2.2 This non-compliance would manifest should the CAS volumes be reduced as per the ACP. It may be theoretically possible that aircraft using the SIDs climb at the minimum rate defined on the current charts.

2.3 We already know that Stansted departures outclimb the existing altitude restrictions (hence the proposal to return the CAS volumes), but the purpose of this document is to transparently explain and demonstrate how Stansted departures on these SIDs climb, meet or exceed the existing altitude restrictions, identify technical solutions and compare existing climb performance with proposed solutions.

2.4 This will provide a solution to neutralise the CAS containment compliance issue. A CAS containment study for the Stansted SIDs was omitted from the originally submitted ACP, for which we apologise.

2.5 We initially conducted a radar track analysis of Stansted departures for August 2019 (one of the hottest months of the decade and Stansted's busiest month of the year) and provisionally concluded that a technical change to the SID altitude restrictions would have no material impact to Stansted departures using those SIDs.

2.6 We briefed the CAA on this provisional conclusion in late September 2021, and arranged a meeting to discuss the implications. Subsequently in early October the CAA requested additional evidence to support the provisional conclusion, along with additional flight-procedure compliance information.

2.7 This supplementary document will illustrate the circumstances, the evidence, and the proposed solutions. Due to limitations within the radar track analysis tool, we present the majority of the results numerically in this document. The radar track images for August are presented along with the numerical data, to illustrate the general situation. However, note that the radar images provided represent only c.25% of the wider data analysed (01 June to 30 September 2019, 121 days).

3. Illustration and explanation of the post-ACP Stansted SID profile analysis

3.1 This applies to CAS containment for the following eight Stansted SIDs as per the chart illustration:
CLN4S, DET1S, (Rwy 04 conventional navigation), DET1D (Rwy 04 RNP1 navigation), LAM2S (Rwy 04 positioning to Heathrow, conventional navigation)
CLN8R, DET1R (Rwy 22 conventional) CLN1E (Rwy 22 RNP1), LAM3R (Rwy 22 positioning to Heathrow, conventional)

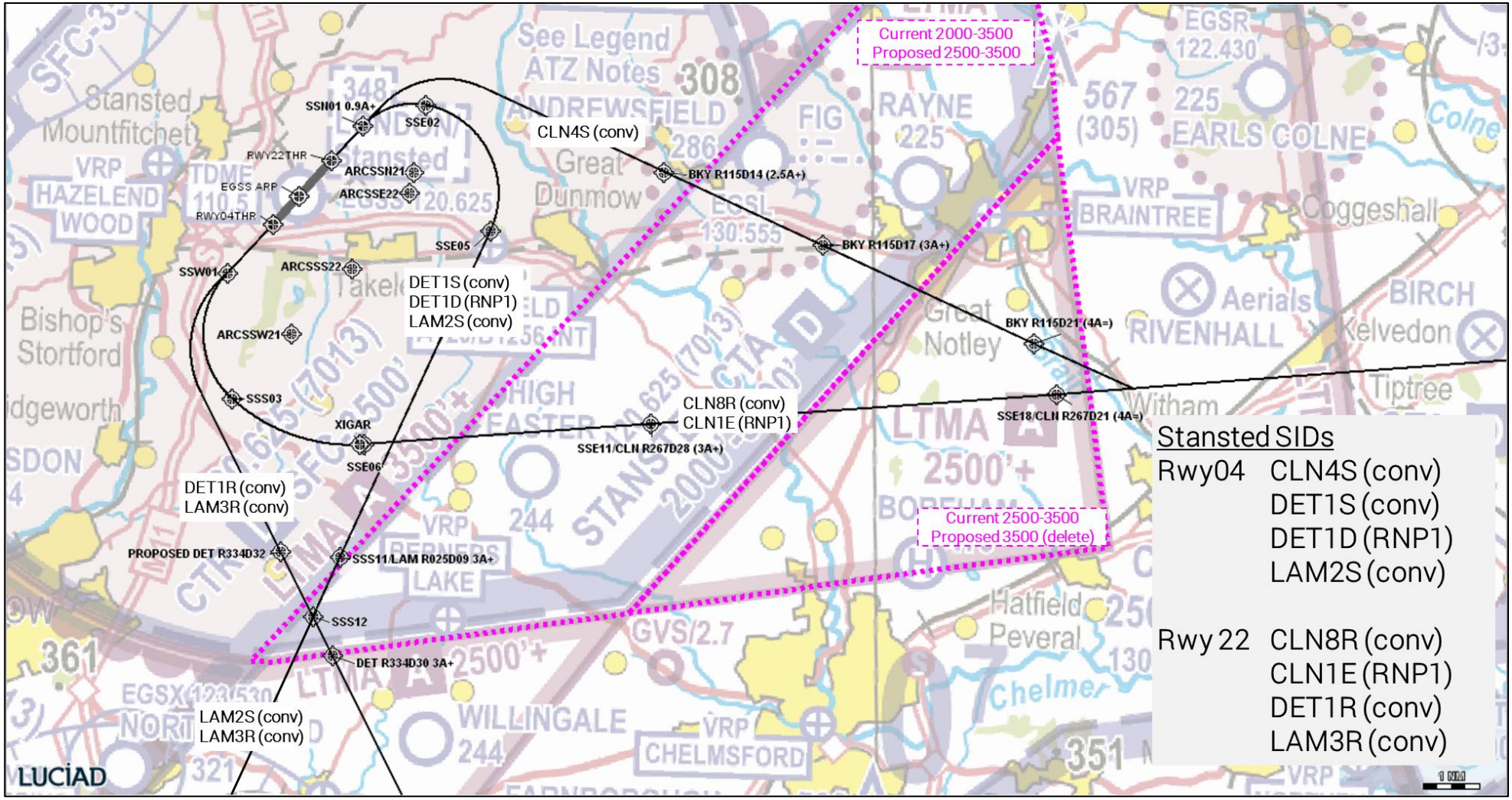

Figure 2 Stansted SID CAS containment (current, and proposed under AD6 if no action taken)

4. Evidence of exceeding of climb gradients

4.1 The following is based on altitude analysis of NATS' radar track data. It examines Stansted south- and east-bound departures during the 121 days from 01 June-30 Sept 2019. Radar track plots are also provided for all 31 days of August 2019 as a pictorial representation of the general situation, but they do not show the complete analysis. Note that the word 'days' in this document means a 24 hour period immediately followed by the next 24 hour period.

4.2 Summer 2019 was, at the time, the twelfth hottest summer in the UK since 1910, and the August bank holiday weekend temperature record was broken in south-eastern England (Heathrow, 33.2°C) (source and source). August was also Stansted Airport's busiest month for air traffic movements that summer (Jun 14,062 ATM, Jul 14,399 ATM, **Aug 14,459 ATM**, Sep 13,820 ATM) (source). Thus the data is representative of 'worst case', i.e. busiest traffic, likely heaviest load factors, lower air density causing reduced aircraft engine performance and aerodynamic surface performance.

4.3 CLN SIDs are far more commonly used than DET SIDs due to usage restrictions following the LAMP 1A airspace change in 2016.
LAM SIDs are very rarely used; only used for positioning aircraft from Stansted to Heathrow, and they follow the same or similar initial tracks as the DET SIDs.

4.4 From page 8 we provide an analysis of departure flows (aircraft altitudes as they fly through the gates shown in Figure 3 below), illustrated by the blue 'whiskers' of August 2019. Where a blue track ends, it has exceeded FL70 in the images, however all flights at all altitudes are counted in the numerical analysis.

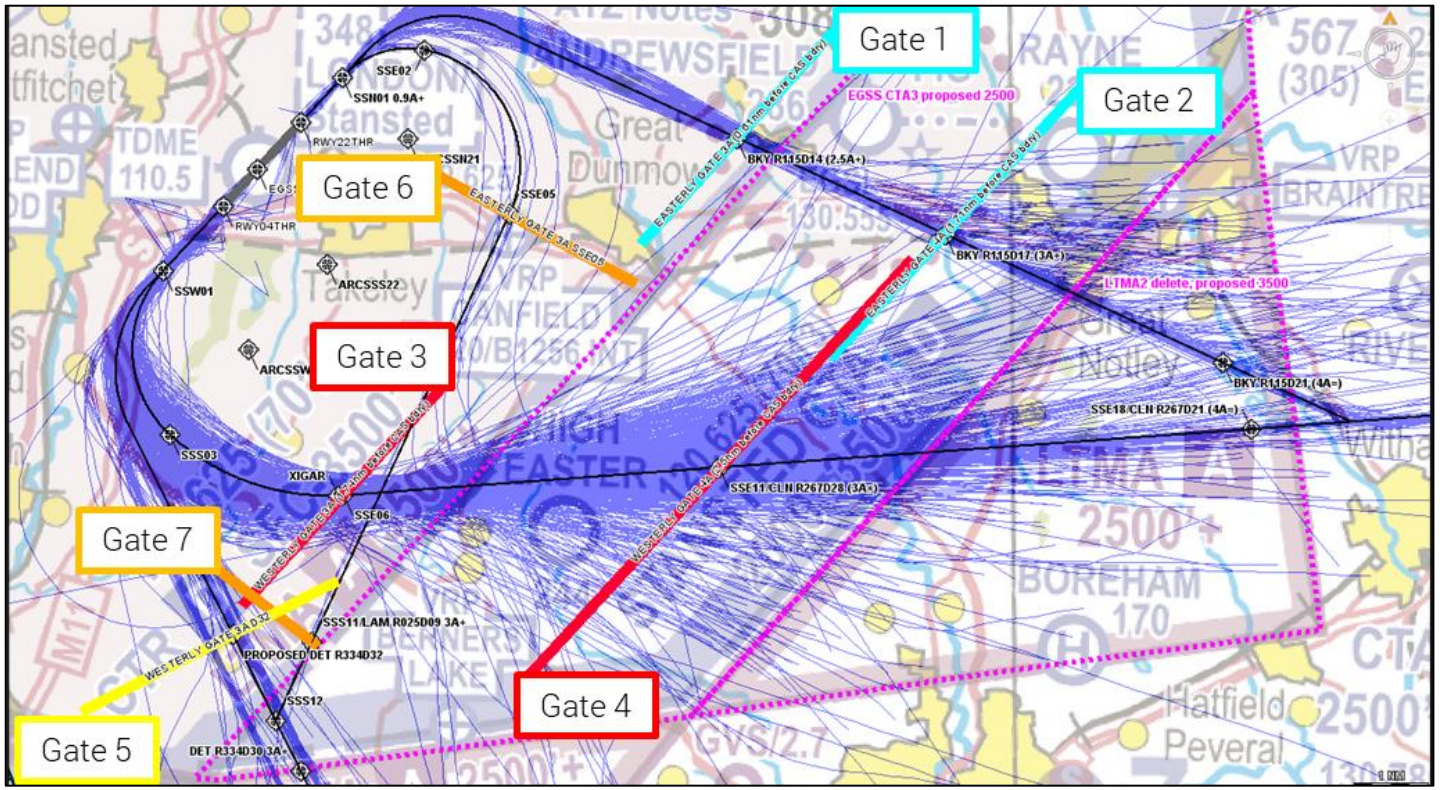

Figure 3 Analysis Gates

4.5 In our analysis, altitude data 400ft or more above the gate altitude means a flight is considered to have passed (met or exceeded) the gate altitude. This is consistent with the level assessment criterion in the Manual of Air Traffic Services Part 1 CAP493 Edition 9 Corrigendum May 2021 Section 1 Chapter 6 Paragraph 10C.1 sub-paragraph (3).

4.6 Thus for example, a flight at or above 3,400ft would be assessed as meeting a 3,000ft gate altitude, and a flight at or below 3,300ft would not.

