RELAS AD6 Stage 7 Common Submission

Version 1.0 - 27 August 2024

https://relas.uk/
https://www.facebook.com/groups/relas.ad6

Email: info@relas.uk

Address: Unit 3, Old Knebworth Lane, Knebworth, Herts SG3 6PY

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Change control:

Version	Date	Summary Of Changes
1.0	27 August 2024	Initial release

Glossary of Acronyms

AD6	Airspace Design change relating to airspaces around Luton airport
ANG2017	Air Navigation Guidance - Governing legislation
ATC	Air Traffic Control
CAA	Civil Aviation Authority - the aviation industry regulator
CAP	Change Aviation Proposal
CAP1616	The document prescribing the 7-stage process to design trial and implement a change in airspace
CDA	Continuous Descent Approach - smooth descent close to landing, typically from around 4000 ft
CDO	Continuous Descent Operation - smooth descent from higher levels, ideally from ToD
FL	Flight Level - standardised measurement of aircraft height when en-route between airfields.
IAS	Indicated Air Speed - effectively the speedometer on the aircraft showing speed of the aircraft through the air, will not match speed over the ground due to wind etc
LLA	London Luton Airport - also joint sponsor, with NATS of this airspace change proposal
NATS	National Air Traffic Service - also joint sponsor, with LLA of this airspace change proposal
NTSC	Luton Noise and Track Sub-committee
PIR	Post Implementation Review - final stage of airspace change process, evaluating the change
STAR	Standard Arrival Route
ToD	Top of Descent

Additional notes for reader:

1. Luton only has one runway, but two designations (07 or 25) depending whether aircraft are heading east or west when they land or take off, which depends on wind direction.
2. In the document you may see an annotation such as REF: AD6 PIR Stakeholder / Annex D. This indicates a reference to a document whose details can be found in Section 12, References.
3. This document is intended to be read in conjunction with the Stage 7 PIR documents, links to which can be found in the references section.

1 Summary

1.1 Preface

This report summarises findings from regional experts and residents affected by the Swanwick Airspace Improvement Programme - Airspace Deployment 6 (AD6). It is based on thorough technical analysis using industry standards and guidelines. The document serves as a centralised, evidence-based resource for stakeholders responding to the PIR stage 7 consultation. Key points:

1. Extensive consultation and review of this document preceded publication.
2. Aims to provide consistent, authoritative points for the regulator's consideration.
3. Reflects widespread alignment on presented perspectives and concerns.
4. Individual Stage 7 responses referencing this document should be treated as separate submissions, not dismissed as part of a collective response.
5. Full and fair consideration of individual responses is required by the CAP1616 consultation process. (See AD6 Stage 3 Consultation Document 1.18)

Further information on industry references, data collection, processing and validation is discussed in Section 10.
Any areas where we disagree with the change sponsors' Post Implementation Review (PIR) are listed in Section 9.

For more information on RELAS, see their details on the front cover.

1.2 Imperative

The Civil Aviation Authority (CAA) must not approve AD6 at the Stage 7 post-implementation review. Furthermore, the AD6 airspace design must not be accepted as part of the future airspace design outlined in the Airspace Modernisation Strategy. (AMS).

This document presents extensive evidence to the aviation industry regulator that supports this assessment. The following sections provide detailed analysis and justification for this imperative.

1.3 Key Reasons Not To Approve AD6

The following reasons are described in detail in this document. Other stakeholders referencing this document may have additional reasons:

1. The actual AD6 operation differs significantly from the airspace operation described in the public consultation. For example as detailed later in Section 1.5: only 5% of traffic using the consulted routes. Any nuisance that might have been expected under the hold has moved to the tactical flows.
2. Approval of AD6 would create ambiguity between planned operation and actual implementation.
3. The implemented AD6 tactical operation does not align with stated AD6 design principles.
4. NATS/Luton's aircraft operational and flight distribution data in AD6 Stage 7 Post-Implementation Review 'Annex A' contains vague, or misleading or erroneous information. The PIR also uses vague statements like 'broadly as expected' & 'within tolerance' without justification.
5. Operational flight data reveals numerous issues of concern.
6. Inappropriate metrics are used as proxies for CO2 efficiency and noise levels; there is selective interpretation of ANG 2017 to justify tactical behaviours.
7. Independent analysis shows AD6 has not delivered significant CO2 or noise profile improvements, failing to progress towards ICAO net-zero targets.
8. Luton remains lowest in Eurocontrol's noise rankings by a significant margin for London Airports, and comparable with Heathrow for the worst per-flight CO2 performance, even before anticipated traffic increases from airport expansion.
9. There has been a lack of transparency in the design and trial of AD6.
10. There has been a failure to act on complaints including from national and local government representatives and face-to-face workshops. Feedback presented in AD6 Stage 7 Post-Implementation Review Annex D is incomplete, see Section 7, inhibiting oversight and transparency in complaint responses.
11. Current traffic patterns demonstrate that consultation in earlier AD6 stages was over an inadequate geographic area.
12. There is a correlation between tactical flow behaviours and a design option previously rejected at stage 2 due to safety concerns.

1.4 Impact Of AD6 Approval, as Proposed

Approving AD6 based on the current Stage 7 Post-Implementation Review report and actual evidenced behaviour would have the following consequences:

1. **Allow "Fly anywhere":**
    - Operational data differs significantly from AD6 consultation, effectively permitting NATS and Luton aircraft to use any flight paths in the AD6-impacted airspace (excluding immediate runway vicinity and existing Stansted hold).
2. **Reinforce mis-stated design principles and operational metrics:**
    - Air Navigation Order principles, AD6 design principles, and NATS sustainability and environmental guidelines are inaccurately paraphrased and/or selectively applied.
    - Approval relies on two new commercially-driven imperatives introduced at stage 7 and not aligned with the original design principles and priorities:
        i. a. 'Flight efficiency': Prioritising reduced track-miles, instead of, and often at the expense of, sustainable CO2/noise solutions.
        ii. b. 'Controller efficiency': Minimising ATC interactions under the guise of safety, serving a commercial agenda.
3. **Allow avoidance of environmental reporting and accountability:**
    - Luton/NATS environmental reporting is flawed theoretically (e.g., CDO reporting from 4,000 ft, not 7,000 ft or top-of-descent) and practically (track length data).
    - Luton, despite its smaller size, is the worst London airport for noise (CDO derived data) and matches only Heathrow in fuel/CO2 inefficiency.
    - NATS Sustainable Aviation Guide appears unused and unreferenced.
4. **Perpetuate ineffective complaints process / consultation:**
    - Unlike other London airports, written complaints receive pro-forma dismissals, repeat complaints are capped, and face-to-face workshops/noise working groups are stalled by Luton.
5. **Continued avoidance of reporting and regulation comparable with other London Airports:**
    - Despite increasing traffic and expansion plans, Luton (as the 4th London Airport) would avoid regulations, reporting criteria, and benchmarking applied to other London airports.
    - Example: The other three London airports are subject to CAA night-time noise/flight review and have more comprehensive and comparable environmental reports.
    - Luton has chosen less demanding benchmarks to publish, potentially obscuring the full environmental impact of its operations.
6. **Reduce Luton Airport's accountability towards residents impacted by AD6 flightpath noise and pollution:**
    - The approval would limit the airport's responsibility to address concerns and implement effective mitigation measures for affected communities.

This document suggests areas to consider for general mitigations of impacts resulting from the current operational behaviours that do not match the AD6 consultation. Stakeholders (including organisations, representative bodies, and individuals) are expected to make further specific references to immediate operational mitigation requests in their 6000-word individual responses. Additionally, they are likely to request a commitment to engage in detailed and ongoing further discussions to create and implement additional mitigation strategies and tactics.

Operation 2024 looks similar. Beyond the monitoring period we have briefly reviewed the flight data to mid August 2024, and also the Eurocontrol data. There has been no significant change to overflight or dispersion data, or to C02 or noise efficiency.

1.5 Summary of Key Operational Issues

Operational issues detailed in this document include:

- Routing issues:
  - Use of STARs not as expected and publicised
  - Use of hold not as expected and publicised
  - Ad hoc creation of larger than anticipated speed absorption areas
  - Undocumented route shortcuts
  - Noise and nuisance exceeding expectations
  - Aircraft overspeed
  - Inequitable traffic distribution, creating high frequency 'rat run' tactical flows
- Late night and early morning flights:
  - Inequitable traffic distribution by time of day, in particular Increased early morning and late night flights, disturbing residents living under the flight path.
- 'Convoying':
  - Multiple aircraft clustered over same location at very short intervals
  - Increased noise and intrusion from these 'convoys'
- Excess CO2 (inefficient descents):
  - Prioritising time to ground over CO2 reduction above 7000 feet
  - Lack of CDO support for pilots on shortcut routes or tactical flows
- Noisy descents:
  - Inadequate and outdated measurement of noise and nuisance (LAEq, dismissal of noise above 7000' and impact on residents in rural area)
  - Noisy, inefficient descents due to time-to-ground prioritisation, requiring frequent descent rate/thrust changes and use of air/speed brakes
  - Noise impact is greater and more widespread than predicted and publicised.
- Consultation and complaint handling issues:
  - Exclusion of newly affected areas from early consultations
  - Deterrent responses to complaints, or complaints routinely ignored
  - Lack of substantive replies to specific information requests
  - Failure to report or follow up on stakeholder meetings
  - Ignored concerns from various levels of government (parish, district, MP) not reflected in PIR Annex D.
  - PIR Annex D failed to disclose Luton working group accepting and investigating descent noise.

1.6 Document Purpose

This document serves as a central resource of collated data and evidence for the CAA in considering AD6.

It can be referenced by various parties and representative bodies in their location specific responses.

Key points:

1. Many issues presented were previously raised in Stage 6 Feedback but remain unaddressed by NATS/LLA.
2. Some tactical mitigations are included for illustration, but local communities may have different priorities for changes and mitigations in their CAA submissions.
3. The authors hope this document will lead to constructive face-to-face discussions rather than being ignored during the consultation process.
4. This is a living document that will be updated throughout the consultation period. It is clearly versioned and available to multiple parties as a resource.
5. Interested parties are advised to review the latest version near the close of the AD6 consultation period.

The overall aim is to provide a comprehensive, evidence-based foundation for stakeholders to reference in their individual responses to the AD6 consultation.

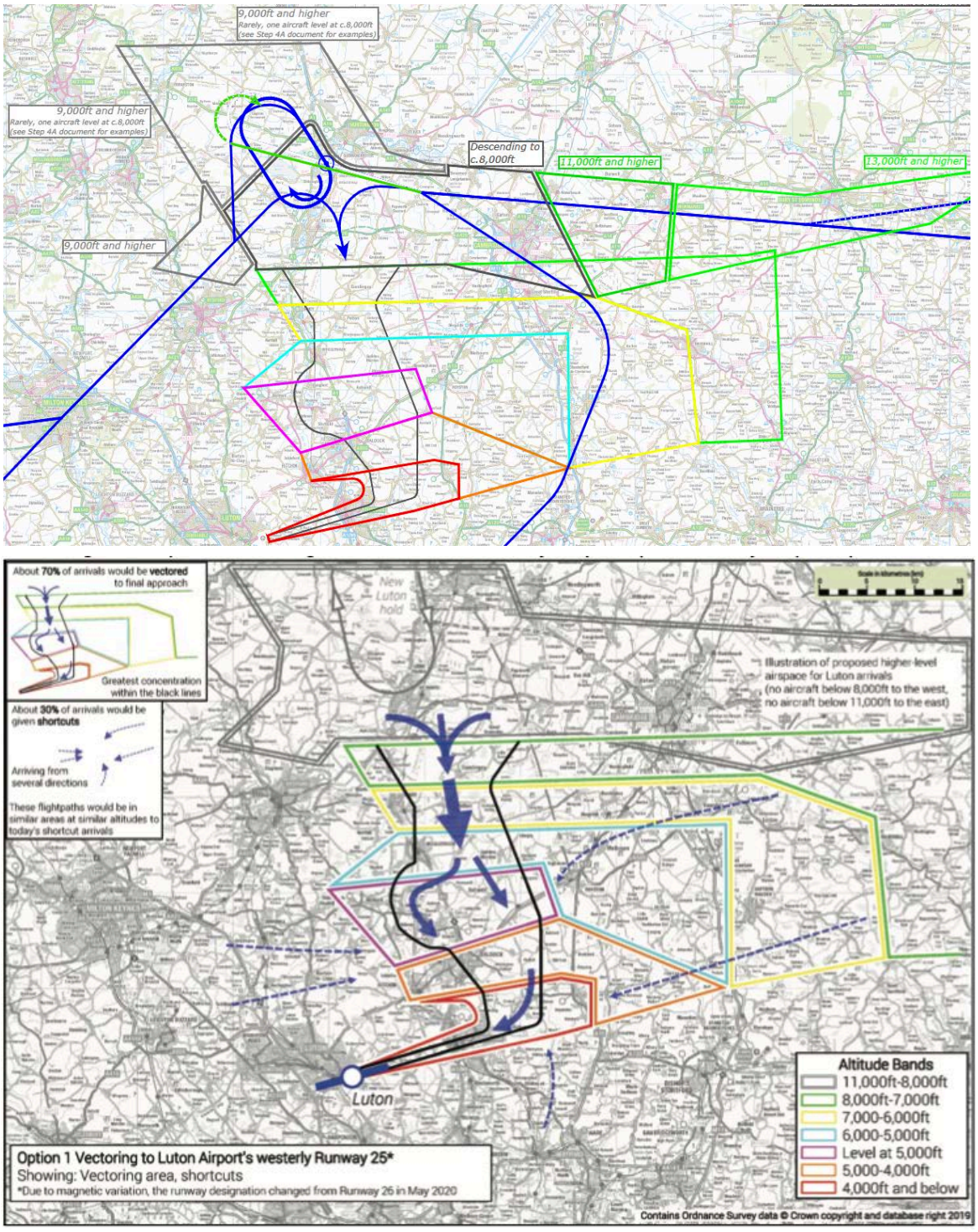
2 Geographic Operations

2.1 Traffic Dispersion

This section presents maps showing the key traffic expectations and actuality of the AD6 design. While it is assumed that the CAA will be familiar with the AD6 overall design, key AD6 fragments are reproduced here for direct comparison against the reported and actual airspace operation.