4.7 Please see Section 11 on p.34 for more information on the analysis methodology.

4.8 In Figure 4 below, we provide extracts from the UK's central repository of flight procedure data, known as the AIP. This gives the reader context for the subsequent analysis.

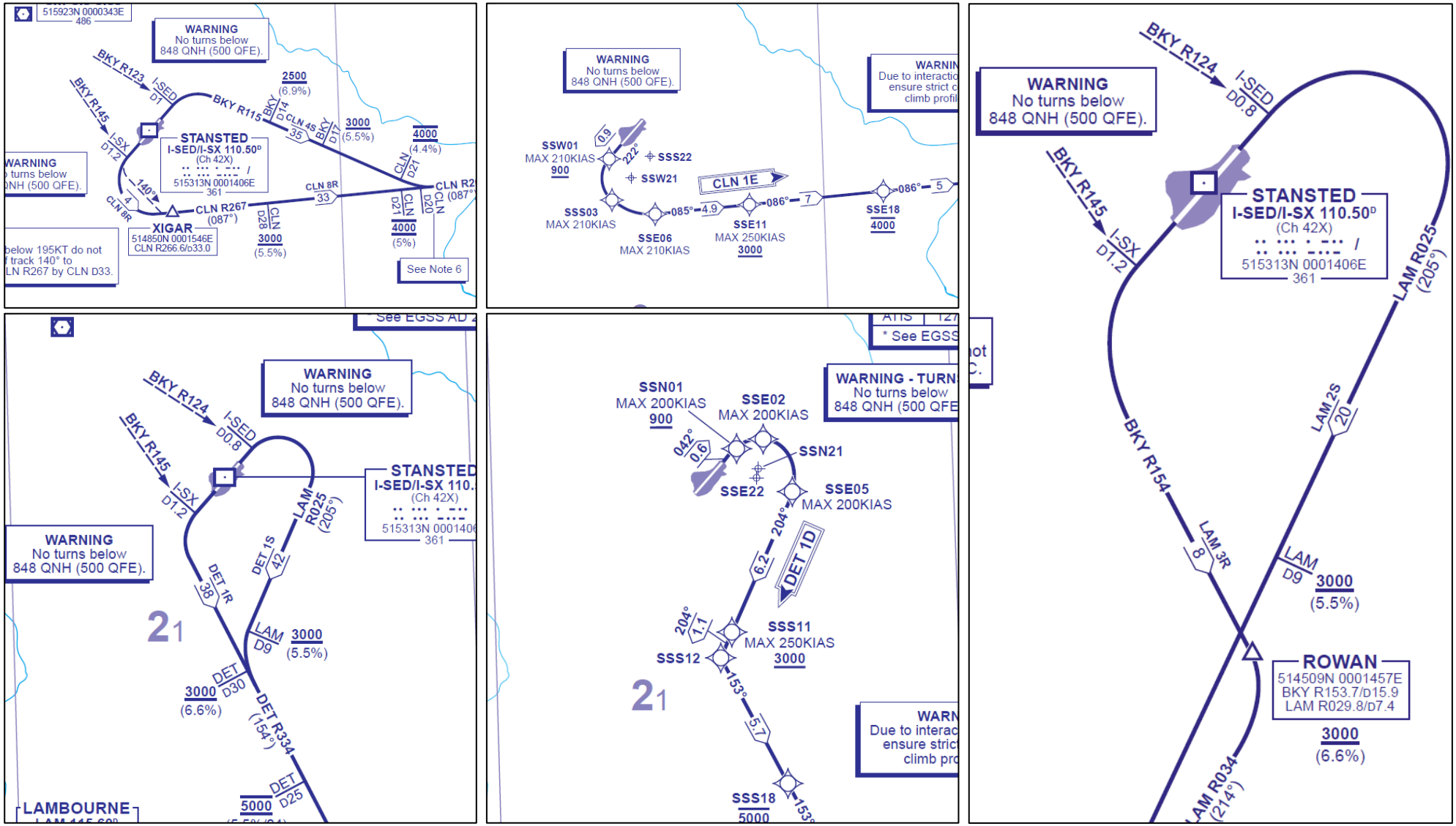

Figure 4 Stansted SIDs: extracts from AIP (AIRAC10-21) clockwise from top left: CLN4S/CLN8R, CLN1E, LAM2S/LAM3R, DET1D, DET1S/DET1R

4.9 Radar track and altitude analysis of Gate 1 and Gate 2 (Stansted SID Rwy 04 CLN4S)

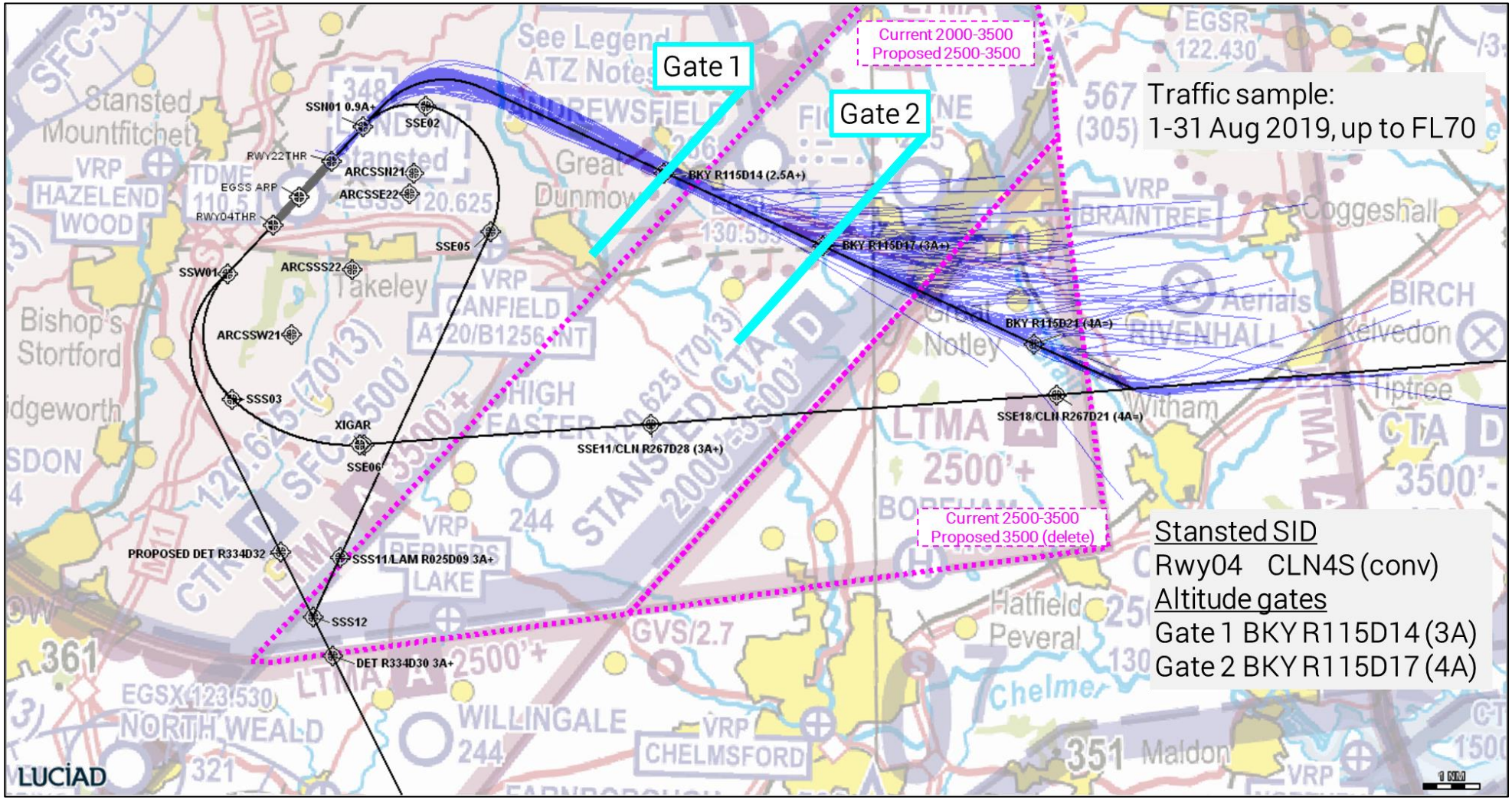

Figure 5 Stansted SID Rwy 04 CLN4S (conventional) – August 2019 illustration

Narrative: Stansted SID Rwy 04 CLN4S (conventional) – data sample from 1 Jun-30 Sep 2019 (121 days)

4.9.1 Analysis Gate 1 was placed at BKY R115D14, designed to analyse flights at 3,000ft (i.e. altitude data of 3,400ft or more, see paragraphs 4.5-4.6 on p.6).

4.9.2 There were 4,821 flights through Gate 1, of which 4,779 (99.1%) met or exceeded an altitude of 3,400ft, which is 0.5nm before the next relevant CAS boundary (measured along the nominal track).

4.9.3 Of the 42 flights (0.9%) through Gate 1 that did not meet 3,400ft, there are examples of similar flights on the same day that did.

- An A320 to Vienna achieving 2,900ft was compared with another A320 to Paphos on the same day, with Paphos 1,000nm further away from Stansted than Vienna (needing several tonnes of aviation fuel more than a flight to Vienna). The Paphos flight achieved 3,800ft.
- An A321 to Dalaman achieving 2,900ft was compared with another A321 to Antalya (a similar distance) on the same day. The Antalya flight achieved 4,000ft.

4.9.4 Analysis Gate 2 was placed at BKY R115D17, designed to analyse flights at 4,000ft (i.e. altitude data of 4,400ft or more, see paragraphs 4.5-4.6 on p.6.).

4.9.5 There were 4,791 flights through Gate 2, of which 4,523 (94.4%) met or exceeded an altitude of 4,400ft, which is 1.8nm before the next relevant CAS boundary (measured along the nominal track).

4.9.6 Of the 268 flights (5.6%) through Gate 2 that did not meet 4,400ft, there are examples of similar flights on the same day that did.

- An A320 to Vienna achieving 3,500ft was compared with another A320 to Paphos on the same day, with Paphos 1,000nm further away from Stansted than Vienna (needing several tonnes of aviation fuel more than a flight to Vienna). The Paphos flight achieved 4,900ft.
- An A20N to Istanbul achieving 3,600ft was compared with another A20N of the same operator, to the same destination on the same day. The latter flight achieved 5,000ft.

Conclusion: Stansted SID Rwy 04 CLN4S (conventional)

4.9.7 4,779 flights (99.1%) met or exceeded the analysis altitude for Gate 1, as did 4,523 flights (94.4%) for Gate 2. Most flights through Gate 1 would also pass through Gate 2 because each gate illustrates altitude achievements at different locations along the same CLN4S SID.

4.9.8 Of those flights that did not meet the analysis altitudes, there are examples of similar flights of the same aircraft type that did, on the same day.

4.9.9 CAS containment assurance would be established, should climb restrictions be placed at the same locations as these gates.

4.10 Radar track and altitude analysis of Stansted SID Rwy 22 CLN8R (conventional) and CLN1E (RNP1)

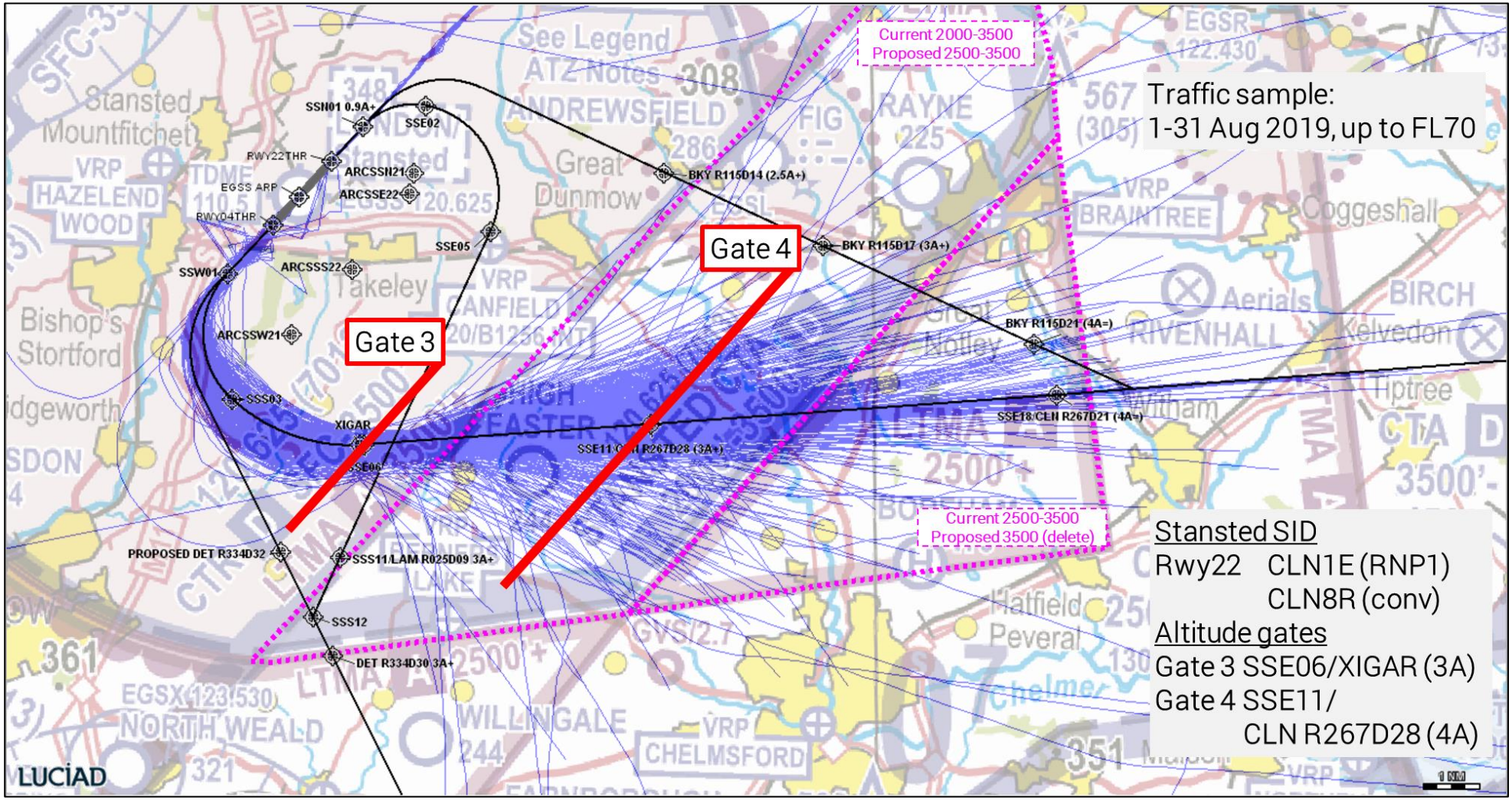

Figure 6 Stansted SID Rwy 22 CLN8R (conventional) and CLN1E (RNP1) – August 2019 illustration

Narrative: Stansted SID Rwy 22 CLN8R (conventional) and CLN1E (RNP1) – data sample from 1 Jun-30 Sep 2019 (121 days)

4.10.1 Analysis Gate 3 was placed at SSE06/XIGAR, designed to analyse flights at 3,000ft (i.e. altitude data of 3,400ft or more, see paragraphs 4.5-4.6 on p.6).

4.10.2 There were 14,070 flights through Gate 3, of which 13,537 (96.2%) met or exceeded an altitude of 3,400ft through the gate, which is 1.6nm before the next relevant CAS boundary (measured along the nominal track).

4.10.3 Of the 533 flights (3.8%) through Gate 3 that did not meet 3,400ft, there are examples of similar flights on the same day that did.

- An A320 to Larnaca achieving 2,700ft was compared with another A320 to Antalya, a similar distance. The Antalya flight achieved 3,500ft.
- An A321 to Paphos achieving 2,700ft was compared with another A321 to Antalya, a similar distance. The Antalya flight achieved 3,500ft.

4.10.4 Analysis Gate 4 was placed at SSE11/CLN R267D28, to analyse flights at 4,000ft (i.e. altitude data of 4,400ft or more, see paragraphs 4.5-4.6 on p.6).

4.10.5 There were 14,099 flights through Gate 4, of which 13,839 (98.2%) met or exceeded an altitude of 4,400ft through the gate, which is 2.8nm before the next relevant CAS boundary (measured along the nominal track).

4.10.6 Of the 260 flights (1.8%) through Gate 4 that did not meet 4,400ft, there are examples of similar flights on the same day that did.

- A B738 to Thessaloniki achieving 3,900ft was compared with another B738 (operated by the same company) to Kerkyra, a similar distance. The Kerkyra flight achieved 5,200ft by the gate.
- A B738 to Rome achieving 3,900ft was compared with the four other flights to Rome using a B738 operated by the same company. The other four B738 flights to Rome (on the same day, by the same operator) achieved at least 7,000ft by the gate.

Conclusion: Stansted SID Rwy 22 CLN8R (conventional) and CLN1E (RNP1)

4.10.7 13,537 flights (96.2%) met or exceeded the analysis altitude for Gate 3, as did 13,839 flights (98.2%) for Gate 4. Most flights through Gate 3 would also pass through Gate 4 because each gate illustrates altitude achievements at different locations along the coincident CLN8R and CLN1E SIDs.

4.10.8 Of those flights that did not meet the analysis altitudes, there are examples of similar flights of the same aircraft type that did, on the same day.

4.10.9 CAS containment assurance would be established, should climb restrictions be placed at the same locations as these gates.

4.11 Radar track and altitude analysis of Stansted SID Rwy 22 DET1R and LAM3R (conventional).

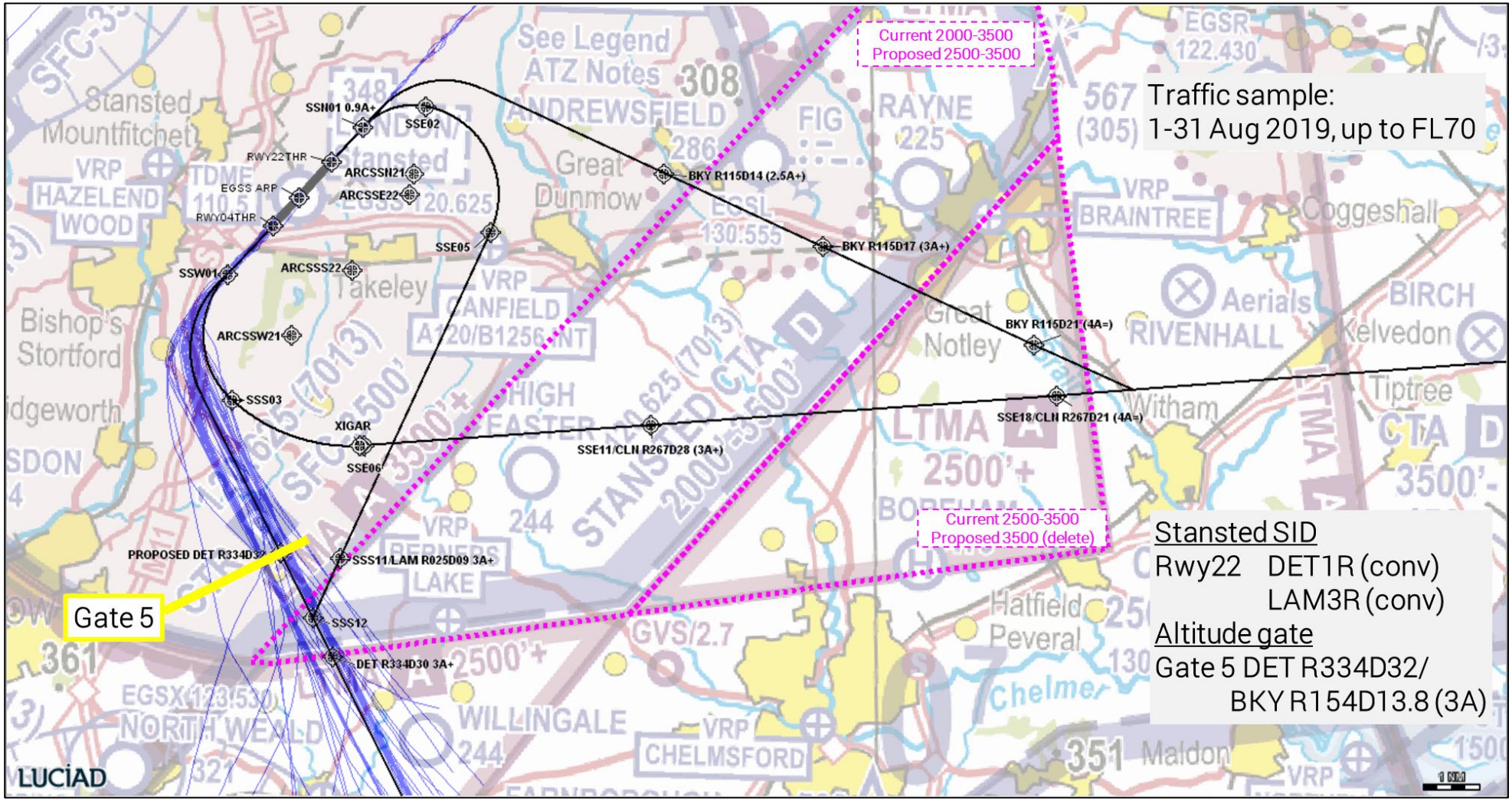

Figure 7 Stansted SID Rwy 22 DET1R and LAM3R (conventional) – August 2019 illustration

Narrative: Stansted SID Rwy 22 DET1R and LAM3R (conventional) – data sample from 1 Jun-30 Sep 2019 (121 days)

The DET SIDs are less frequently used, following the LAMP1A ACP from 2016 which transferred the majority of traffic to the CLN SIDs (analysed earlier), and the LAM SIDs are for positioning aircraft to Heathrow. Both would follow a similar track through Gate 5.

4.11.1 Analysis Gate 5 was placed at DET R334D32/BKY R154D13.8, designed to analyse flights at 3,000ft (i.e. altitude data of 3,400ft or more, see paragraphs 4.5-4.6 on p.6).

4.11.2 There were 462 flights through Gate 5. All met or exceeded an altitude of 3,400ft through the gate, which is 1.0nm before the relevant CAS boundary (measured along the nominal track).

Conclusion: Stansted SID Rwy 22 DET1R and LAM3R (conventional)

4.11.3 All 462 flights using these SIDs in 121 days met or exceeded the Gate 5 analysis altitudes.

4.11.4 CAS containment assurance would be established, should climb restrictions be placed at the same location as this gate.