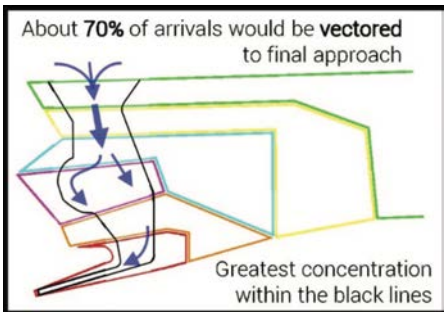
2.2 AD6 Expectation

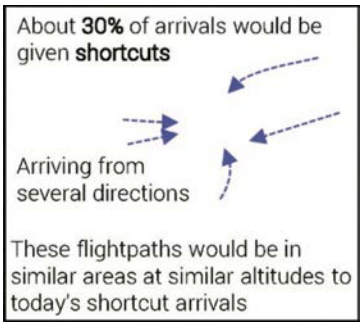
The following two maps taken from NAT's produced AD6 documentation (post consultation at stage 4B) summarise the low altitude and high altitude path aspects of AD6 and should be familiar to the audience. Corresponding maps are also available for arrivals to Runway 7. Both the following two original maps can be found in the AD6 Stage 4 documentation.



Above low level from 4B Airspace Change Proposal Issue 1.0, previous image from latest Tech Map refer to source for © details.

Notable features presented in the earlier public consultation, setting public expectations were:





1. **New Hold.** A new hold would be established near Grafham Water to separate Luton and Stansted Traffic.
2. **Eastern Traffic**. Traffic from the east would fly north of Cambridge (following the blue line corresponding to arrival STAR on aviation maps) to the new hold arriving there at around 9000 feet, then turn south following a line parallel to the A1 road and gradually descending to turn right onto the final approach path shortly before landing
3. **Southern Traffic**. Traffic from the south would be routed east of Cambridge to join the eastern arrivals and approach Luton from the north.
4. **70% Vectored Approach via *vectoring area* ('funnel') from the stack**. The vectoring area (the black funnel) is identified on the map above, and in the map key as being the concentration of lower level traffic taking 70% of the traffic. Quote map key: *"About 70% of arrivals would be vectored to the final approach. Greatest concentration between the black lines".*
5. **30% Existing Shortcuts.** The remaining 30% of traffic would take shortcuts as shown on the second map as dotted blue lines. Quote map key: *"About 30% of arrivals would be given shortcuts, arriving from several directions. These flight paths would be similar areas, at similar altitudes to today's [i.e. pre-AD6] shortcut arrivals."* So please note the position of these lines with care.

ANG2017 guides that consultation material should be appropriate for the audience. From the materials presented, listeners reasonably expected that illustrated strategic flows would be followed and there would be minimal impact on villages to the north of Biggleswade (no Luton traffic here prior to AD6) and, where villages were overflown, flights would be dispersed (See P27 Stage 5 CAA Consultation Assessment) and would 'stay higher for longer' (https://airspacechange.caa.co.uk/documents/download/3853 Sponsors' responses 3.3 & 4.2.6).

The same design was explicit in the video shown in the online (during COVID) public consultation (see the still taken from the video below):

2.3 AD6 As Reported By NATS/LLA

The Tactical Flow diagram in CAP1616 AD6 Stage 7 Post-Implementation Review Annex A, reproduced below, provides the NATS/LLA interpretation of the actual traffic distribution flow. This is substantially different from the AD6 expectation outlined in the previous section, as will be explained in more detail:

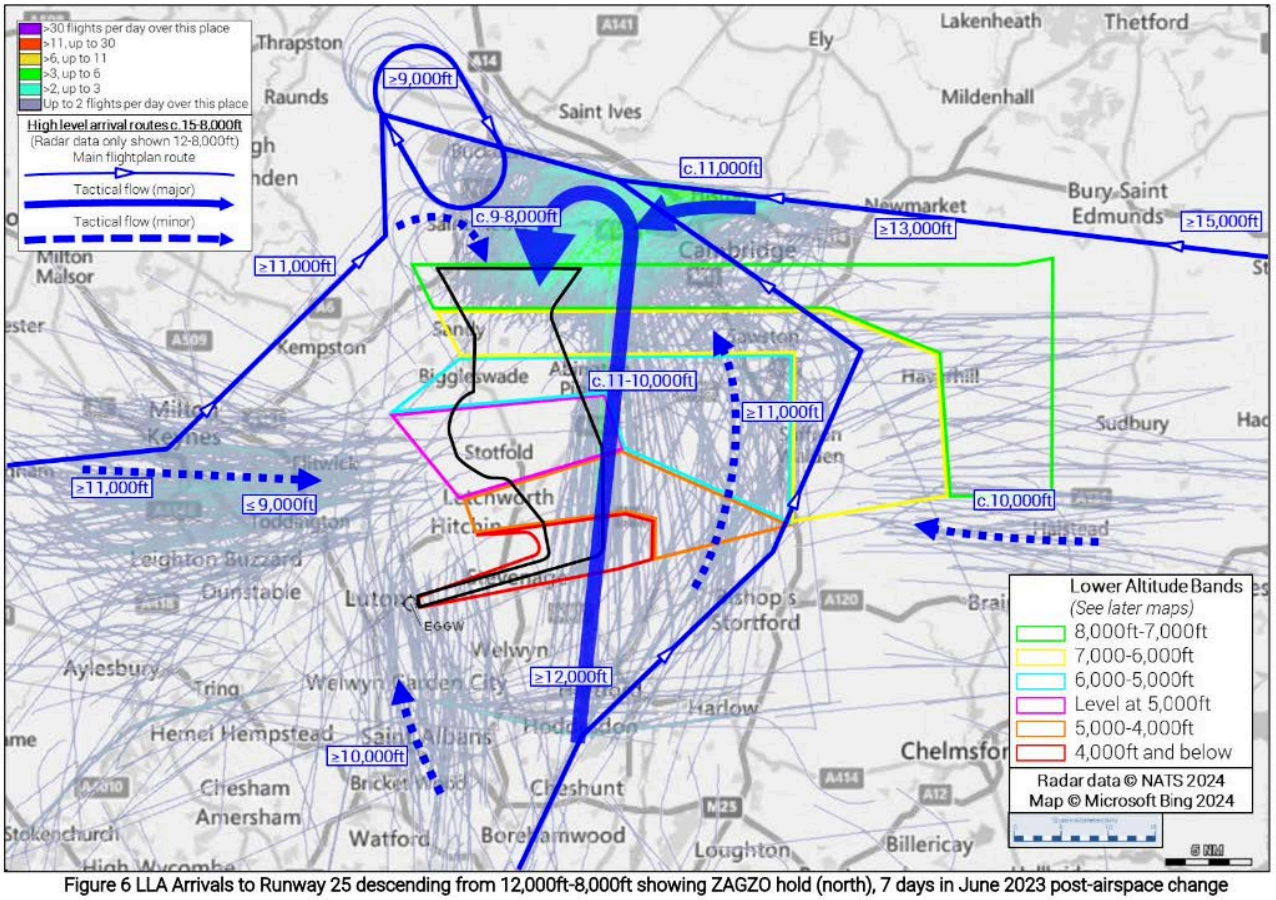


Figure 6 LLA Arrivals to Runway 25 descending from 12,000ft-8,000ft showing ZAGZO hold (north), 7 days in June 2023 post-airspace change

2.4 AD6 In Post Implementation Operation - June 16 to Sept 15 2023

2.4.1 Track Analysis

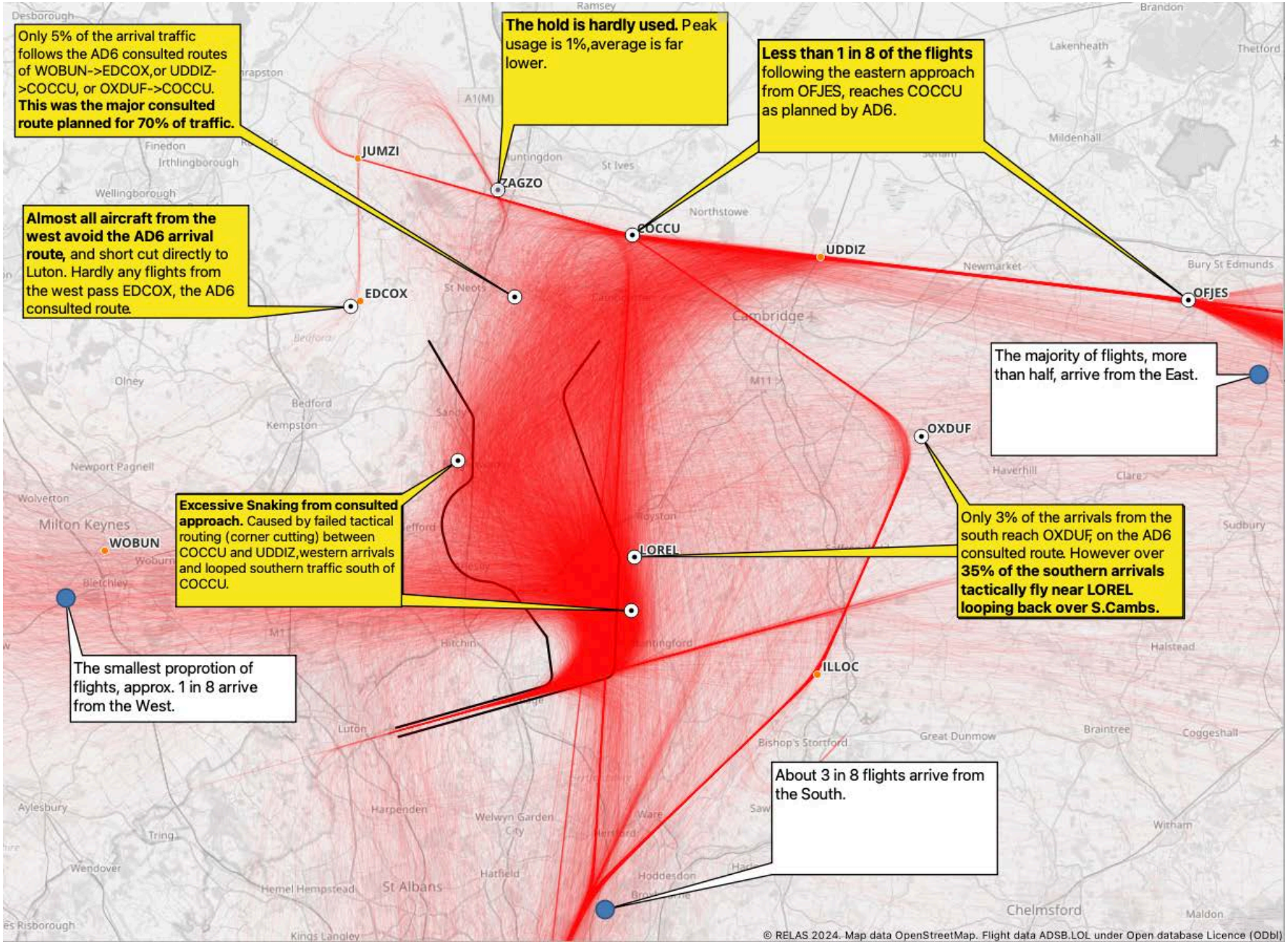
The following RELAS diagram shows all traffic flows to Runway 25. This runway, where aircraft land heading to the west, is used the majority of the time.

This is not a few days' sample data chosen by NATs **but the full CAA CAP 1616i reporting period of 16 June 2023 to 15 September 2023 (excluding NATS failure at the end of August).**[1]

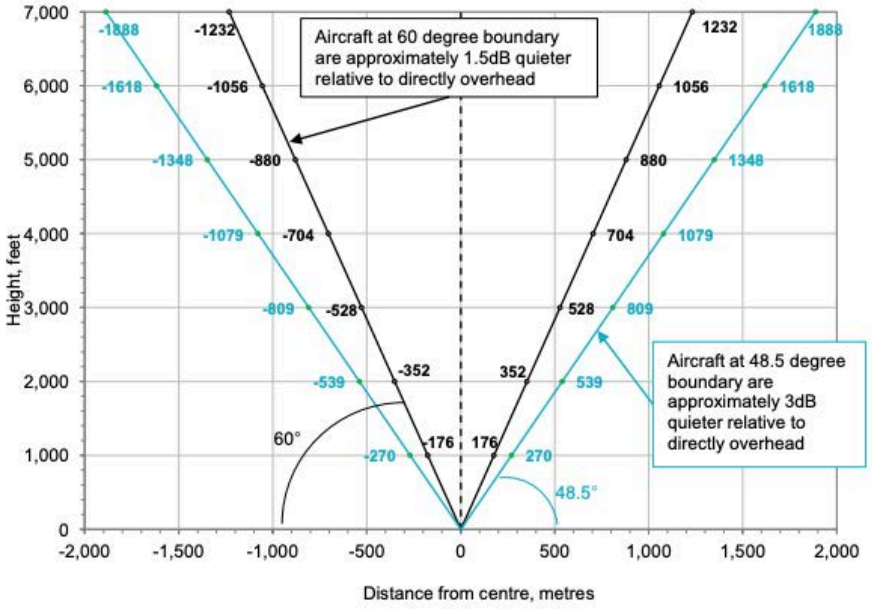
The 7 day sample period selected by NATS as 'representative' used in the previous diagram does illustrate the issues described in this report, but is not fully representative of flights over a longer summer reporting period.