4.12 Radar track and altitude analysis of Stansted SID Rwy 04 DET1S LAM 2S (conventional) and DET1D (RNP1).

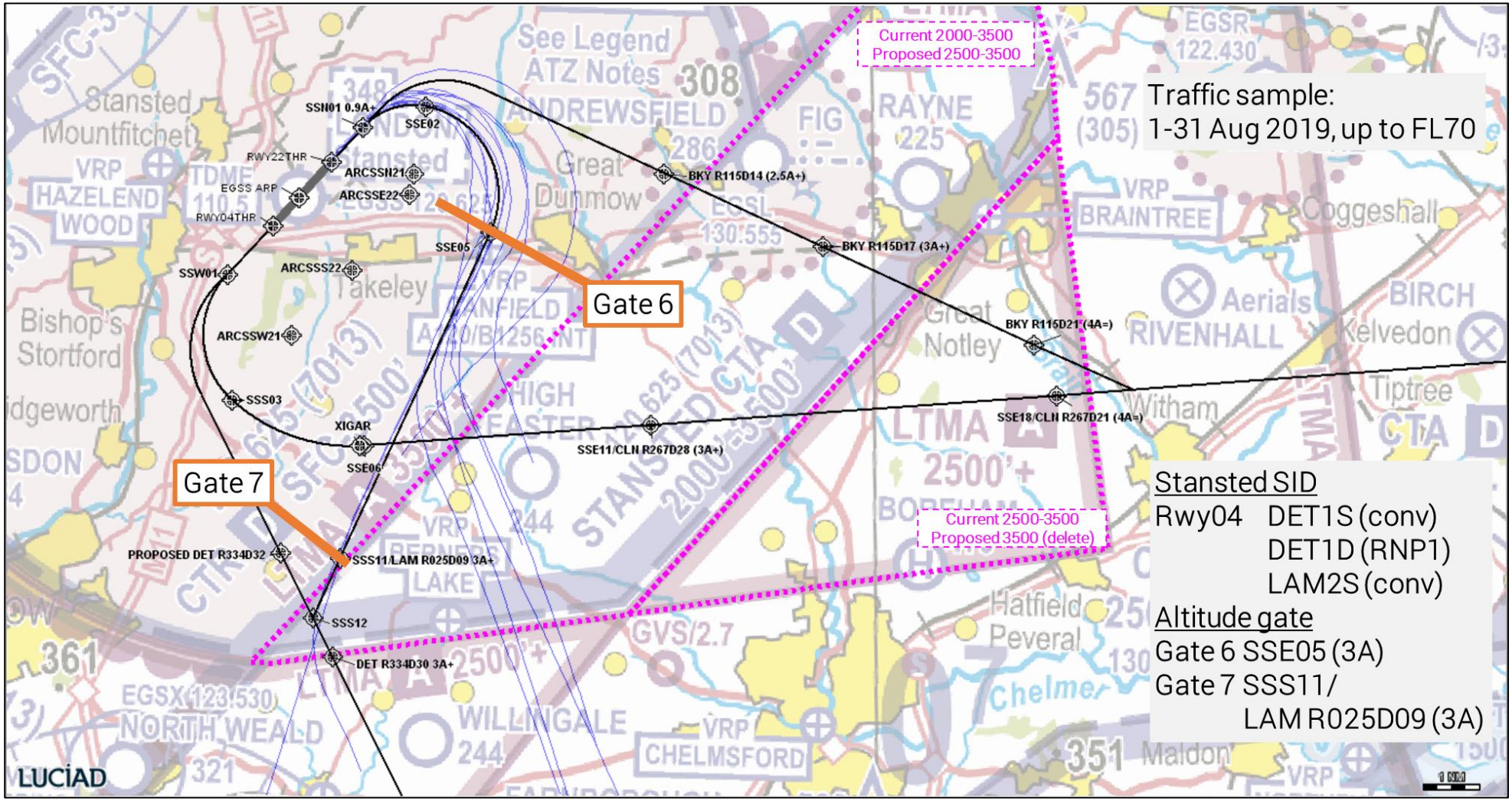

Figure 8 Stansted SID Rwy 04 DET1S LAM 2S (conventional) and DET1D (RNP1) – August 2019 illustration

Narrative: Stansted SID Rwy 04 DET1S LAM 2S (conventional) and DET1D (RNP1) – data sample from 1 Jun-30 Sep 2019 (121 days)

The DET SIDs are less frequently used, following the LAMP1A ACP from 2016 which transferred the majority of traffic to the CLN SIDs (analysed earlier), and the LAM SIDs are only for positioning flights. Both would follow a similar track through Gate 6, with the LAM2S always continuing through Gate 7 towards LAM.

In the August illustration above, note that several DET-bound aircraft appear to have been turned directly to DET while still abeam the runway, thus avoiding Gate 7. A turn such as this is only allowable once the aircraft has attained an altitude of 4,000ft in accordance with EGSS-AD-2.21 Noise Abatement Procedures, assuring CAS containment for the areas of interest. This is a common controlling technique which complies with the Noise Abatement procedures and shortens the track to DET.

4.12.1 Analysis Gate 6 was originally designed to understand the altitude of flights making the right turn. As there was no intent to place a climb restriction in this location, altitude analysis of Gate 6 would not provide useable insight. Other elements of Gate 6 data did, however, serve as part of the internal functionality of the analysis (summarised in Section 11 on p.34).

4.12.2 Analysis Gate 7 was placed at SSS11/LAM R025D09 to analyse flights at 3,500ft (i.e. altitude data of 3,900ft or more, see paragraphs 4.5-4.6 on p.6).

4.12.3 There were 70 flights through Gate 7. All met or exceeded an altitude of 3,900ft through the gate.

Conclusion: Stansted SID Rwy 04 DET1S LAM 2S (conventional) and DET1D (RNP1)

4.12.4 All 70 flights using these SIDs in 121 days met or exceeded the Gate 7 analysis altitude.

4.12.5 CAS containment assurance would be retained, should a climb restriction be placed at the same location as Gate 7.

4.12.6 Altitude data for Gate 6 was not used for climb restriction purposes, however the gate itself was used for analysis functionality.

If the flight's altitude meets or exceeds the Gate analysis altitude plus 400ft, then it meets CAP493's Mode C level assessment criterion for passing through a level. (See paragraphs 4.5-4.6 on p.6)

Gate 1 (3,000ft)		
	%	Flights
3,300-	0.9%	42
3,400+	99.1%	4,779
TOTAL	100.0%	4,821

Gate 2 (4,000ft)		
	%	Flights
4,300-	5.6%	268
4,400+	94.4%	4,523
TOTAL	100.0%	4,791

Gate 3 (3,000ft)		
	%	Flights
3,300-	3.8%	533
3,400+	96.2%	13,537
TOTAL	100.0%	14,070

Gate 4 (4,000ft)		
	%	Flights
4,300-	1.8%	260
4,400+	98.2%	13,839
TOTAL	100.0%	14,099

Gate 5 (3,000ft)		
	%	Flights
3,300-	0.0%	0
3,400+	100.0%	462
TOTAL	100.0%	462

Gate 7 (3,500ft)		
	%	Flights
3,800-	0.0%	0
3,900+	100.0%	70
TOTAL	100.0%	70

Figure 9 Summary of flights 300ft or less, and 400ft or more, above the Gate altitudes

5. Noise, Local Air Quality, Fuel, Greenhouse Gas and Controller Workload Impacts

5.1 There were 19,543 unique flights in the 121 day sample (NB individual flights pass through more than one gate).

5.2 Paragraphs 4.9 (p.8) to 4.12 (p.14) and Figure 9 (above) show that the proportions of flights meeting the proposed altitude restrictions through each gate varies, from 94.4%-100%. The number of flights per gate is also provided, in order to ensure transparency on potential changes in these impacts as per paragraphs 5.5-5.6 below.

5.3 It is possible that one, some or all underperforming flights could have made the Gate altitude by trading airspeed for height gain, and it is also possible that the vertical reporting under-reads (i.e. the aircraft is actually higher than its reported Mode Charlie Altitude) as often as it may over-read. Also, the altitude conversion was always rounded down to the nearest 100ft (i.e. an unrounded altitude of 2,999ft was always rounded to 2,900ft for this analysis), so approximately half the under-performing flights are likely to be closer to the next highest 100ft instead of the next lowest. There may also have been flight deck or ATC reasons.

5.4 We have demonstrated that closely-equivalent flights to those under-performers either met or exceeded the proposed altitude restrictions. Two of the six gates had no under-performers at all.

5.5 In theoretical worst-case scenarios for four of the six gates, a small proportion of flights may slightly, temporarily, increase climb rate power to gain altitude. In this unlikely scenario, there would still be no impact on the CAP1616 primary noise metrics due to the minuscule proportion of under-performers, and the small amount of additional power needed to gain enough altitude to pass the Gate, given that the overwhelming majority of comparable flights meet or exceed the Gate altitude.

5.6 Therefore, we cannot guarantee that there would be no changes to thrust settings due to this proposal. However, the evidence we have supplied strongly suggests that this would apply only to an extremely small proportion per gate. Environmental impacts may occur, but they would be neither discernible nor measurable. This impact statement also applies to impacts on biodiversity and tranquillity.

5.7 The proposed changes would cause no air traffic controller workload impacts.

6. Proposed Solution: SID altitude restriction amendments

We propose to amend the vertical definitions, but not the lateral definitions, of the following 8 SIDs:

6.1 Rwy 04 CLN4S (conventional)

6.1.1 Change altitude restriction at BKY R115D14 from 2500ft to 3000ft.

6.1.2 Change altitude restriction at BKY R115D17 from 3000ft to 4000ft.

6.1.3 Up-issue the SID chart to CLN5S (see Figure 11 on p.21).

6.1.4 As per the evidence supplied in paragraph 4.9 from p.8, aircraft already meet or exceed these proposed restrictions.

6.2 Rwy 22 CLN8R (conventional)

6.2.1 Add an altitude restriction at XIGAR 3000ft.

6.2.2 Change altitude restriction at CLN R267D28 from 3000ft to 4000ft.

6.2.3 Up-issue the SID chart to CLN9R (see Figure 11 on p.21).

6.2.4 As per the evidence supplied in paragraph 4.10 from p.10, aircraft already meet or exceed these proposed restrictions.

6.3 Rwy 22 CLN1E (RNP1)

6.3.1 Add an altitude restriction at SSE06 3000ft.

6.3.2 Change altitude restriction at SSE11 from 3000ft to 4000ft.

6.3.3 Up-issue the SID chart and coding table to CLN2E (Figure 13 on p.23 and Figure 20 on p.30).

6.3.4 As per the evidence supplied in paragraph 4.10 from p.10, aircraft already meet or exceed these proposed restrictions.

6.4 Rwy 04 DET1S (conventional)

6.4.1 Change altitude restriction at LAM R025D09 from 3000ft to 3500ft.

6.4.2 Up-issue the SID chart to DET2S (Figure 15 on p.25).

6.4.3 As per the evidence supplied in paragraph 4.12 from p.14, aircraft already meet or exceed this proposed restriction.

6.5 Rwy 04 DET1D (RNP1)

6.5.1 Change altitude restriction at SSS11 from 3000ft to 3500ft.

6.5.2 Up-issue the SID chart and coding table to DET2D (Figure 17 on p.27 and Figure 21 on p.31).

6.5.3 As per the evidence supplied in paragraph Figure 7 from p.12, aircraft already meet or exceed this proposed restriction.

6.6 Rwy 22 DET1R (conventional)

6.6.1 Add an altitude restriction at DET R334D32 3000ft.

6.6.2 Delete the altitude restriction at DET R334D30 3000ft.

6.6.3 This has the effect of moving the 3000ft restriction 2nm closer to the runway along the same track.

6.6.4 Up-issue the SID chart to DET2R (Figure 15 on p.25).

6.6.5 As per the evidence supplied in paragraph 4.12 from p.14, aircraft already meet or exceed this proposed restriction.

6.7 Rwy 04 LAM2S (conventional)

6.7.1 Change altitude restriction at LAM R025D09 from 3000ft to 3500ft.

6.7.2 Up-issue the SID chart and coding table to LAM3S (Figure 19 on p.29).

6.7.3 As per the evidence supplied in paragraph 4.12 from p.14, aircraft already meet or exceed this proposed restriction.

6.8 Rwy 22 LAM3R (conventional)

6.8.1 Add an altitude restriction at BKY R154D13.8 3000ft.

6.8.2 Delete the altitude restriction at ROWAN (BKY R153.7D15.9) 3000ft.

6.8.3 This has the effect of moving the 3000ft restriction 2.1nm closer to the runway along the same track.

6.8.4 Up-issue the SID chart to LAM4R (Figure 19 on p.29).

6.8.5 As per the evidence supplied in paragraph 4.11 from p.12, aircraft already meet or exceed this proposed restriction.

7. Engagement Summary and Additional Evidence

7.1 Stansted Airport 'owns' the SIDs.

7.1.1 Its senior management supports the way forward (Section 10 Annex para 10.1).

7.2 Most flights at Stansted are operated by Ryanair (ten times as many flights as the second most frequent operator). From 01 June to 30 September 2021 (the same 121 day period as analysed, but for 2021) they operated over 66% of flights at Stansted, averaging c.111 flights per day.

7.2.1 Ryanair's performance department has reviewed the proposed changes and does not consider them as limiting (Section 10 Annex para 10.2).

7.3 The second most frequent operator at Stansted is Jet2. From 01 June to 30 September 2021 they operated c.6% of flights at Stansted (c.10 flights per day on average).

7.3.1 Jet2's performance department has reviewed the proposed changes and agreed that operating their flights in the same manner they do today would meet the increased altitude restrictions and would not result in increased power settings to do so (Section 10 Annex para 10.3).

7.4 Two operators, Ryanair and Jet2, accounted for c.72% of Stansted flights. Other operators at Stansted, accounted for the remaining 28%, but each operator had a far smaller proportion of flights (fewer than 4% per operator). 380 operators flew less frequently than once per week, and over 300 flew less frequently than once per month on average.

7.5 The 2021 departure proportions were broadly comparable to the same period in 2019 (before the Covid-19 pandemic impacted air transport), where Ryanair and Jet2 accounted for c.68% (c.59% and c.9% respectively). Additionally in 2019, EasyJet also accounted for c.9% of Stansted departures. However, in autumn 2020 EasyJet closed its Stansted base. As a result of that base closure, EasyJet's Stansted proportion dropped significantly, to c.3% in summer 2021. Therefore Ryanair and Jet2 account for the majority of Stansted departures in both periods (c.68% in 2019, and c.72% in 2021).

7.6 We contend this is sufficient engagement for the operators currently flying the majority of aircraft from Stansted to understand and accept these proposed changes.

7.7 Original unredacted emails for all three stakeholders will be forwarded to the CAA.

7.8 Additionally, our project team had opportunistic access to an Airbus A330 simulator and a Boeing 737-800 simulator for other project reasons.

7.8.1 They were able to use spare time to input some test parameters and acquire photographs of the flight management system screens, which detail the predicted altitudes at each proposed restriction point.

7.8.2 These are informal, however they support the conclusion drawn in this document.

7.8.3 Those photographs will not be published but will be documented and sent direct to the CAA.

8. Overall Conclusion – and what happens next

8.1 The proposed SID amendments increase altitude restrictions. They would not change lateral distribution as a result.

8.2 This would be a technical change to aeronautical data charts and coding tables. The overwhelming majority of aircraft already fly the same (or greater) altitudes by the proposed restriction points.

8.3 Therefore, we cannot guarantee that there would be no changes to thrust settings due to this proposal. However, the evidence we have supplied strongly suggests that this would apply only to an extremely small proportion. Environmental impacts may occur, but they would be neither discernible nor measurable. This impact statement also applies to impacts on biodiversity and tranquillity.

8.4 Neither would the change restrict climbs any more than they are restricted today.

8.5 The climb restrictions would be moved closer to what are already flown, in order to achieve the goal of raising the CAS bases as per the originally submitted ACP.

8.6 Separately, a NATS Approved Procedure Designer has submitted an appropriate Instrument Flight Procedure (IFP) data package in accordance with CAA requirements.

8.7 This will be assessed by the CAA's IFP regulators and, presuming they are approved, a formal AIP change request for these 8 SIDs will be submitted by NATS on behalf of Stansted Airport, in late November 2021 to be implemented in AIRAC02-2022 (24th February 2022).

9. ANNEX: Draft charts and coding tables (the following 12 pages)

Note: these are draft charts and tables to illustrate proposed changes to SIDs, they are not for flight. A separate formal instrument flight procedure package of data has been supplied to the CAA for their evaluation.

(This layout is for pagination purposes)

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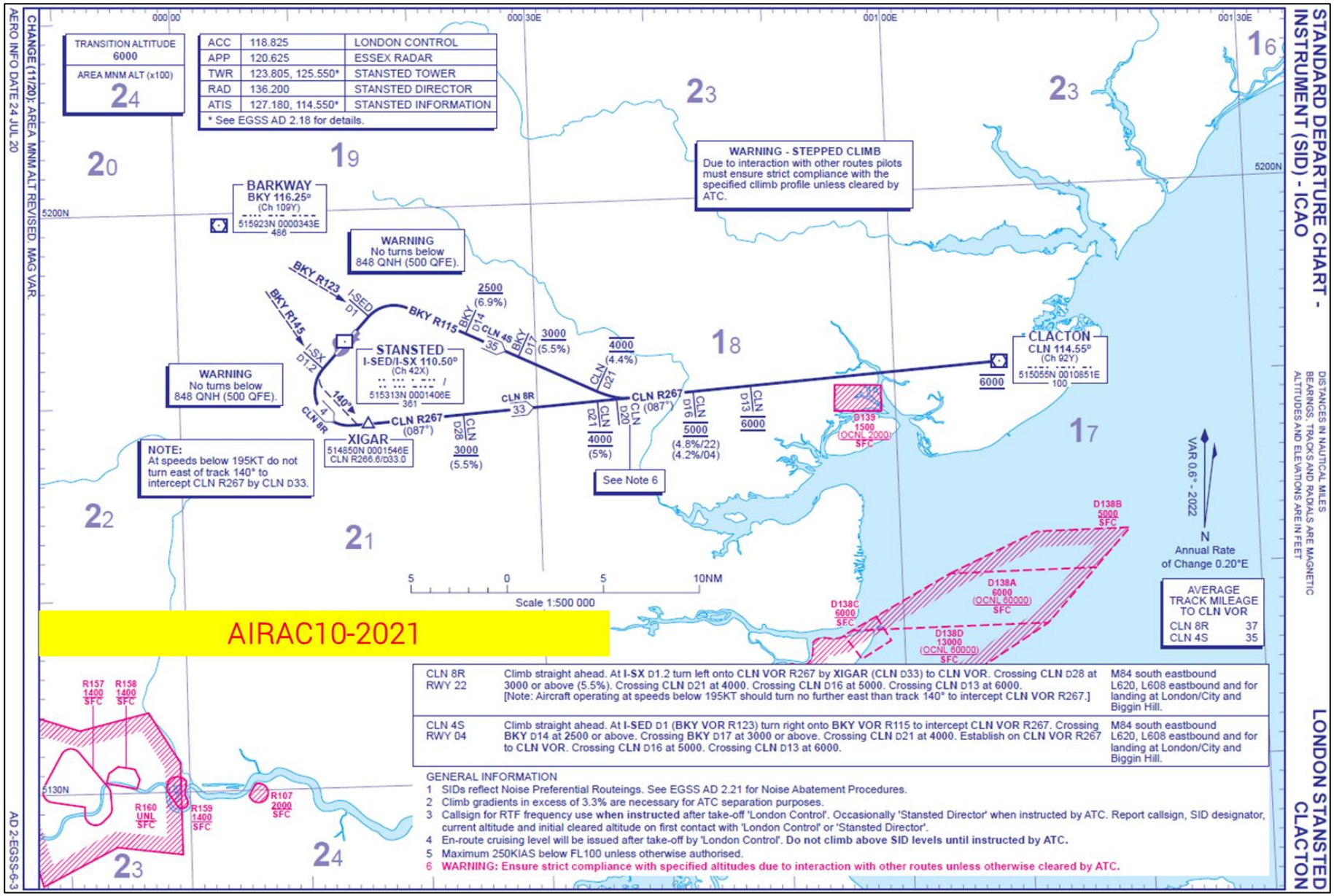

Figure 10 Current Rwy 04 CLN4S and Rwy 22 CLN8R as per AIRAC10-2021

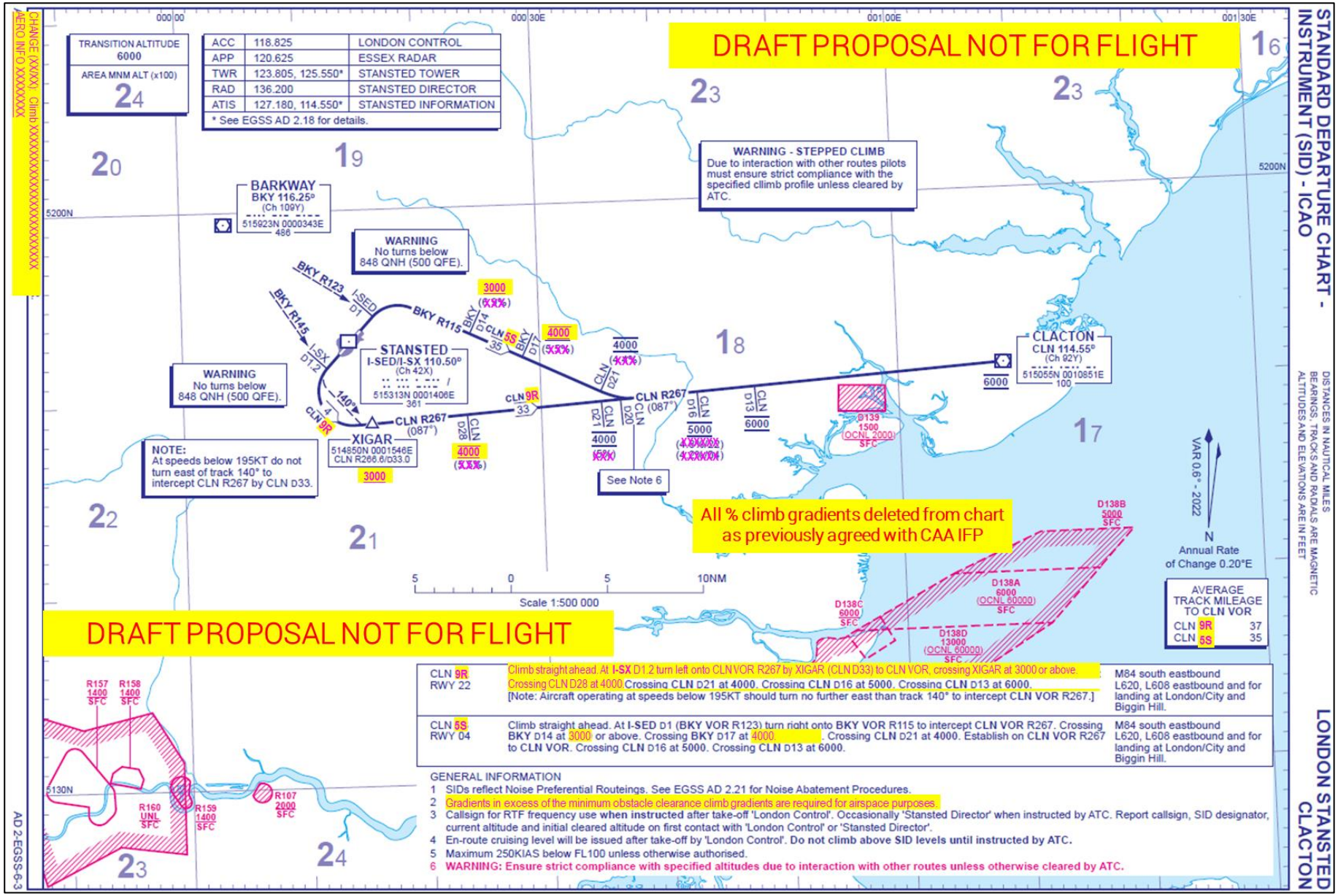

Figure 11 Rwy 04 CLN4S and Rwy 22 CLN8R, to CLN5S and CLN9R (conventional)