Traffic over the longer period shows more pronounced 'S' flights within the vector area, and some changes to the flight pattern, especially from the south.

[1] See section 10 for verification of data processing methodology.



1. **The 'tactical flows', that were not consulted, have become the major flight path routes**, operating 24 hours a day.
2. **All the planned and consulted strategic routes are largely unused**.
    a. The stack is fundamentally unused (< 2%, with only 1.7% usage in July), despite traffic levels having returned to pre Covid levels. Low use of the hold may initially seem beneficial, however traffic spacing, descent and speed absorption are still necessary, and are effected on tactical-flows by snaking or use of spoiler/speed-brake.
    b. The tactical flows carry 33% of the traffic.
    c. Of the total traffic monitored between April and mid September, instead of 70%, only approximately 33% of the flights entered the funnel from near the hold (within 15km of the waypoint ZAGZO). Outside working hours use of the hold and adherence to the STARs is negligible as can be seen from Section 2.4.3 on night flights.
3. **The NATS/LLA data sample shown is unrepresentative**.
    a. As detailed above, the selected data sample covers only 7 days in June 2023, before the summer vacation peak traffic built.
4. **All NATS/LLA actions now are justified by a newly emergent metric, 'flight efficiency',** that was not defined in the consultation, and is being 'optimised' as minimum distance over ground (i.e. minimum time to gate). All of the prior CAA metrics (as reflected in the Air Navigation Order 2017 legislation) are not given any analysis or priority.
    a. Shortening distance over the ground ONLY increases CO2 efficiency once the descent profile is also efficient [as acknowledged in the AD6 Stage 3 Consultation documentation Section 3.37[2]]. Otherwise it does not minimise CO2 or noise. The only way to minimise noise and CO2 is first using optimum CDO from TOD, as documented in the NATS Sustainable Aviation report, and this is demonstrably not being followed. Shortening distance over the ground with increased use of fast descents, and pitch and throttle changes will increase fuel use and CO2 emissions, as well as on-the-ground disturbance.
5. **The overflight counts are both misleading and we believe badly in error** (see below and next section). Areas of the Tactical Flow diagram, above are coloured to represent counts of overflights per day.
    a. The method used for the overflight calculation is unstated, and does not draw from CAP 1498.
    b. The overflight density plot appears to be based on simply plotting the track lines, scaled from the diagram scale bar to be between 50 metres to 100m wide. From CAP1498 (cone diagram reproduced below) an aircraft at even 7,000 feet will have a noise cone of approximately 3.5 km width.
    c. This accounts for the overflight data, above, being an order of magnitude less than the overflight data presented in the following sections based on the code methodology from CAP 1498
    d. The worst overflight areas are not visible as they are overdrawn by the tactical flow arrows graphics.

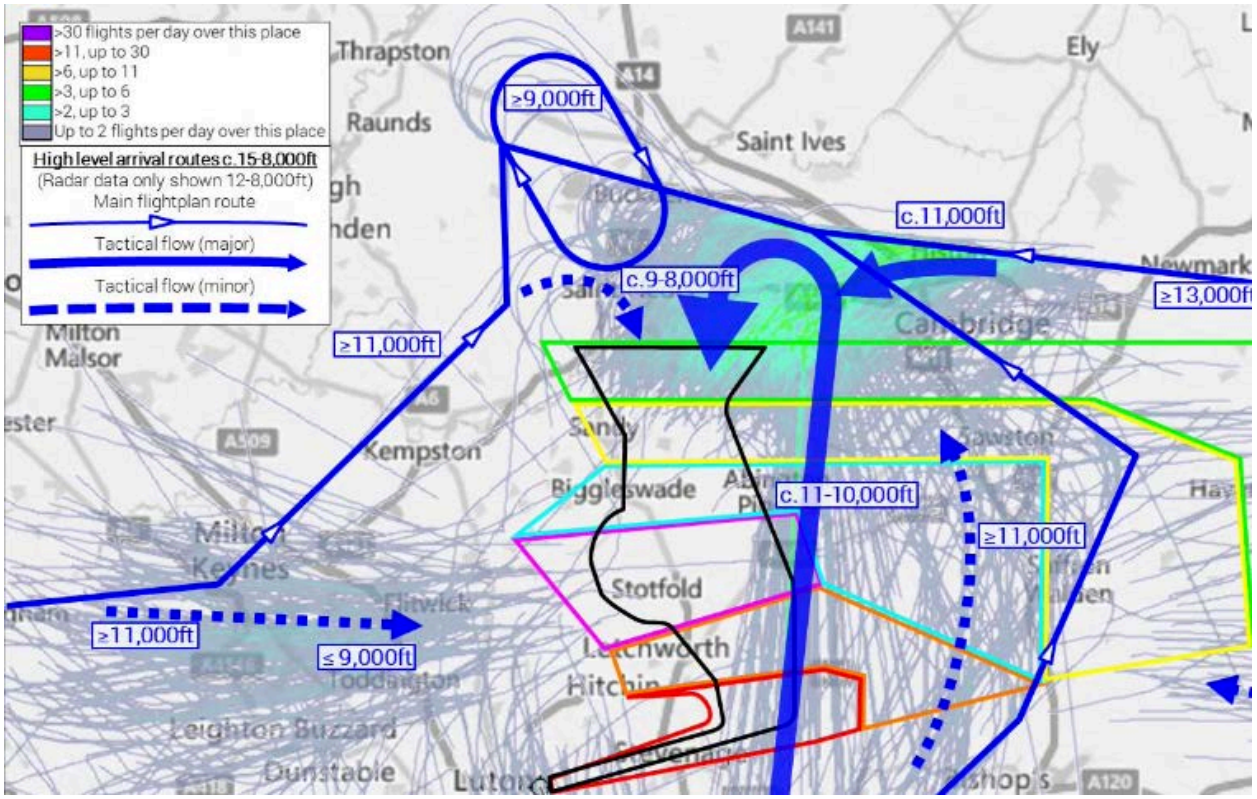


The concerns here also need to be considered in the context of the future airspace modernisation and the the REF: NATS Sustainable Aviation Guide

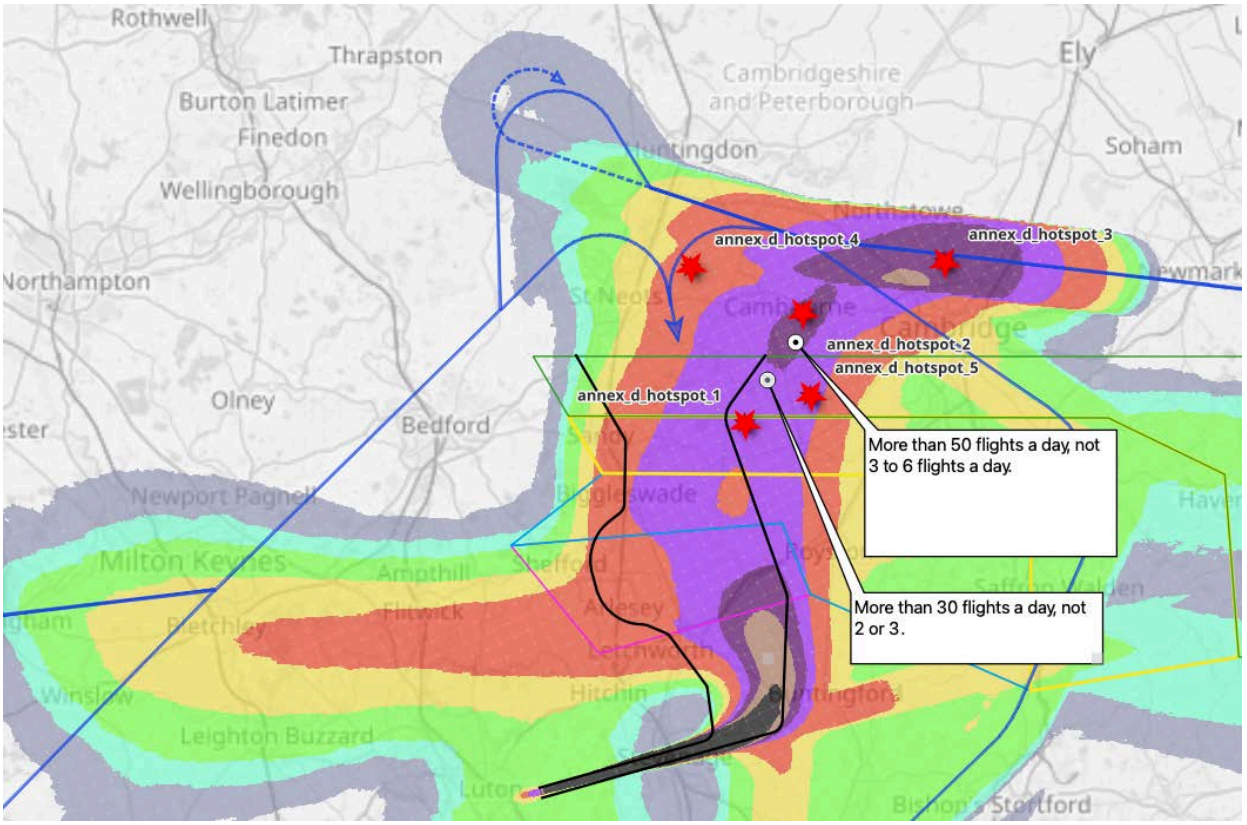
[2] https://consultations.airspacechange.co.uk/london-luton-airport/ad6_luton_arrivals/supporting_documents/LLA%20Arrivals%20Consultation%201.1%20Screen%20View.pdf

2.4.2 Overflight Analysis

It is unclear how the PIR report on overflights in Annex A was calculated. The NATS Tactical Flow diagram, enlarged and reproduced below, shows at most 6 overflights north of Biggleswade. Note the faint green glow to the west of Cambridge.



Residents report of 50+ overflights a day. So we would have expected the above diagram to be covered by large blocks of red or purple. We have independently repeated the analysis below. **The diagram below is generated by RELAS, and coloured using the same key as above, eg cyan : 2-3 overflights per day, green : 3-6 overflights per day etc. We have added an additional element to the key - very dark brown/purple for >50 overflights per day.**



In detail, the number of overflights is plotted using the exact CAP1498 'inverted cone' methodology, over a 100m grid, but we have extended the height to 12,000 ft for direct comparison with the overflight data in the earlier NATS/LLA diagram.

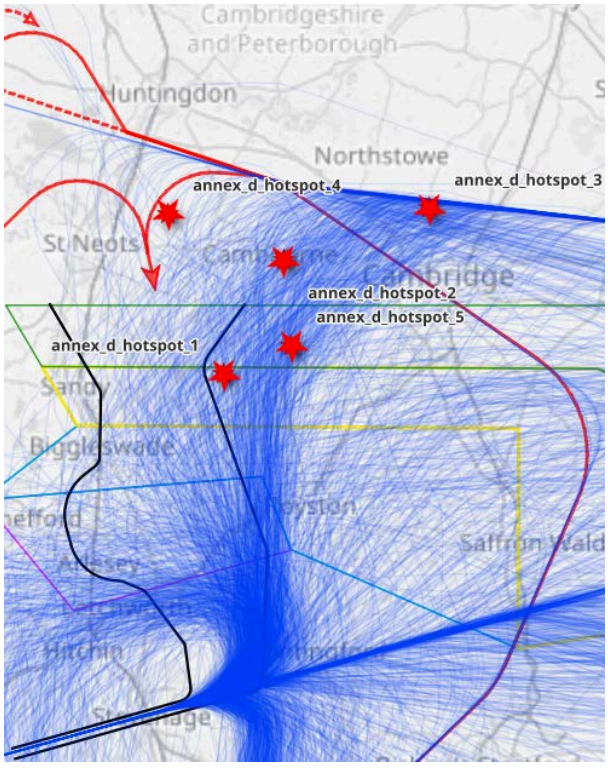
As can be seen from the diagram many areas in South Cambridge have over 50 flights a day[3], while the PIR Tactical Flow diagram shows at most 6 per day across this area. Interestingly, the **count of at least 50 flights per day is consistent with the estimate modelled in the PIR Noise Report (Fig 35)**

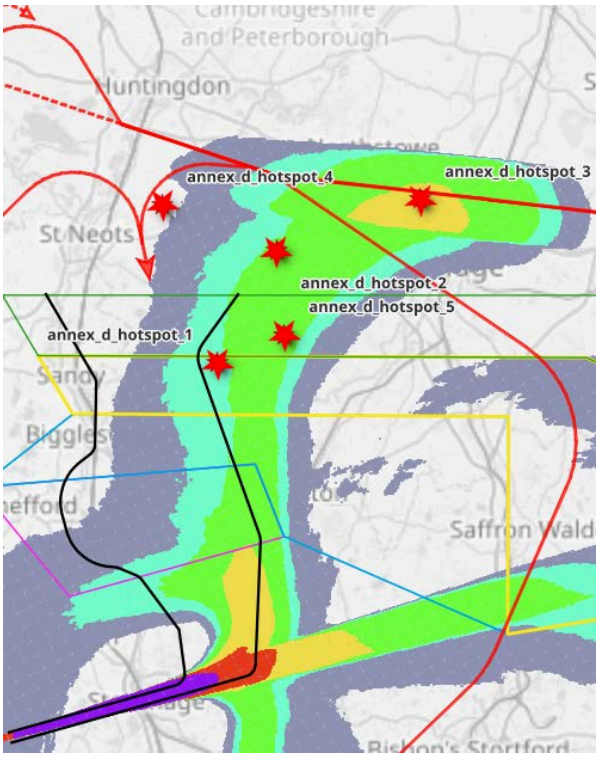
While Individual aircraft overhead may only be considered intrusive when they are below 7000 ft, if they fly in apparent convoy, up to 12 per hour (frequently less than 2 minutes apart), they cause nuisance from much greater heights. This is before considering the excess noise issues covered in Sections 5 and 6. Compare the most overflown areas with the locations of complaint hotspots (outlined in the PIR report Annex D) as shown above.

This level of overflight is before the major expansion planned for LLA. The PIR Main Report 8.3.8 suggests that the increase in passenger numbers to 19m per annum, quote "*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.*". It is not credible that the current plans to increase to 32m passengers per annum could be carried without more flights. The Luton load factors (passenger/flight occupancy) are already high, so larger aircraft are required for this assumption to be true, requiring a substantial change of aircraft fleet mix.

2.4.3 Night flights

The diagram to the left shows all the nightflight tracks for all arrivals from all directions using the westerly runway in the CAP 1616i compliant monitoring period (16 June to 15 September 2023). The night flights are shown as both track plots (on the left) and an overflight diagram (on the right). This uses the same colour key (but in this case night time only) as the previous plots. Again this is CAP 1498 compliant, extended beyond 7,000ft to be consistent with the original NATS diagram above in Section 2.4.2. Night time is from 23:00 to 07:00 local time.



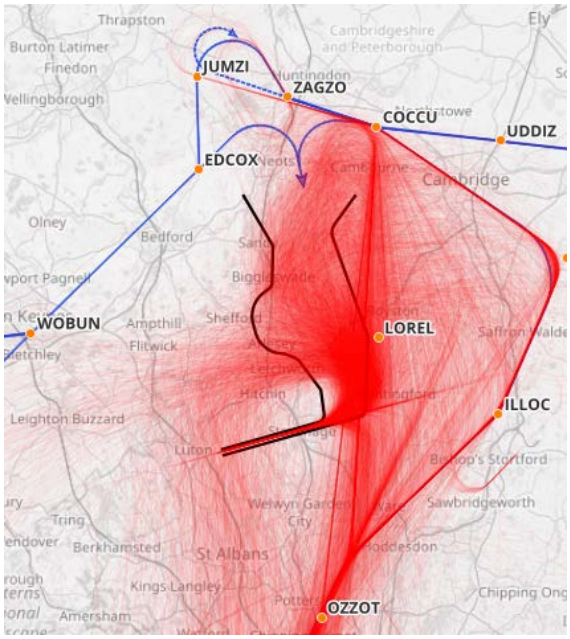


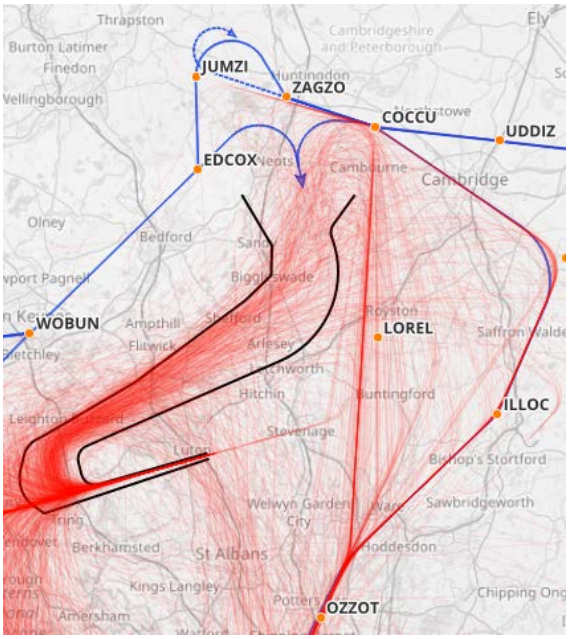
The locations of some complaint hotspots can be seen under high concentrations of night flights. **This is a key future concern with the very significant proposed 70% increase in night flights with Luton expansion.**

2.4.4 Southern Arrival "Tactical Route" Is Dominant

The following diagrams show the "tactical route" of traffic arriving from the south passing LOREL is actually a dominant route. Less than 3% of traffic originating in the south follows the route past OXDUF and COCCU to the westerly runway.

[3] Technical note: To ensure the per day counts per runway direction are absolutely accurate, we excluded days with landings in both easterly and westerly directions. Specifically we selected all days in the CAP1616i monitoring period (16 June to 15 September 2023) where at least 95% of arrivals used a single runway.





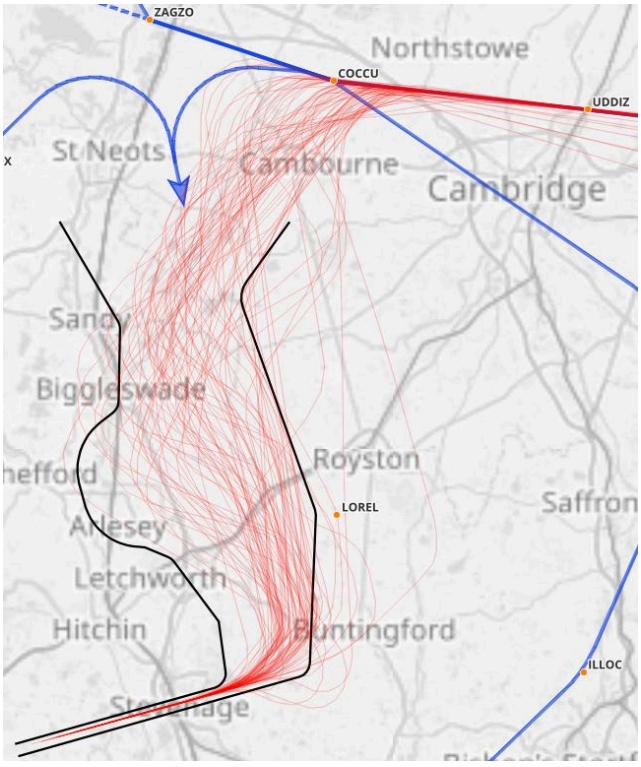
The tactical route results in many properties being overflown twice by the same aircraft with just a few minutes separation. Above especially on the left diagram, **many flight paths can be seen to cross themselves**.

2.4.5 Shortcut Justification / Speed Absorption

The justification for aircraft not to follow the consulted route (e.g. traffic from the east not continuing to CUCCU) is given as minimising distance over the ground. We have calculated the actual track distance back from the runway and used that distance in the analysis below.

The track plots below show that many of the tactical flows 'fail'. They are not shortcuts, but deliver over the ground distances at least as long as the consulted path.

Establish Track Distance For Consulted Path Is 80km or greater



This plot is for flights where track distance actually flown from UDDIZ to the runway is **80 km (43 nm)**. These give representative flights following the consulted path close to COCCU, then staying within the vectored space are shown here.

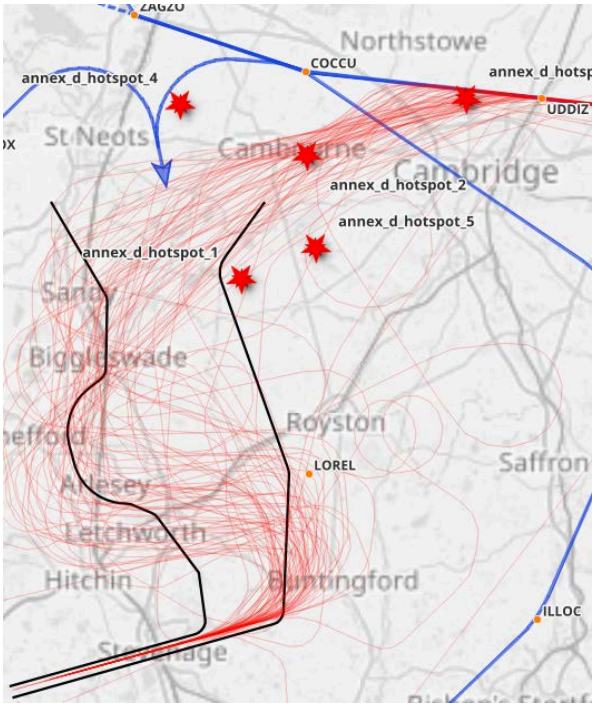
Stated simply any arrival flying longer than 80km is not a shortcut from the consulted arrival path.

Therefore to justify the tactical routing it would be expected that flights from the east taking the tactical shortcut passing UDDIZ and turning south before COCCU will fly shorter flight paths.

Review Flights With Track Paths > 90km

Clearly due to aircraft sequencing is it not realistic to expect all aircraft to fly 80km via COCCU.

So, in the plot to the right, we show aircraft with track distances to Luton > 90 km (49nm), i.e. a path distance that allows the aircraft to reach COCCU, These flights are clearly not shortcuts. Note, flights using the hold or going round were specifically excluded from this analysis, so that the distance selected is genuine track from UDDIZ to runway.



The plot shows that many flights with > 90 km to run at UDDIZ start taking the 'tactical route' avoiding COCCU and overflying more densely populated areas. **These flights then totally fail to deliver the reduced track distance (track efficiency) with extensive 'S' tracks spilling outside the vectoring area.**

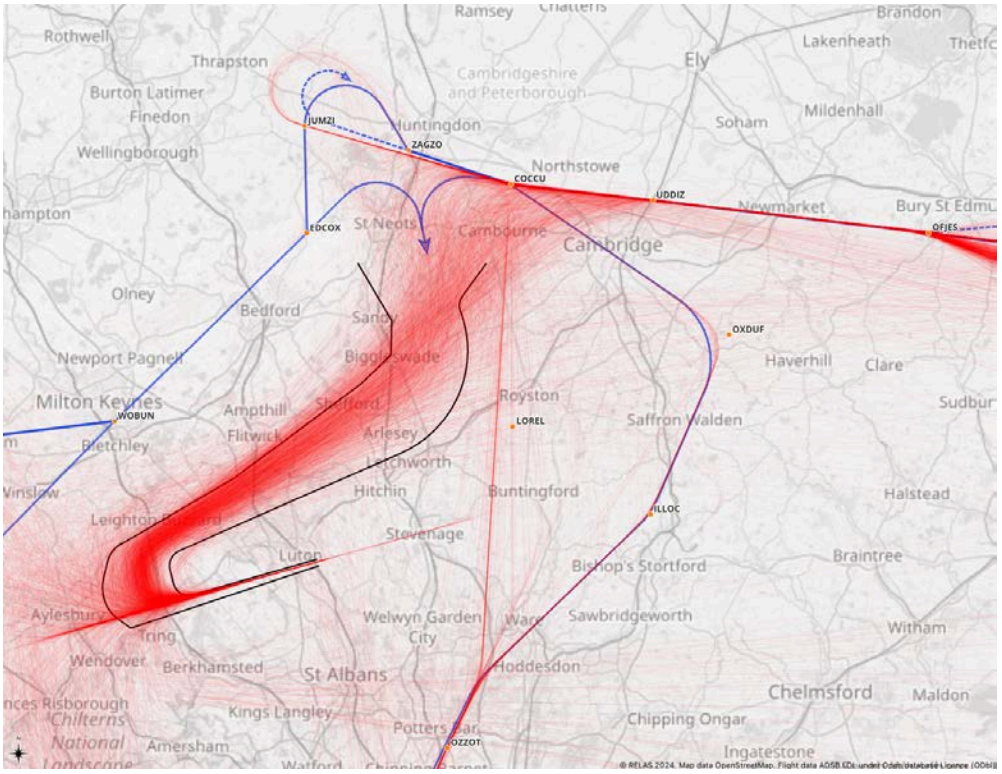
2.4.6 Rejected Design Options

At Stage 2, upper flight level options (1.3, 1.5, 1.6) where delay would be absorbed by ATC's use of tactical vectoring within Luton Airport's "Radar Manoeuvring Area" (RMA) were rejected as impractical and unsafe.

The tracks flown into, across and through the vectoring 'funnel' look remarkably similar to the rejected options. This is particularly apparent for flights arriving from the west (or south tactically routed via the west) to the westerly runway.

2.4.7 Eastern Runway

Below is a diagram of the Eastern runway in use for the same 16 June to 15 September 2023 core monitoring period. Flights originating from all directions are shown. As can be seen comparing these easterly and westerly arrivals most of the issues described above also apply for these easterly arrivals.



3 Time Of Day / Temporal Distribution

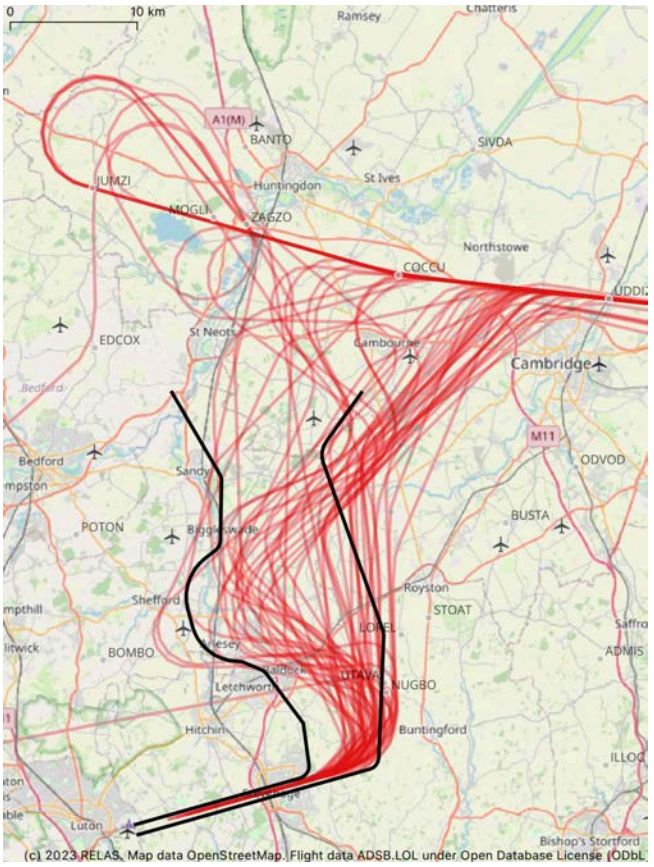
3.1 Introduction

We have investigated dispersion of traffic by time of day, as well as by geographical area. It appears that early morning and late evening flights are not equitably distributed, but are concentrated in a few locations. We have investigated aircraft passing over a number of locations, particularly near complaint hotspots.