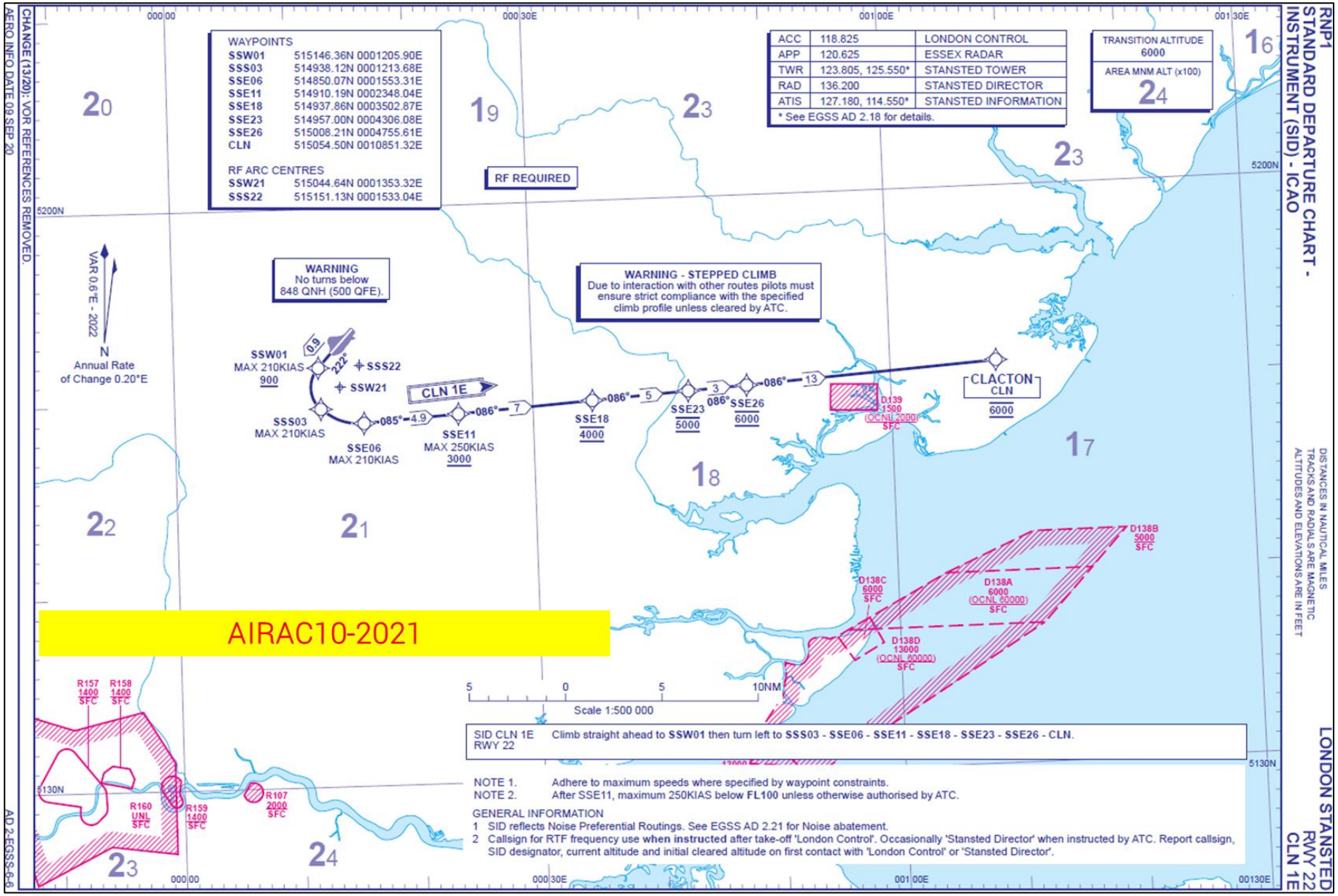

Figure 12 Current Rwy 22 CLN1E as per AIRAC10-2021

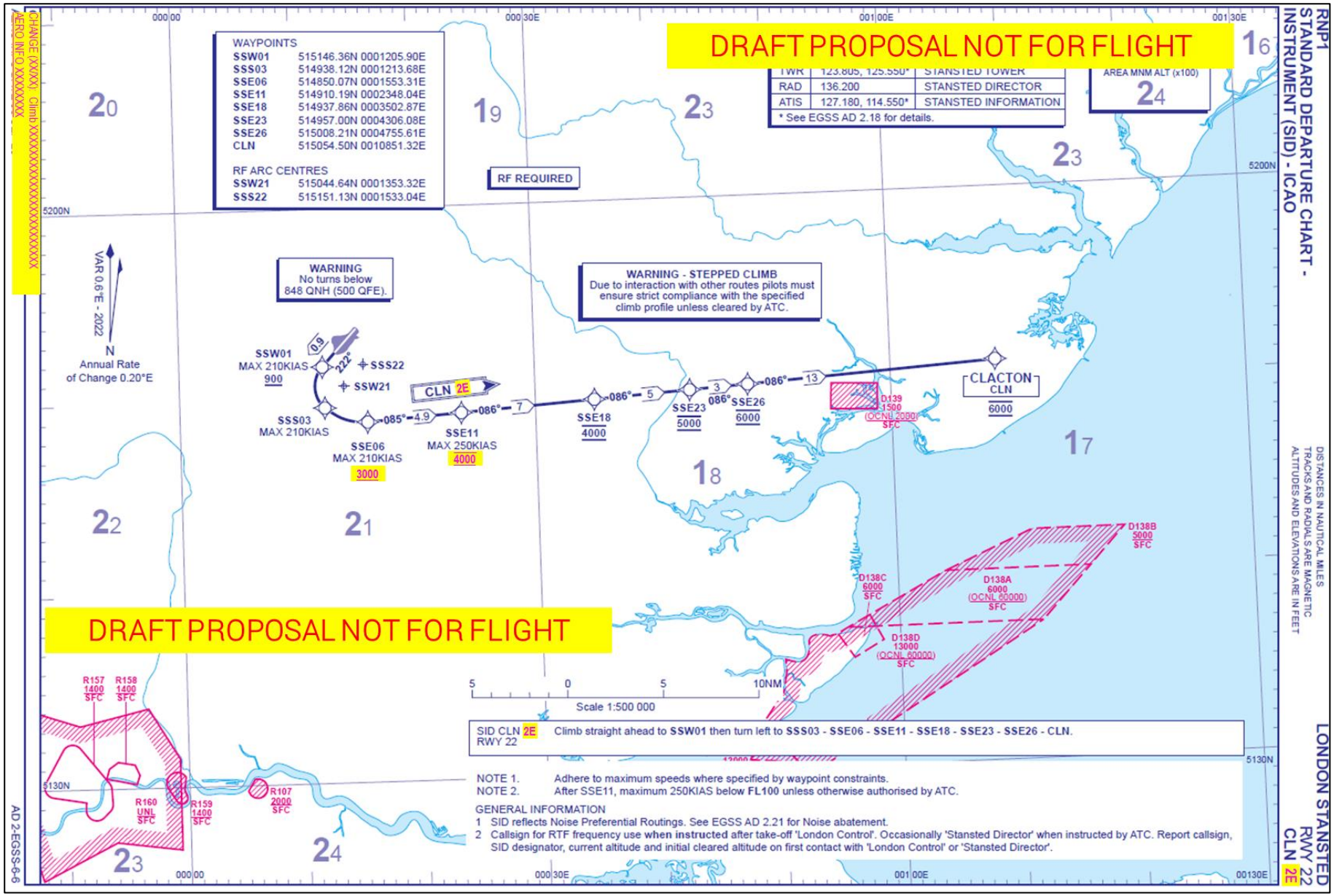

Figure 13 Rwy 22 CLN1E, to CLN2E (RNP1) Chart

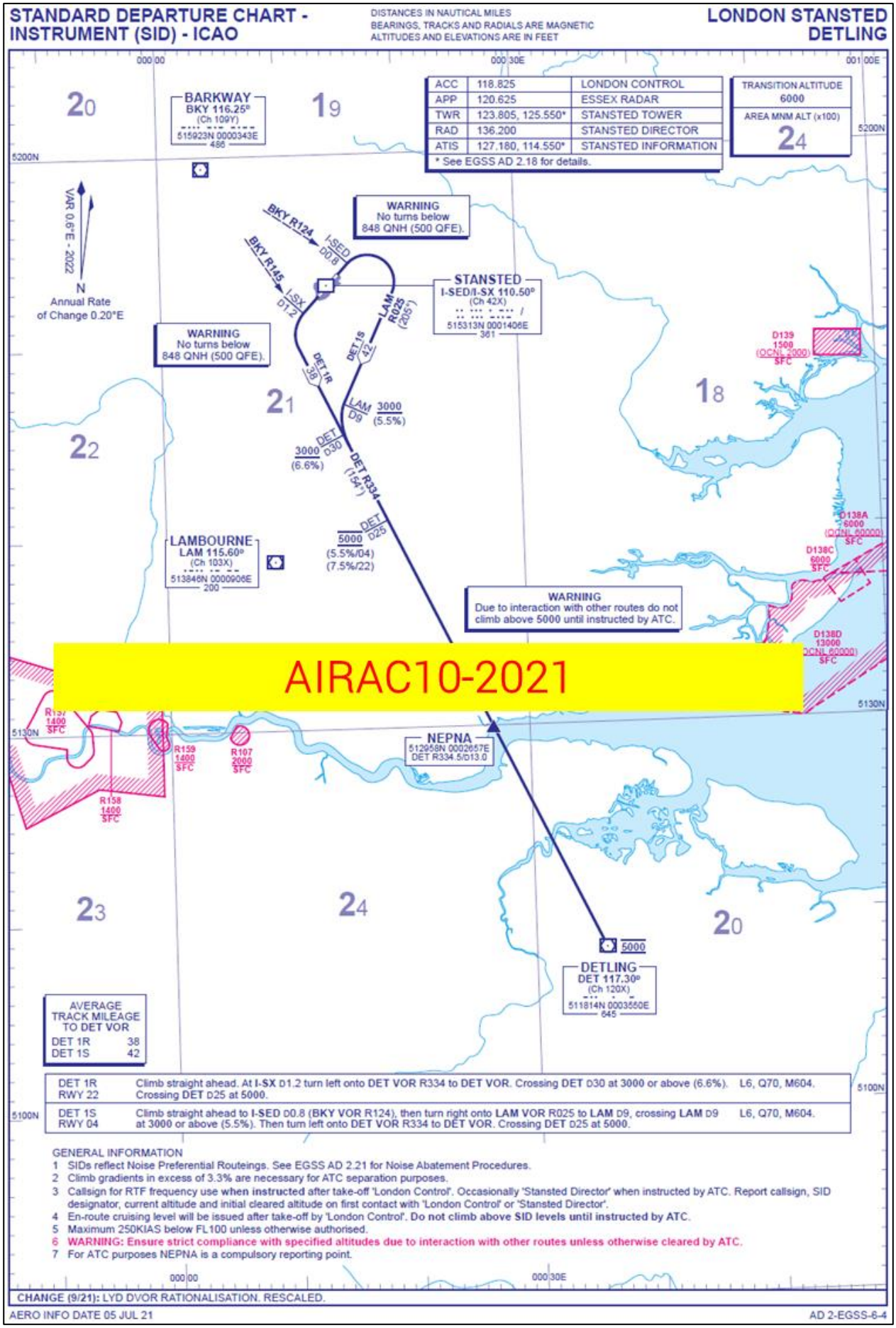

Figure 14 Current Rwy 04 DET1S and Rwy 22 DET1R as per AIRAC10-2021

Figure 15 Rwy 04 DET1S and Rwy 22 DET1R, to DET2S and DET2R (conventional)