The diagram on the left shows all Category A2 & A3 traffic from any origin, 6:30 AM BST to 7:30 AM BST, in the first week in July 2023.

This represents Luton arrivals in a one hour period.

The concentration of paths visible for this limited sample illustrates how convoys of aircraft cause nuisance to overflown areas.



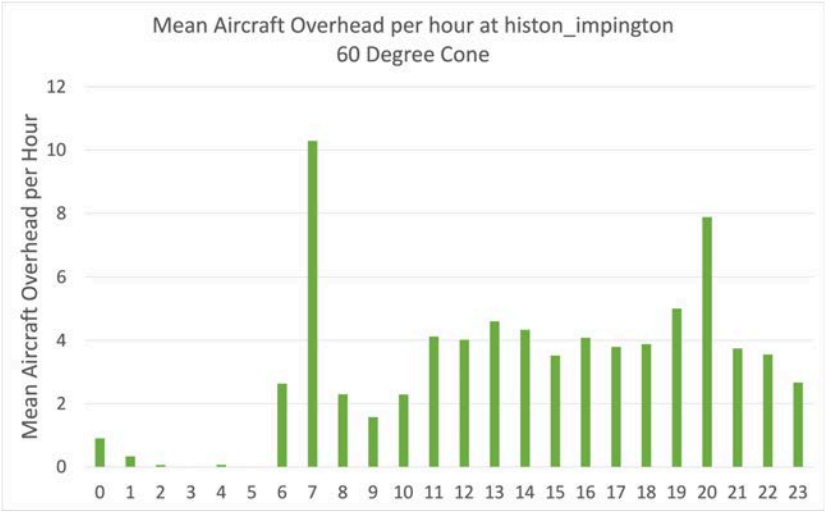
3.2 Time Of Day & Convoy Issues

CB24 has been a complaint hotspot since the Trial Implementation started. Aircraft are at around 11000 feet here, and the area was not originally consulted on AD6. The temporal concentration at complaint hotspot 3 is shown on the graph to the right.

The chart shows that, over the noise monitoring period, there were on average more than 10 aircraft passing overhead between 7 and 8am.

Even if spread evenly over the hour, this would give aircraft noise every 6 minutes, but the traffic is not even. Convoys of 5 or 6 flights at 3 min intervals are not unusual before or around 8am. If people don't observe the first aircraft, by the end of the convoy they are fully sensitised.

While noise is not the highest priority for traffic at 11000 feet, convoys of aircraft turning and descending in a stepped descent with frequent changes in engine thrust, make much more intrusive noise, which has distinct adverse effects on the overflown population.



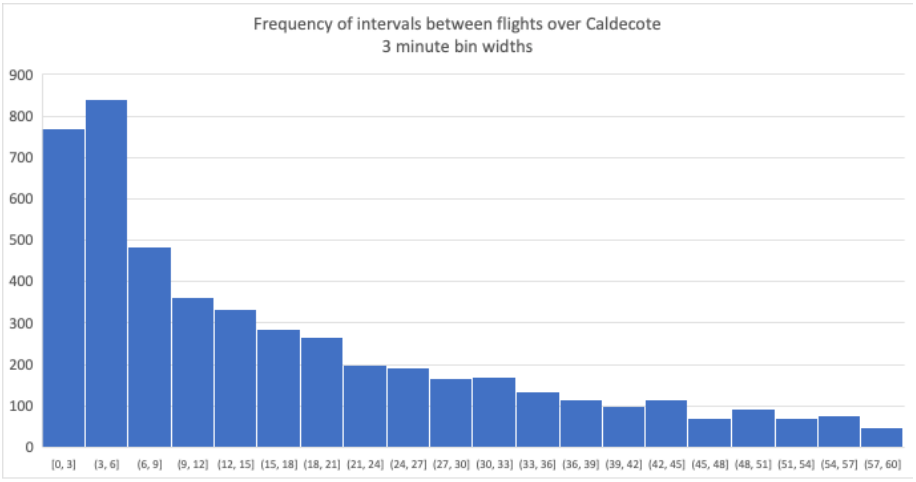
3.3 Overflight Frequency - Convoys

The noise and disturbance caused by ‘Convoys’ [i.e. high frequency flights over a narrow area in a short period] of aircraft can be seen in the histogram to the right. Here we show the interval, in minutes, between flights passing over an unconsulted village in CB23.

Times of each aircraft passing through a 48.5 degree cone were compared to give the time between flights, over the whole period from June to September 2023. (118 days)

Each histogram bin is 3 minutes wide, so that the first column shows the count of intervals of less than 3 minutes, the second shows the count of intervals from 3 to 6 minutes etc.

So, there were 770 occasions when the aircraft were less than 3 minutes apart, and 841 occasions with aircraft 3-6 minutes apart. Over the 118 days, there were on average 6.5 pairs of flights in very rapid succession per day, with many of them forming tight, intrusive, convoys.



4 Descent CO2

4.1 Background

At first sight, some of the routing issues above may appear, and are being claimed, to save CO2. This is incorrect. This does not take into account how the aircraft descend for minimisation of CO2 and noise. Furthermore, LLA consistently claims high level compliance with CDO (the June 2024 copy of the 'LLA Inform newsletter' claiming 92% CDO of arriving aircraft in Q1 2024 **from 4,000ft**). Use of this altitude is misleading, particularly when compared with descent practices and substantially lower performance, as reported by Eurocontrol, from higher levels.

A shorter distance to travel also means there will be less distance to lose height, and therefore requires steep descents and subsequent descent rate changes that use additional fuel. This non-optimal descent behaviour is shown in the following sections, and correlates well with the complaint hotspots discussed in Section 7.

The CO2 impacts here are very clearly documented by one of the changes' sponsors. Within the NATS A GUIDE TO CONTINUOUS DESCENT OPERATIONS produced by NATS for Sustainable Aviation, descents should, quote *'Use the 3x rule*', i.e. descend 1000ft over 3 nautical miles, that corresponds to 3 degree descent. CAA's CAP 2302 specifies even shallower descent rates. These descents are also smooth and continuous, not stepped.

For reference: *1,250ft/min at 250 kt gives an angle of descent around 3 degrees,*
2,000ft/min at 250 kt gives an angle of descent around 4.5 degrees,
2,500ft/min at 200 kt gives an angle of descent around 7 degrees

The Stage 1 AD6 design principle 7 (Priority 3) is to "*enable continuous descent from at least 7,000ft & facilitate continuous descent above that*". To do this AD6 would have had to show aircraft arriving towards an airport, from the top of the descent (i.e. above 7,000 ft) losing height continuously, avoiding stepped descents, and limiting the rate of descent to be no more than 3 degrees.

Furthermore NATS have now developed a metric called 3Di (described at REF: NATS Airspace Efficiency) that measures overall flight efficiency. This measure has nothing to do with minimising track miles[4].

No 3Di or CAP 2302 information was presented in the Stage 7 report to justify the assertion that the flights arriving at Luton (especially tactical flows) were being flown in a fuel efficient way. Indeed the CAA/NATS submission made no evidence of any CDO operations that align with their best practice documented in 'A GUIDE TO CONTINUOUS DESCENT OPERATIONS' (i.e. no evidence of ATC training for CDO operation).

In summary AD6 Stage 3 Consultation Document Issue 1.1 Page 18 provides the following explanation, quote:

3.37 Using the analogy of driving a car, it can be more efficient to take a longer route to travel around a city by motorway, than to take a shorter route straight through the city centre.

3.38 This is because a car operates more efficiently at a constant speed on a motorway than stop/start or crawling in traffic jams on the shorter route thereby burning less fuel per mile.

The tactical flows are being flown in an analogous way to a car driving in the city, rather than as anticipated by the AD6 design criteria and do not provide best fuel performance. This is illustrated in the diagram to the right, taken from REF: NATS Airspace Efficiency.

4.2 Overall Noise and CO2 CDO Performance

As described above, ascent and descent profile data is critical in measuring CO2 and noise efficiency.

The NATS 3Di information is, as far as known, still not published in general or on a per flight basis.

However, similar data is published via https://ansperformance.eu/efficiency/vfe/ who publish CDO data taken from data provided by NATS.

[4] It is hoped the 3Di when released will incorporate CAP 2302, and not add another noise metric.

This data is accepted as a 'gold standard' published for the CO2 and noise efficiency of an airport/airline and allows comparison between airports, aircraft and airlines.

In summary the key published values are:

- **CO2 efficiency.** Percentage of flights using continuous descent from top of descent is the best indicator of fuel/CO2 efficiency (CDO - TOD % in tables below). This measures the same descent behaviour as the NATS 3Di metric.
- **Noise efficiency.** Percentage of flights using continuous descent from 7,000 ft (or 7,500ft AMSL using data provided to Eurocontrol, that corresponds almost exactly to 7,000ft height over Luton) is the best indicator of noise efficiency. (% CDO FL75 in tables below).

These figures are therefore a direct measure of the extent to which an airport is complying with the noise and CO2 minimisation directives in ANG 2017, AD6 design criteria, CAA 2302, NATS own sustainability guidelines and apparently every document describing how to minimise noise and CO2 for aircraft arrivals written in the last 20 years.

It is very noticeable that Luton did not wish to disclose CDO data above 5,000 feet, and stated their intent not to disclose this data in their AD6 response despite CAA data request25(a), see 9.4.1, below.

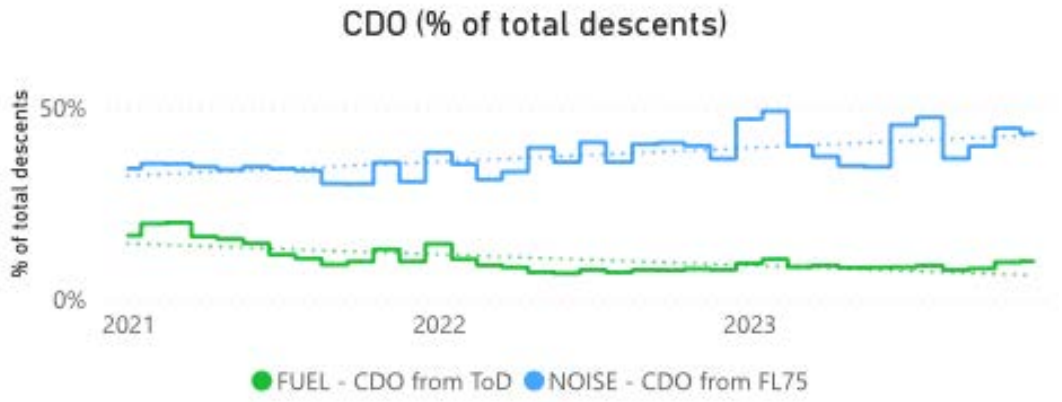
Related aside: the limitation of CDO to 5,000 ft at Luton is an artefact of the pre-AD6 airspace design. As described below the LLA AIP must be amended to align with AD6 to encourage CDO from ToD.

4.3 CDO Before and After AD6

There is no significant improvement in the CDO from ToD or noise performance as measured from NATS supplied data. This is despite the removal of the shared stack with Stansted, and the use of shortcuts as anticipated by AD6 and tactical flows, and the clear design goal to enable CDO from 7,000 ft and above.

In the chart below (from Eurocontrol), the vertical axis shows the percentage of LLA arrivals achieving CDO.

- The blue line shows the percentage achieving CDO from FL75, where under ANG2017 noise is the priority.
- The green line shows the percentage achieving CDO from Top of Descent, where under ANG2017 CO2 efficiency is the priority.



Source: Vertical Flight Efficiency Portal - https://ansperformance.eu/efficiency/vfe/

Period	**CDO from Top of Descent** Fuel efficiency is the priority, higher number better	**CDO from FL75** Noise efficiency is the priority, higher number better
1H 2020	11.0 %	32.2 %
2H 2020	15.0 %	38.4 %
1H 2021	17.4 %	35.4 %
2H 2021	10.0 %	33.0 %
1H 2022	8.9 %	36.7%
2H 2022	7.0 %	44.2 %
1H 2023	9,2 %	41.3 %
2H 2023	9.3 %	44.0 %

The proportion of LLA arrivals achieving CDO from FL75 is more erratic after implementation of AD6. Careful selection of the period of observation could suggest a slight improvement, but overall the final proportion is almost exactly as before and shows no improvement.
The green line in the diagram above shows a marginal **decrease i.e. worsening** in flights achieving CDO from TOD after implementation of AD6

The airspace operation before and after AD6 is summarised in the table to the left, where readings for LLA arrivals after

implementation of AD6 are shown in yellow. Measurements are basically flat, though note that the fuel/CO2 performance has actually deteriorated.

4.4 CDO Benchmarking Vs Other English Airports

The AD6 Stage 2 design objectives clearly stated that CDO from 7,000 ft and above was a priority for AD6. The only higher objective was safety. The reality of the delivery of this design objective is best judged by benchmarking Luton against the other major English airports. Below, we show the CDO dataset from Eurocontrol for the last 6 months of the monitoring period (April to September 2023):

Apt_label	Descents	Tot. level time (min)	FUEL - Avg. level time ToD (sec)	FUEL - trend	CDO - ToD (%)	NOISE - Avg. level time < FL75 (sec)	%_CDO_FL75	NOISE - trend
⊞ Birmingham (EGBB)	23,240	72,390	186.9		21.9%	14.1	77.1%	
⊞ London/ Stansted (EGSS)	51,444	185,097	215.9		13.2%	41.2	61.2%	
⊞ Manchester (EGCC)	48,932	74,993	92.0		44.5%	45.1	57.7%	
⊞ London/ Gatwick (EGKK)	66,977	356,079	319.0		11.3%	56.2	51.1%	
⊞ London/ Heathrow (EGLL)	117,228	549,172	281.1		7.8%	64.9	50.5%	
⊞ London/ Luton (EGGW)	31,043	156,972	303.4		8.8%	72.6	40.9%	
Total	338,864	1,394,702	246.9		15.7%	53.9	54.3%	

As can be seen from the above Luton is the worst performing English major airport on a per flight basis (including comparison with Heathrow) for Noise (**see column % CDO - FL75**) by a significant margin and matches Heathrow for poor CO2 efficiency **(see column % CDO - ToD**),

Considering the large number of shortcuts taken by Luton arrivals this data demonstrates clearly that the actual operation of AD6 is not delivering any noise or CO2 efficiency gains and can not be justified on environmental grounds. Arrival 'efficiency' in the AD6 report simply masks the commercial imperative of minimising time to gate, rather than delivering any environmental (noise or CO2) benefits.

To ensure that the comparison is fair the 2024 year to date (up to and including June 2024) data ranks the airports in the same order:

Apt_label	Descents	Tot. level time (min)	FUEL - Avg. level time ToD (sec)	FUEL - trend	CDO - ToD (%)	NOISE - Avg. level time < FL75 (sec)	%_CDO_FL75	NOISE - trend
⊞ Birmingham (EGBB)	19,909	58,672	176.8		22.0%	16.0	74.6%	
⊞ London/ Stansted (EGSS)	47,176	157,330	200.1		16.7%	34.7	66.7%	
⊞ London/ Gatwick (EGKK)	54,647	249,716	274.2		13.4%	42.8	57.8%	
⊞ Manchester (EGCC)	43,584	76,400	105.2		41.5%	53.4	54.1%	
⊞ London/ Heathrow (EGLL)	116,294	675,530	348.5		6.2%	54.6	52.6%	
⊞ London/ Luton (EGGW)	27,040	128,048	284.1		10.5%	61.0	45.4%	
Total	308,650	1,345,696	261.6		15.5%	47.4	56.7%	

4.5 CDO Benchmarking By Airline at Luton

CDO performance of Luton in the last 6 months of the monitoring period (April to September 2023) is provided below, broken down by airline. The CDO from ToD is exceptionally poor for some airlines (e.g. Wizz Air at less than 1% CDO from ToD).

This shows that individual airlines have considerable discretion in flight operations, and any claims that NATS and LLA are vectoring and managing aircraft effectively to minimise noise and CO2, is false.

Again this underlines that tactical routes are not delivering any fuel or noise efficiency, with Wizz Air achieving less then 1% CDO from ToD compared with Ryanair at over 18%.

Apt_label	Descents	Tot. level time (min)	FUEL - Avg. level time ToD (sec)	FUEL - trend	CDO - ToD (%)	NOISE - Avg. level time < FL75 (sec)	%_CDO_FL75	NOISE - trend
⊟ London/ Luton (EGGW)	31,043	156,972	303.4		8.8%	72.6	40.9%	
easyJet (EZY)	11,680	52,126	267.8		10.2%	57.8	42.8%	
Wizz Air UK (WUK)	4,392	23,060	315.0		6.7%	85.9	37.9%	
Wizz Air (WZZ)	4,319	29,262	406.5		0.8%	107.4	30.2%	
Ryanair (RYR)	3,392	14,997	265.3		18.7%	38.7	66.5%	

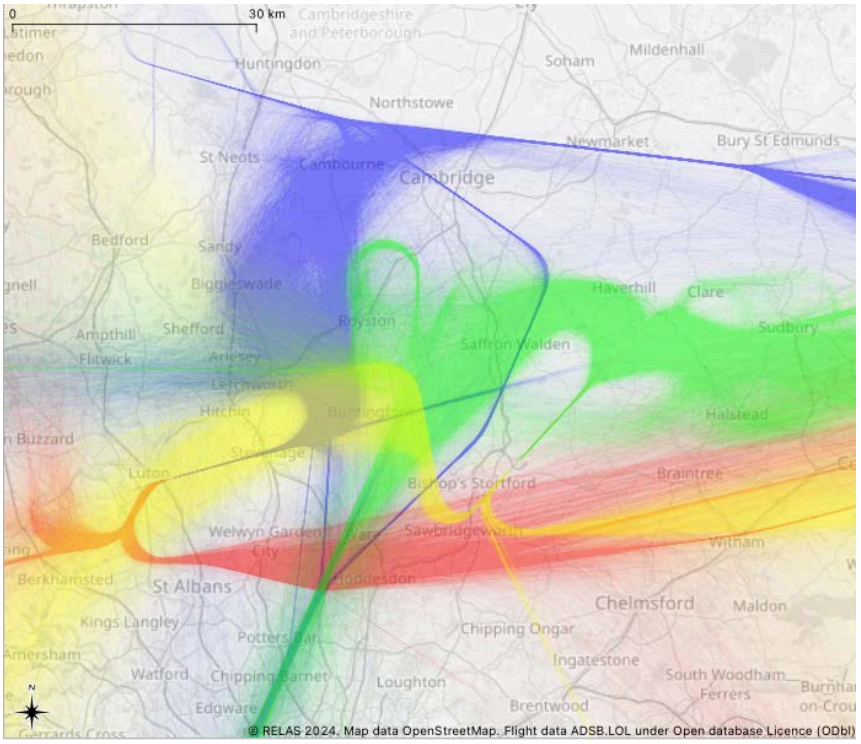
4.6 CDO Above 5,000 Foot / Traffic Conflict

The restriction on Luton only operating CDO below 5,000ft rather than from top of descent due to airspace conflicts is no longer valid, especially for aircraft arriving from the east.

This restriction on CDO only being in operation below 5,000 ft should be removed[5]. Aircraft arriving at Luton should be required to fly CDO from ToD, and report CDO on at least the same basis as other London airports.

This is evidenced by the plot of Stansted and Luton arrivals and departures, with

- Luton Arrivals shown in blue,
- Luton Departures in red,
- Stansted Arrivals in green and
- Stansted Departures in yellow.



No explanation has ever been given why the Luton arrivals marked in blue can not operate CDO from ToD, especially early in the morning (e.g. 6:30 to 8am overflight of West Cambridge).

Also we have analysed the period spent in level flight at each altitude and flight level. There is no dominant period of level flight as described prior to AD6 around 5,000 ft for arrivals.

Note that this diagram also invalidates past Luton noise workshop claims (See Section 7) that traffic around north Cambridge has to undertake expedited descents to avoid other traffic.

In operating CDO from 5,000 ft and Luton only reporting CDO performance from 4,000 ft it is clear that the Sponsors are only paying lip-service to the AD6 design principles and NATS own REF: NATS Sustainable Aviation Guide.

[5] AIP / AD2 / EGGW / AD 2.21 / Section 3d
https://www.aurora.nats.co.uk/htmlAIP/Publications/2024-08-08-AIRAC/html/index-en-GB.html

5 Excess Descent Noise

Causes for excess noise detailed below in Section 6 include:

- **Objectionable nature of sound.** Changing pitch of sound (c.f. Pitch changes in alarm) is far more noticeable and objectionable than constant sound.
- **Airframe noise.** Excess sound (speed brakes), and in some cases below 6,000ft early lowering of undercarriage to lose speed.
- **Engine noise and resonance.**
- **Height correction.** Height of land, and low air pressure resulting in aircraft at or above transition altitude being closer to the ground than the flight level might indicate.

While these are known causes of noise nuisance, there is no evidence that LLA/NATS have sought mitigations, their symptoms persist, as detailed in Section 6.

Note any of these issues would never be shown by the computer based noise simulations, and may not show on a sound level meter set to a slow response time[6] as currently specified. See also issues with noise monitoring in rural areas (e.g. lack of 4G coverage covered in Section 7).

The overflight data, and modelling submitted in the PIR report assume aircraft emit constant steady sound levels. In fact, this assumption does not hold, and the modelling does not capture the significant nuisance of excess noise that has been previously discussed with LLA/NATS. This section discusses the potential causes of excess noise. Section 6 shows that these occur in this AD6 trial implementation.

5.1 Excess Noise Background

The remainder of Section 5 is a series of background perspectives about excess descent noise. Professional readers may be aware of all of the following legal, engineering and pilot perspectives and skip to Section 6.

5.1.1 Legislative Perspective

The UK governing law in ANG 2017 is frequently paraphrased, summarised, and optimistically read by operators to say that noise does not matter above 7,000 ft altitude above mean sea level (AMSL).

The legislation actually says that CO2 is a higher priority than noise above 7,000 feet. It does not say that noise does not matter above 7,000 ft. Indeed an objective of ANG 2017 is to "...*reduce the number of people in the UK significantly affected by adverse impacts from aircraft noise",* and this statement is not qualified by aircraft altitude. See Section 8.

Note that the PIR Report estimate of population overflown used data from 2021. With the building of new towns such as Northstowe, Bourn Airfield, and Cambourne West, in South Cambridgeshire, this is already out of date and gives a significant underestimate of adverse effects.

5.1.2 Engineering Perspective

The context within the ANG 2017 wording clearly assumes that the aircraft are being flown in a cruise configuration or another normal flight configuration that does not generate excess noise.

The CAA CAP 1498 notes that noise diminishes by approximately 1.5dB per 118 metres, equivalent to 3.8 dB per 1000 ft. Therefore an aircraft being flown at 9,000 ft in a way that results in 8db additional noise will make as much noise as an aircraft at 7,000 ft. Some of the causes of noise discussed below can generate far more than 8dB addit and take an objectionable form.

5.1.3 Aircraft Dynamics & Pilots Notes

This section discusses observations around modern airlines, using the Airbus A320 as an example. The A320 represents 69% of Luton arrivals and 80% of the most frequent tactical flows.

- Descent rates exceeding 1,800 feet/min while maintaining 250 kt (or lower) require speed brakes or lowered undercarriage for modern airliners like A320/A321 and Boeing 777. This limit is for 'heavy' aircraft; lighter positioning flights and newer A321neo models descend more slowly.
- Undercarriage may be lowered as high as 6,000 ft to facilitate rapid approach, causing significant noise when deployed at height.

[6] The aviation industry recognises this issue and newer noise metrics are being researched.

- A320 throttles are typically under auto-thrust control during descent, adjusting engine thrust to maintain selected airspeed and descent/ascent rates.
    - Most CDO approaches endeavour to maintain constant speed and descent angle (220 knots at Luton).
    - Stepped adjustments (specifically reductions) in rate of descent during a descent typically involve auto-thrust increasing engine power to reduce descent rate and maintain speed, increasing fuel consumption and CO2 emissions.
- Airbus piloting differs from other aircraft: pilots command desired outcomes rather than specific actions.
- On A320, speed brakes (wing spoilers) are manually applied.
    - Unfortunately, their use is no longer discouraged in pilot training.
    - Less experienced crew may leave speed brakes deployed for longer due to minimal instrument reminders (best practice is not to release the speedbrake lever until returned to normal position).
    - Engine thrust automatically increases to maintain speed.
- Flying the approach STAR via pre-defined waypoints minimises pilot and ATC workload, as waypoints are pre-programmed in the aircraft's Flight Management System (FMS).
    - This allows for low-noise, CO2-efficient continuous descents calculated by the flight computer.
    - Shortcut routes require additional calculation of track-distance-to-touchdown, increasing pilot cognitive load and potentially impacting situational awareness and safety.
- Manually commanded shortcuts and tactical route are rarely fuel-efficient unless:
    - The pilot is both experienced and motivated (as noted in NATS Sustainable Aviation Guide)
    - Ideally has a newer light management computer with the ability to generate pseudo-waypoints.

5.2 Common Solution: CDO from ToD

Almost all of the problems evidenced in the following sections can be mitigated, to some extent, by following the AD6 design objective of CDO from above 7,000 ft (i.e. top of descent).

Further mitigation is achieved with a descent angle of no more than 3 degrees and avoiding frequent changes of descent rate/engine power even between different low power settings.

As CDO benefits both CO2 and noise these mitigations are required, following the intent of ANG 2017 and the AD6 design goals both above and below 7,000 ft.

Note for these following impacts to be mitigated a true continuous descent is needed. Stepped descents will not achieve the objectives, indeed they will be counter-productive.

6 Excess Descent Noise - Analysis By Location and Type

As noted in REF: AD6 PIR Stakeholder / Annex D, many of the noise complaints are whistling noise. This, as with all other Luton noise complaints, is dismissed in the PIR Report Annex D as " just people being unhappy at being overflown". However work has been undertaken to listen to and analyse the sound sources on the Luton approach as the layman assumption of being exclusively caused by 'speed brakes' is often incorrect.