Figure 16 Current Rwy 04 DET1D as per AIRAC10-2021

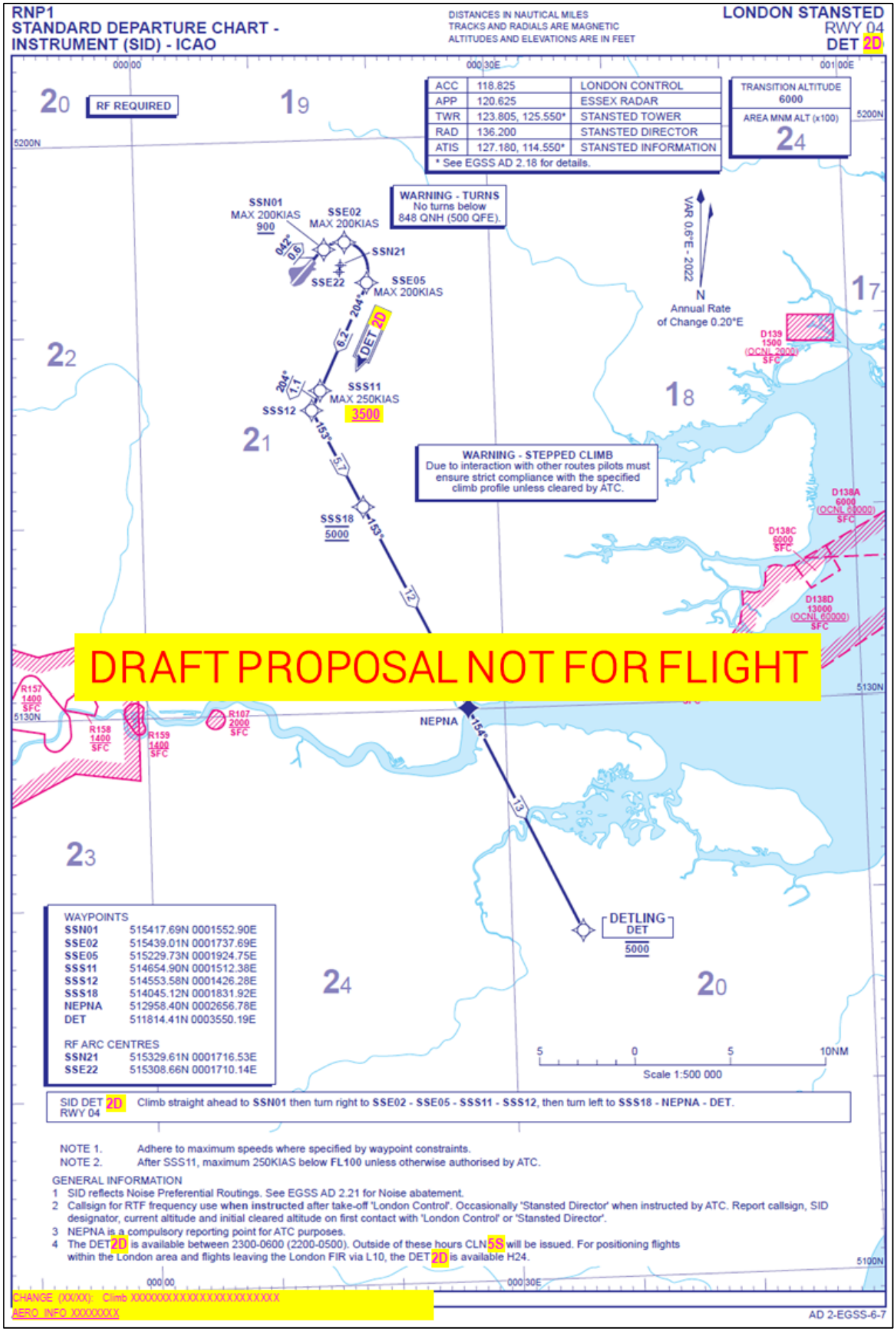

Figure 17 Rwy 04 DET1D, to DET2D (RNP1) Chart

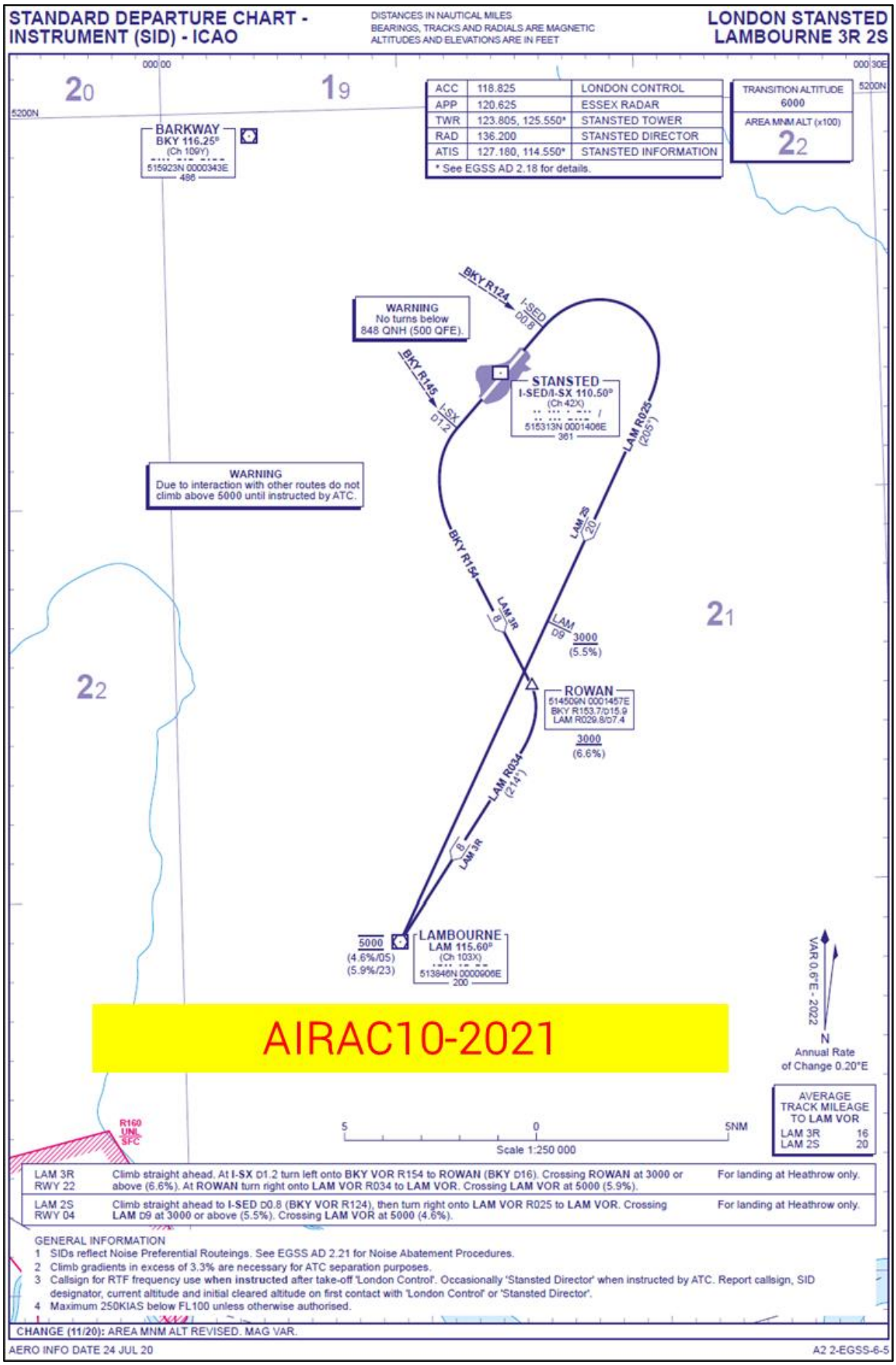

Figure 18 Current Rwy 22 LAM3R and Rwy 04 LAM2S as per AIRAC10-2021

Figure 19 Proposed Rwy 22 LAM3R and Rwy 04 LAM2S, to LAM4R and LAM3S (conventional)

CHANGE (13/20): VOR REFERENCES REMOVED.
AERO INFO DATE 09 SEP 20

Standard Instrument Departure Coding Tables

AIRAC10-2021

London Stansted Runway 22 CLN 1E

Designator	Sequence Number	Path Term-inator	Waypoint Name	Waypoint Co-ordinates	Arc Centre Name	Arc Centre Co-ordinates	Fly-over	Course/ Track °M (°T)	Magnetic Variation	Distance (NM)	Turn Direction	Level Constraint	Speed Constraint (KT)	Navigation Performance
CLN 1E	001	CF	SSW01	515146.36N 0001205.90E	-	-	N	222° (222.9°)	0.6	0.9	-	+900	-210	RNP1
CLN 1E	002	RF	SSS03	514938.12N 0001213.68E	SSW21	515044.64N 0001353.32E	N	-	0.6	-	LEFT	-	-210	RNP1
CLN 1E	003	RF	SSE06	514850.07N 0001553.31E	SSS22	515151.13N 0001533.04E	N	-	0.6	-	LEFT	-	-210	RNP1
CLN 1E	004	TF	SSE11	514910.19N 0002348.04E	-	-	N	085° (086.0°)	0.6	4.9	-	+3000	-250	RNP1
CLN 1E	005	TF	SSE18	514937.86N 0003502.87E	-	-	N	086° (086.3°)	0.6	7.0	-	4000	-	RNP1
CLN 1E	006	TF	SSE23	514957.00N 0004306.08E	-	-	N	086° (086.3°)	0.6	5.0	-	5000	-	RNP1
CLN 1E	007	TF	SSE26	515008.21N 0004755.61E	-	-	N	086° (086.4°)	0.6	3.0	-	6000	-	RNP1
CLN 1E	008	TF	CLN	515054.50N 0010851.32E	-	-	N	086° (086.5°)	0.6	13.0	-	6000	-	RNP1

AD 2-EGSS-6-8

Figure 20 RNP1 Coding Table: (above) Current Rwy 22 CLN1E as per AIRAC10-2021, (below) proposed CLN2E