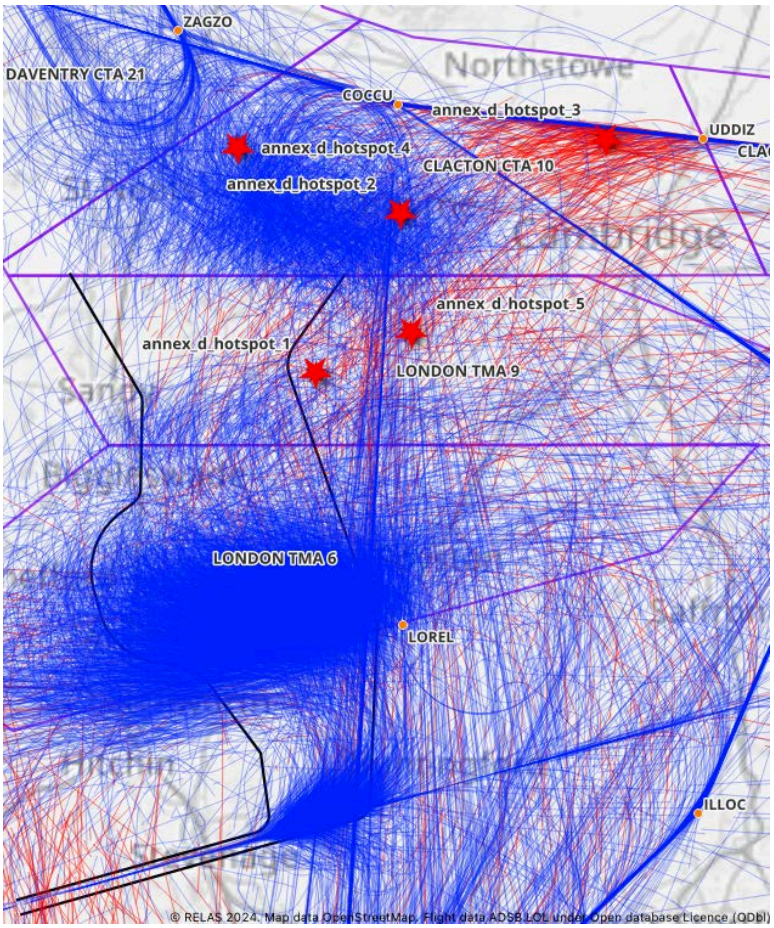
The following sections introduce the key types of noise, and at the end of the section we associate these with the noise hotspot reports in REF: AD6 PIR Stakeholder / Annex D. The Luton sponsored programme of descent noise analysis has been stalled, see Section 7.5. Therefore independent noise analysis has been undertaken.

All the graphics are arrivals to the westerly runway at Luton in the monitoring period between 16 June to the 15th September 2023 . Similar effects are observed at other locations for the easterly runway.

6.1 Stepped Descents

The plot shows the locations where aircraft are frequently level or descending steeply.

For clarity aircraft following a standard descent have been omitted.



The purple lines are the official airspaces to allow some correlations to be made.

Ideally, aircraft should descend smoothly at a 3-degree angle (CDO). However, the chart reveals stepped descents with steep drops (red lines show >2500 ft/min, ~5.6degrees) and long level flight periods (blue lines show <250 ft/min). Complaint hotspots are shown by red stars.

Stepped descents cause increased noise due to increased engine thrust and abnormal recognisable and intrusive pitch patterns. This approach is less efficient in terms of CO2 emissions and noise reduction.

A significant portion of these flights are in peak periods (06:45 to 8:00 am), even when there's little conflicting air traffic which might justify this non-optimal approach. A contributing factor is the sudden change in minimum height from 11,000ft to 8,000ft after UDDIZ, as aircraft attempt to shortcut across CLACTON CTA 10 airspace.

Aircraft are following stepped approaches at the minimum height for each airspace, descending earlier than expected and, because of shortcuts, over a wider area than publicised. This contradicts claims (see https://airspacechange.caa.co.uk/documents/download/3853 Sponsors' responses Sections 3.3 & 4.2.6) by NATS/LLA of "staying higher for longer"

In summary every change in the rate of descent (that pilots may refer to as a configuration change) will generate noise and/or use additional fuel.

6.2 Speed Brake / Spoilers - Expedited/Steep Descents

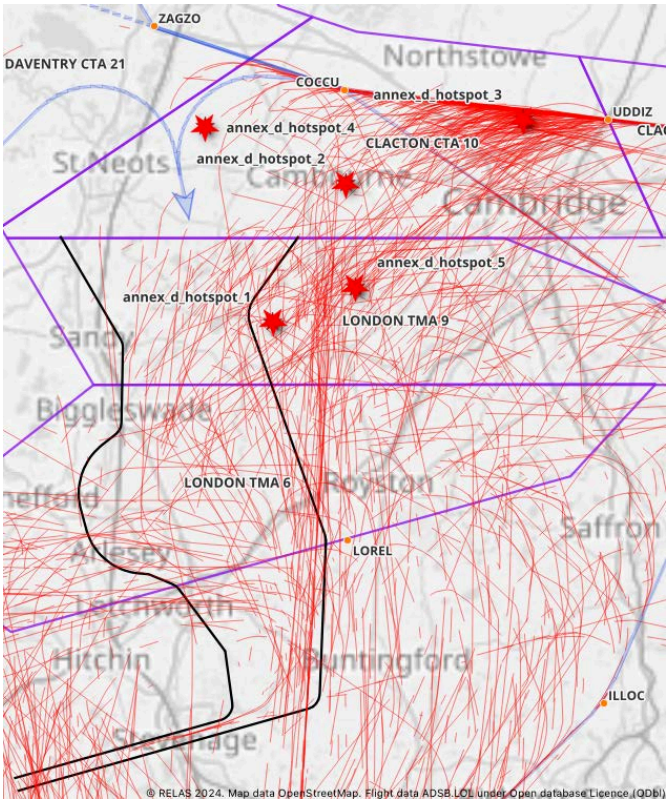
As above, airspaces are outlined in purple, and red stars show complaint hotspots. Red lines show steep descents.

As discussed earlier [5.1.3], for around 90% of the aircraft landing at Luton, descent rates greater than 2000 ft/min require speed-brakes (or lowered undercarriage) to maintain a constant speed of 250 kt or less.

The red lines represent track segments of individual flights during steep descents (2500 ft/min approx 5.6 degrees). To avoid excess speed gain (greater than the limit of 250 kt) whilst still descending steeply, or to slow down from overspeed (following an earlier steep rate of descent), the aircraft must use spoilers of some form.

Aircraft at Hotspot 5 are either using speed brakes or may be generating excess noise overspeeding. In this area we have observed flights reporting IAS > 300kt.

Additional noise occurs when the descent segments stop (as additional thrust is applied to level out). The villages around the edges of these clusters are significantly impacted.



6.3 Excess Airframe Noise including FOPP Noise

Most (69%) of the aircraft arrivals at Luton are Airbus 220/320 families.

That this family has excess noise issues is well known to the CAA and aircraft operators. To the right from CAA's CAP 1554 (CAA review of Arrival Noise Controls, 2017), and see also the Airbus documentation "Getting To Grips With Aircraft Noise"

Airframe noise

In addition to engine noise, the airframe itself, including components such as flaps and landing gear, can generate significant noise during approach, which may be comprised of prominent tones that are clearly audible on the ground. Tonal noise can often increase the likelihood of annoyance and/or complaint over that compared to the A-weighted noise level.

A specific case is that of the Airbus A320 family where a safety device called the Fuel Over Pressure Protector (FOPP) (consisting of cavities on the underside of the wing) generates audible tones as much as 15 dB higher than that of adjacent frequencies during certain phases of flight. The FOPP tonal noise is most prominent during the intermediate approach phase, prior to deployment of flaps and landing gear.

Not only is this noise loud, it is aurally intrusive and quite recognizable as it is often heard as a rising and falling whistle as the aircraft approaches, followed by a short quiet period and then the rising and falling tones associated with Doppler approach overhead, and onward flight. The noise occurs with speed/descent rate changes so may occur at every attitude change in a stepped descent. Also, as noted by the CAA extract above, this noise is not detected by the traditional (A-weighted) noise meter.

Interviews and analog noise recordings have shown this is a significant contribution to excess noise complaints in the CB23 and CB24 postcodes. The noise described in the CAA documentation adds 15dB to the expected noise. This additional noise makes, for instance, an aircraft at 8000 ft sounds as if it is at 4000 ft. Objections to this noise can be expected for aircraft well over 12,000 ft, i.e. from near UDDIZ.

Samples of this noise can be heard as: https://youtu.be/0D9Dx5ZXn-w and https://youtu.be/DK73oGoRKO4 and as can be seen the noise is objectionable even when the sound trace shows this to be at a low level. A couple of people have described this noise as a form of torture where convoys of aircraft arriving around or before 7am all make this sound 3 min apart.

While airframe modifications may mitigate the noise (which we believe have not been completed on the aircraft fleet routinely serving Luton) these modifications are not fully effective based on the Lufthansa sponsored study only reducing the excess noise by 5dB. The worst possible approach for this noise is aircraft making a ‘CDO-like’ approach that is composed of many power setting changes and steps. This is analysed in later sections.

An obvious general mitigation which LLA could implement (and the Regulator could insist on) as part of its commitment to Noise Action Plan ‘good neighbour’ policy, is fining or banning aircraft which are still using systems which generate excess noise without any noise reduction fitted.

6.4 Engine Resonance

In addition to airframe noise the A220 (formerly Bombardier C Series) and the Embraer E2 use Pratt & Whitney PW1500G geared turbofan engines. These engines are well known to produce a distinctive and loud "buzz saw" noise, reported as changing in tone like whale song, during certain phases of flight, especially during descent. This noise is also heard on the A320 family to a lesser extent including the A320neo. This problem is well documented: [Self-Styled Airbus `Whisperjet' Is Too Loud for Zurich Residents - Bloomberg]

6.5 Excess Speed

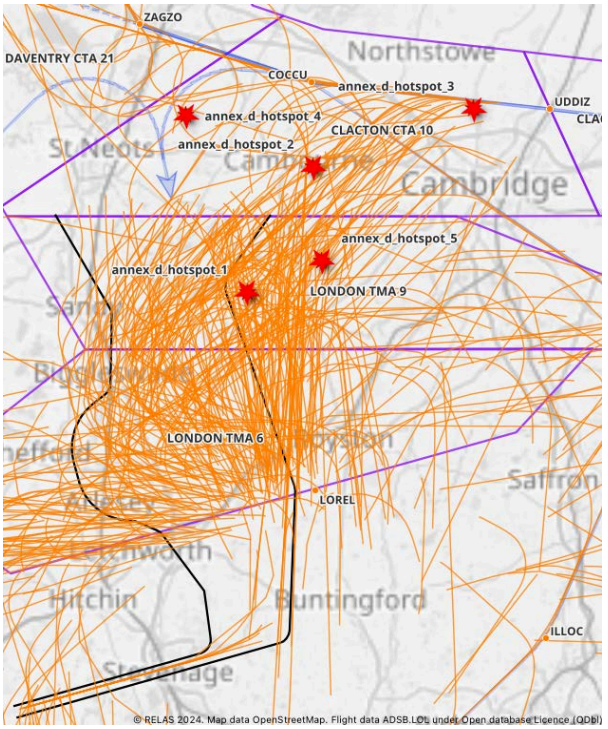
6.5.1 Excess Speed > 60 Sec

A 250 kt speed restriction exists below FL100, which can be exceeded with ATC permission ("free speed").

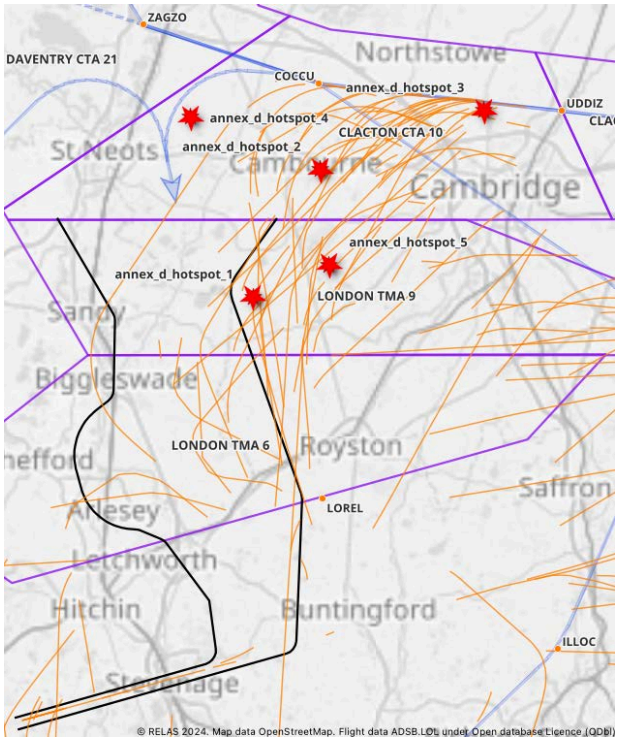
The diagram shows example track segments of aircraft exceeding 280 kt IAS for at least 60 seconds below FL100, indicating deliberate pilot-commanded overspeed rather than transient speed increase when starting a descent. The selection of 280 kt and 60 second gives a margin for error for the indicated air speed and filters out transient speed increases due to commencing a descent without speed control.

These overspeed areas highly correlate with complaint hotspots. The excuse of urgent arrivals is invalid, as there are looped overspeeds and overspeeds in the hold.

Many overspeeds occur late in the approach..



6.5.2 Excess Speed At Night



Most excess speed traffic occurs in the evening, overnight, or early morning, which is concerning.

The recommended airspeed for Luton approach is 220 kt IAS, with a maximum of 250 kt IAS below FL100 without ATC approval. ATC permission for higher speeds should only be given for flight issues, not to reduce time-to-gate, especially at night due to noise concerns.

Tracks of nighttime (23:00 to 07:00) overspeed flights below FL100 shows multiple overflights of West Cambridge, with a significant level of overflight extending over central Cambridge.

6.5.3 Excess Speed For Aircraft Looping Over South Cambs

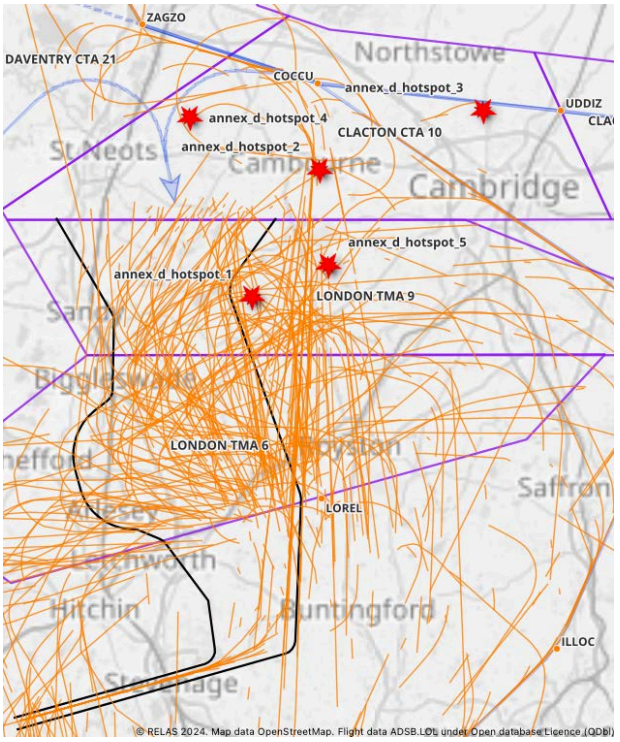
A large proportion of daytime overspeed traffic comes from the South.