CHANGE (XX/XX). Climb XXXXXXXXXXXXXXXXXXXXXXXX
AERO INFO XXXXXXXX

Standard Instrument Departure Coding Tables

DRAFT PROPOSAL NOT FOR FLIGHT

London Stansted Runway 22 CLN 2E

Designator	Sequence Number	Path Term-inator	Waypoint Name	Waypoint Co-ordinates	Arc Centre Name	Arc Centre Co-ordinates	Fly-over	Course/ Track °M (°T)	Magnetic Variation	Distance (NM)	Turn Direction	Level Constraint	Speed Constraint (KT)	Navigation Performance
CLN 2E	001	CF	SSW01	515146.36N 0001205.90E	-	-	N	222° (222.9°)	0.6	0.9	-	+900	-210	RNP1
CLN 2E	002	RF	SSS03	514938.12N 0001213.68E	SSW21	515044.64N 0001353.32E	N	-	0.6	-	LEFT	-	-210	RNP1
CLN 2E	003	RF	SSE06	514850.07N 0001553.31E	SSS22	515151.13N 0001533.04E	N	-	0.6	-	LEFT	+3000	-210	RNP1
CLN 2E	004	TF	SSE11	514910.19N 0002348.04E	-	-	N	085° (086.0°)	0.6	4.9	-	4000	-250	RNP1
CLN 2E	005	TF	SSE18	514937.86N 0003502.87E	-	-	N	086° (086.3°)	0.6	7.0	-	4000	-	RNP1
CLN 2E	006	TF	SSE23	514957.00N 0004306.08E	-	-	N	086° (086.3°)	0.6	5.0	-	5000	-	RNP1
CLN 2E	007	TF	SSE26	515008.21N 0004755.61E	-	-	N	086° (086.4°)	0.6	3.0	-	6000	-	RNP1
CLN 2E	008	TF	CLN	515054.50N 0010851.32E	-	-	N	086° (086.5°)	0.6	13.0	-	6000	-	RNP1

AD 2-EGSS-6-8

CHANGE (13/20): VOR REFERENCES REMOVED. SEQUENCE NUMBER 003 ARC CENTRE NAME CORRECTED.
AERO INFO DATE 18 SEP 20

Standard Instrument Departure Coding Tables

AIRAC10-2021

London Stansted Runway 04 DET 1D

Designator	Sequence Number	Path Term-inator	Waypoint Name	Waypoint Co-ordinates	Arc Centre Name	Arc Centre Co-ordinates	Fly-over	Course/ Track °M (°T)	Magnetic Variation	Distance (NM)	Turn Direction	Level Constraint	Speed Constraint (KT)	Navigation Performance
DET 1D	001	CF	SSN01	515417.69N 0001552.90E	-	-	N	042° (042.9°)	0.6	0.6	-	+900	-200	RNP1
DET 1D	002	RF	SSE02	515439.01N 0001737.69E	SSN21	515329.61N 0001716.53E	N	-	0.6	-	RIGHT	-	-200	RNP1
DET 1D	003	RF	SSE05	515229.73N 0001924.75E	SSE22	515308.66N 0001710.14E	N	-	0.6	-	RIGHT	-	-200	RNP1
DET 1D	004	TF	SSS11	514654.90N 0001512.38E	-	-	N	204° (205.1°)	0.6	6.2	-	+3000	-250	RNP1
DET 1D	005	TF	SSS12	514553.58N 0001426.28E	-	-	N	204° (205.0°)	0.6	1.1	LEFT	-	-	RNP1
DET 1D	006	TF	SSS18	514045.12N 0001831.92E	-	-	N	153° (153.7°)	0.6	5.7	-	5000	-	RNP1
DET 1D	007	TF	NEPNA	512958.40N 0002656.78E	-	-	N	153° (153.7°)	0.6	12.0	-	-	-	RNP1
DET 1D	008	TF	DET	511814.41N 0003550.19E	-	-	N	154° (154.5°)	0.6	13.0	-	5000	-	RNP1

AD 2-EGSS-6-9

Figure 21 RNP1 Coding Table: (above) Current Rwy 04 DET1D as per AIRAC10-2021, (below) proposed DET2D

CHANGE (XX/XX): Climb XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
AERO INFO XXXXXXXX

Standard Instrument Departure Coding Tables

DRAFT PROPOSAL NOT FOR FLIGHT

London Stansted Runway 04 DET 2D

Designator	Sequence Number	Path Term-inator	Waypoint Name	Waypoint Co-ordinates	Arc Centre Name	Arc Centre Co-ordinates	Fly-over	Course/ Track °M (°T)	Magnetic Variation	Distance (NM)	Turn Direction	Level Constraint	Speed Constraint (KT)	Navigation Performance
DET 2D	001	CF	SSN01	515417.69N 0001552.90E	-	-	N	042° (042.9°)	0.6	0.6	-	+900	-200	RNP1
DET 2D	002	RF	SSE02	515439.01N 0001737.69E	SSN21	515329.61N 0001716.53E	N	-	0.6	-	RIGHT	-	-200	RNP1
DET 2D	003	RF	SSE05	515229.73N 0001924.75E	SSE22	515308.66N 0001710.14E	N	-	0.6	-	RIGHT	-	-200	RNP1
DET 2D	004	TF	SSS11	514654.90N 0001512.38E	-	-	N	204° (205.1°)	0.6	6.2	-	+3500	-250	RNP1
DET 2D	005	TF	SSS12	514553.58N 0001426.28E	-	-	N	204° (205.0°)	0.6	1.1	LEFT	-	-	RNP1
DET 2D	006	TF	SSS18	514045.12N 0001831.92E	-	-	N	153° (153.7°)	0.6	5.7	-	5000	-	RNP1
DET 2D	007	TF	NEPNA	512958.40N 0002656.78E	-	-	N	153° (153.7°)	0.6	12.0	-	-	-	RNP1
DET 2D	008	TF	DET	511814.41N 0003550.19E	-	-	N	154° (154.5°)	0.6	13.0	-	5000	-	RNP1

AD 2-EGSS-6-9

10. ANNEX: Engagement Emails (Redacted)

10.1 MAG Stansted Airport:

RE: SAIP AD6 discussion - STN response

AS [redacted]@magairports.com>
To [redacted]
Cc

27/09/2021

Follow up. Start by 27 September 2021. Due by 27 September 2021.
You replied to this message on 27/09/2021 09:32.

[redacted]

Hi [redacted]
I've just come off a call with [redacted] (Ops Dir) and [redacted] (Hd of Airside Ops).

As a team we're happy with your proposed way forward and will continue to support AD6 as a means for improving operations at both LTN and STN

Best regards
[redacted]

10.2 Ryanair:

Re: Changes to Stansted SID Gradients

BC Base Captain, STN [redacted]
To

08/10/2021

You replied to this message on 08/10/2021 10:09.

Hi [redacted], our performance department has reviewed the changes and we don't see them as limiting under normal conditions from a climb gradient perspective.

Kind Regards
Captain [redacted]
Base Captain Stansted
Phone +44 [redacted]
Mobile +44

10.3 Jet2:

RE: Changes to Stansted SID gradients

CC [redacted]@jet2.com>

To [redacted]

08:10

Dear [redacted]

Thank you for the information.

Following our conversations, Jet2.com understands the proposed amendments to the altitude restrictions for these SIDs, and agrees with the NATS statement.

Best regards,

[redacted]

[redacted]
Aircraft Performance Manager
Flight Operations Technical

Jet2.com & Jet2holidays
Low Fare Finder House
Leeds Bradford Airport
Yeadon
LS19 7TU

Direct Dial: [redacted]
Extension:
Mobile:

From: [redacted]@nats.co.uk>
Sent: 22 October 2021 16:00
To: [redacted]@jet2.com>; [redacted]@nats.co.uk>
Subject: Changes to Stansted SID gradients

Dear [redacted]
Please find attached the draft changes to Stansted SID altitude restrictions, as discussed.

We can confirm, through our analysis of radar data, that Jet2's Stansted B738 fleet did not underfly the proposed altitude restrictions in summer 2019.
If Jet2 continues to operate its fleet in the same manner, there is no reason to expect underflight of the proposed altitude restrictions when they go 'live', planned for AIRAC02-2022 (Thurs 24 Feb 2022).
An increase in aircraft power settings would not be required, as evidenced by the radar analysis.

Best wishes

[redacted]

NATS

[redacted]
Airspace Change Expert
Airspace Change Compliance & Delivery
Airspace & Future Operations
WFH Mobile: +44 [redacted]

[redacted]@nats.co.uk www.nats.aero

11. ANNEX: Summary of Gate Analysis Methodology

11.1 This section briefly explains the dataset and summarises the methodology used to provide the results in this supplement. The gate results were based on the analysis of flight data points of Stansted departures, from just after midnight on 1 June to just before midnight on 30 September 2019, a period of 121 days.

11.2 The flight data points are sourced from NATS' radar data repository. Each data point represents a 'snapshot' of an actual aircraft's flight, at the moment it passes through one of the analysis gates.

11.3 An individual flight may go through more than one of the analysis gates. A single flight would cause more than one data point if, for example, it passes through both Gate 1 and Gate 2 - where Gate 1 is closer to the runway than Gate 2 along the same SID track.

11.4 A single flight may also pass through gates that overlap or cross, causing a data point for each gate. Each of these data points required additional study to ensure that the data point for the correct gate is identified and counted (see para 11.10 below).

11.5 Each data point has multiple elements such as vertical position and heading that have been used to set parameters for the analysis. One element of each flight data point is its Mode S vertical position report, based on the Standard pressure setting 1013.2hPa, which was then converted to altitude using the relevant QNH, and subsequently rounded down to the nearest 100ft (for example, a converted altitude of 2,999 would be rounded down to 2,900). This is commonly referred to as Mode Charlie Altitude.

11.6 Another element of each data point is the Mode S heading report, indicating the direction of travel at that instant.

11.7 As noted in paras 4.5-4.6 on p.6, data could not be considered as having past an altitude until it was 400ft or more above that altitude.

11.8 The flight data points for the Mode Charlie altitudes per gate were counted 400ft above (met) and up to 300ft above (not met).

11.9 Data points considered 'bad' per gate were excluded, such as altitudes reported as 0ft.

11.10 As per para 11.4 above, data points caused by a flight passing through overlapping or crossing gates required additional study. A set of logical conditions was agreed with a subject matter expert, in order to filter in (or out) the data points and determine the correct proportions meeting (and not meeting) the gate altitude before they were converted to numbers of flights.

11.11 For example, and as per para 4.12.1 on p.15, Gate 6's altitudes are not relevant, but if a unique flight passed through both Gate 1 and Gate 6 and was heading in an appropriate direction through Gate 6, then that flight should be removed from the count for Gate 1 because it was unintentionally captured (perhaps an unusually wide turn) and is not relevant to the Gate 1 SID being analysed.

11.12 Another example is where Gate 7 is designed to understand Rwy 04 departures, however it 'crosses' the Rwy 22 DET/LAM track, as per Gate 5

Figure 22 Gate 5 and Gate 7 crossover highlighted

11.13 This means that many Rwy 22 flights were unintentionally captured by this gate. We inferred that only flight data points with a heading between 190°-230° 'belong' in Gate 7. Outside these heading parameters the flight is likely to 'belong' to a different Gate. Thus all flight data points with a heading outside 190°-230° were excluded from this Gate.

11.14 Other similar logical conditions determined in which gate(s) each flight logically 'belongs'. The data point extraction was processed in accordance with the logical conditions.

11.15 This provided the proportions of flight data points meeting, and not meeting, each gate's altitude. Additional processing steps translated the flight data points into the number of flights in each category as per the narratives and summary table in Section 4.

11.16 A brief discussion for the two 'pairs' of gates, i.e. Gate 1-Gate 2 and Gate 3-Gate 4:

11.16.1 As per para 4.9.7, most flights through Gate 1 would also pass through Gate 2 because each gate illustrates altitude achievements at different locations along the same CLN4S SID. There is a slight difference between the number of flights.

11.16.2 There are several potential causes, for example the track of the flight past Gate 1 but was tactically vectored away from Gate 2 by a controller in order to achieve an advantage. Another potential cause could that flight data was temporarily 'bad' or points were missing through one of the gates, but were available/deemed reliable through the other.

11.16.3 The same apply to the pair of Gate 3-Gate 4 (para 4.10.7) where most flights through Gate 3 would also pass through Gate 4 because each gate illustrates altitude achievements at different locations along the coincident CLN8R and CLN1E SIDs.

11.16.4 We contend that the similarity in numbers between the paired gates is sufficient to adequately illustrate the SIDs in question.

End of document