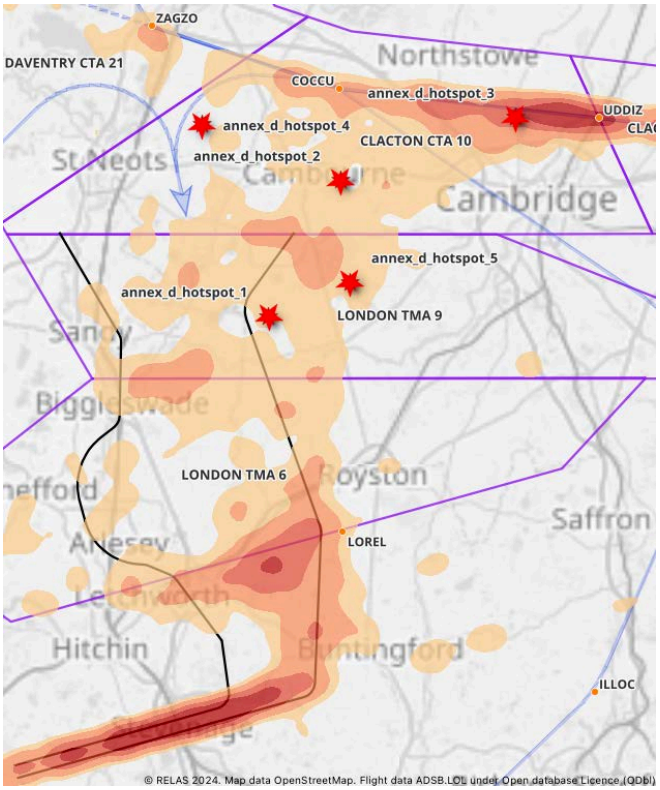
The diagram to the right shows traffic from the South, below FL 100, at >280 kt IAS.

Not only does traffic from the south loop over South Cambs provide a "tactical route" it does so at speed.

The 180-degree turn over Hotspot 2 may also be executed at significant speed, typically above FL100.

Some flights from the South loop around hotspot 1, then head South on a downwind leg toward Luton's runway centreline, all at over 250 kt.





6.6 Descent Hotspots

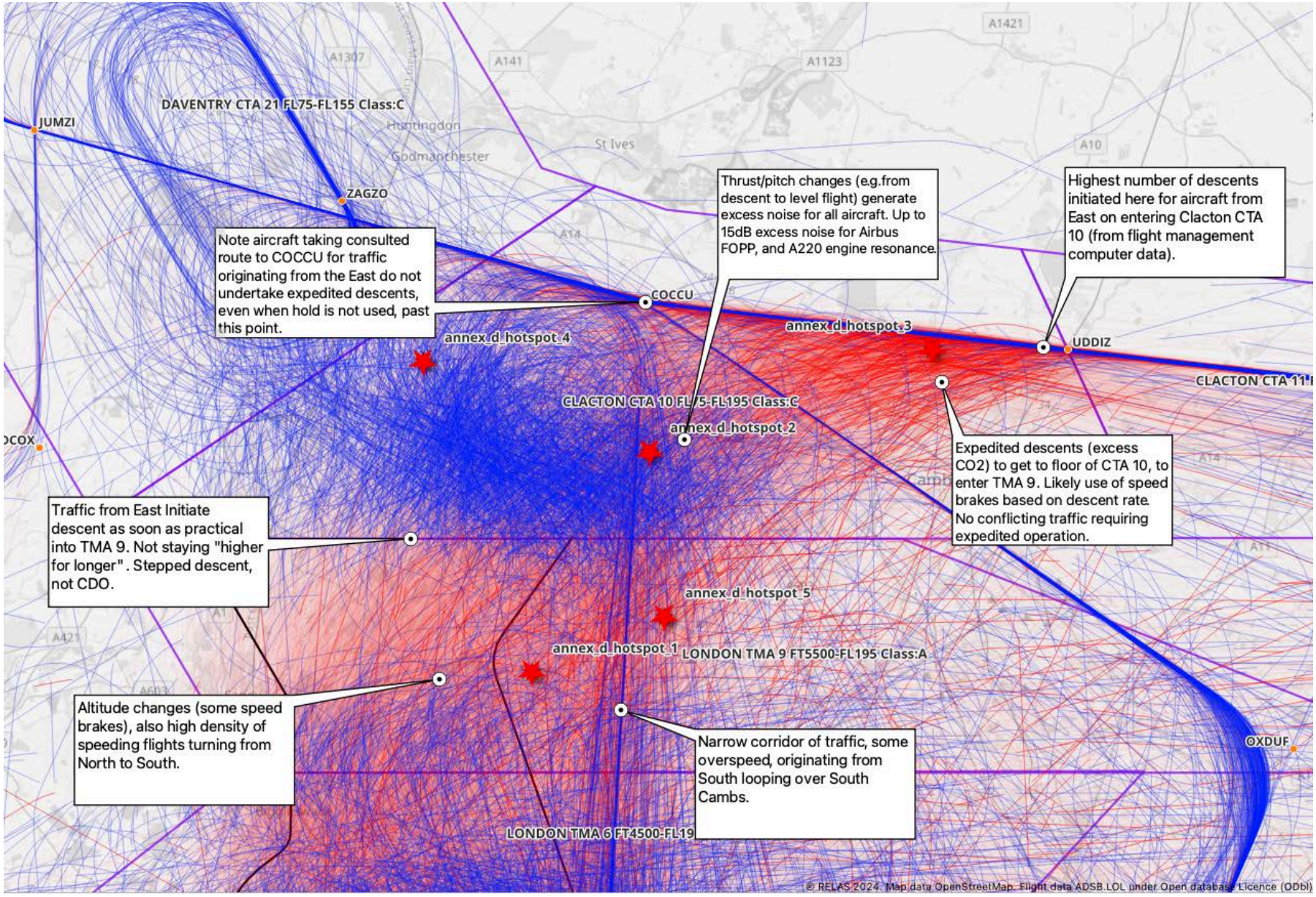
As part of the flight dataset we can see when the pilot commands the autopilot to descend, and the size of that descent. Therefore we can plot exactly where significant descents are started and render this as a heatmap.

This diagram is not a track plot of descents, it is a heatmap of the locations where pilots are most commonly commanding a descent that will cause excess noise based on one of the previously described mechanisms.

Darker colour of orange/red indicates a larger count of aircraft have changed the height requirement on the aircraft's Flight Management System.

Note the correlation with complaint hotspots, as indicated by red stars.

A combination of all the factors and events described in Section 6 is accumulated in the diagram below. It shows a series of hot spots and events that cause extra noise and disturbance to the residents under the flightpath. Again, red tracks show steep descents, blue lines show level flight.



Summary - Combining all of the previous diagrams.

7 Complaints & Interactions

Common themes of complaints were of:

1. Excessive, unexpected noise, high frequency of overflight
2. Noise at night, and early morning
3. Inadequate consultation
4. Inadequate, dismissive, or confusing response to complaints
5. Environmental impact, health and well being of residents under the flightpath.

While, as listed by the PIR Annex D, many complaints (over 2300) related to the earlier stages of the consultation, we focus on complaints that relate to the performance of the Trial Implementation.

7.1 Reporting of Complaints in PIR (Annex D)

The PIR report suggests that complaints should be given low weighting because:

1. Many complaints are geographically concentrated
2. A few complainants have submitted many complaints while others put in very few.
3. Complaints dropped off at the end of the review period

The implication of the above is that the complaints can be disregarded by the Regulator as being submitted by agitators, rather than reflecting genuine concerns. However, the very features that NATS/LLA claim as reasons to reject complaints are also descriptive of genuine issues; with these criteria, it is hard to see how valid complaints could be made.

An alternative reading is that

1. Complaints are geographically concentrated because the adverse effects perceived on the ground are much worse in some locations than in others, or than they had been given to expect. This reading is consistent with the ‘concentrated nuisance’ described above.
2. LLA Noise Policy https://www.london-luton.co.uk/LondonLuton/files/9c/9c30954f-aaa1-4df0-8f17-2f7d66c38a10.pdf states:
    a. **where complaints are made about noise incidents caused by multiple aircraft within one email or online form, this will be categorised as a general disturbance and only one complaint will be registered. Where complainants wish to report noise, incidents caused by multiple aircraft and would prefer these to be registered as separate complaints, each noise incident should be reported using a separate online complaint form**
    b. A complaint about multiple aircraft, perhaps in ‘convoy’, which is considered more specific than ‘general disturbance’ has to be submitted as multiple complaints, so the fact that a few complainants have submitted many complaints indicates following process, rather than agitation. The noise policy includes a number of reasons why multiple complaints from a single person may appear to be rejected, again limiting the number of complaints individuals are likely to submit.
3. Many potential complainants understood that complaints after the end of the review period would be ignored.

We list evidence supporting this alternative reading in the rest of this section.

We note also that the PIR fails to report on the change sponsors’ responses to complaints. Beyond very limited and ineffective (see below) offers of noise monitoring at key points, there is no evidence of

- Intent to address, rather than just count, complaints
- Reporting on complaints by elected representatives
- Reporting on workshops/working groups/surgeries/meetings with complainants

The PIR emphasises that complaints fell off after the end of the Review period, and suggests that this shows increasing acceptance of the current traffic patterns. We believe this is not the case.

Anecdotal evidence leads us to believe that the fall off is because

- it is understood that the Review period has ended, so there is no point in complaining: complaints outside the Review period would not be considered. Lack of complaints should similarly not be considered.
- Responses to previous complaints deter further complaints.
- There may have been some misunderstanding by complainants between numbers of **complaints**, and numbers of **complainants**, as a number of complainants interpreted responses from LLA to mean that further complaints from that person would not be noted. They then, obviously, did not expend what they thought was useless effort.

- A reason for complaint in the noise policy is that aircraft are flying too low. However, the ‘height’ reported by the Travis system does not say whether it shows height above sea level or flight level, to allow potential complainants to check this. The policy says that complaints including information from public systems such as FlightRadar24 will not be registered. This will discourage complaints of this class.

Whilst outside the review period, we have compared traffic in July 2024 with that in July 2023. All the issues raised above occur in similar patterns to those in the review period.

Finally the PIR Annex D fails to report that:

- Many of the noise issues have already been accepted by LLA, but work on these issues has been stalled within the LLA's formal NTSC group (see below).
- The long form reports referenced in Annex D, despite being endorsed by local MPs, regional councils and parish counsel remain unanswered.

7.2 Geographical Hotspots

Referring to the NATS Annex D report, Figure 11

Hotspot Location	Issue	See Report Section
1 SG19 Boundary between green and yellow boxes of the NATS low altitude height bands.	Steep descents from 7000’ to 6000’.	6.1
2 CB23 North of the green box of the NATS low altitude height bands.	Not initially consulted. Not previously overflown. Subsequently residents were told there would be no noise or nuisance in this area. ~50% of traffic originating in the East descends here to 8000’ or lower, Steep descents High proportion of Airbus, with ‘Howl’ Convoyed traffic, up to every 3 minutes during peak periods.	6 6 2.4.2 6.1 6.2.1 3
3 CB24 Especially between UDDIZ and COCCU	Steep descents from around 11,000feet, High proportion of Airbus, with ‘Howl’ turning left off the flightpath	2.1 3
4 PE19	Entry and exit from hold Convoys between 6:30 and 7:30 am Cf PIR Annex D 7.3.5	3.2
5 SG8	Residents told there would be no noise or nuisance in this area, as traffic funnelled to the west Steep descents Convoyed night flights east of ‘funnel’	6.1 3
Clusters North of the green box within NATS Annex D report, Figure 11	Steep descents Flights from south loop to turn back south	6.1 6.4
Clusters within the vectoring area/‘funnel	Engine thrust, levelling after steep descents Very frequent overflight, often more than once by a single aircraft on a snaking route.	6.1 6.5

In each of the hotspots listed above, there is a strong correlation with at least one of the noise sources discussed above in Sections 4-6.

7.3 Individual NATS/LLA Interactions

In summary:

- Responses to complaints were handled in a way that discouraged further complaint, and indicated there would be little point in continued complaint.
- All noise workshops have not been followed up by Luton (at which all the issues in this report have been previously raised).
- Luton have de-resourced and stalled all of the community consultation via Luton's Noise and Track Sub-Committee

In some cases, requests for information seem to have been ignored. Complainants in many cases received no response, or received ‘boilerplate’ responses, which they found uninformative, misdirecting, not specific to the themes of their complaints, or not documenting any resulting action. With no visible resulting action or evidence of follow-up, many complainants believed there was no point in continuing effort that had no effect.

7.4 Height Reporting Confusion

A major community concern has been Luton's handling of height/altitude/flight level related noise queries and complaints, especially for aircraft above or descending through the transition altitude (around 6,000 ft AMSL).

This is due to the variety of aviation definitions, contextual variables, and the limited explanation of height provided in the original consultation document.

The expectations for height based on the AD6 Stage 3 Consultation Document and AD6 master technical plans are unclear.

The key on the consultation diagram (reproduced on the right) states 'Altitude', i.e. feet above sea level.

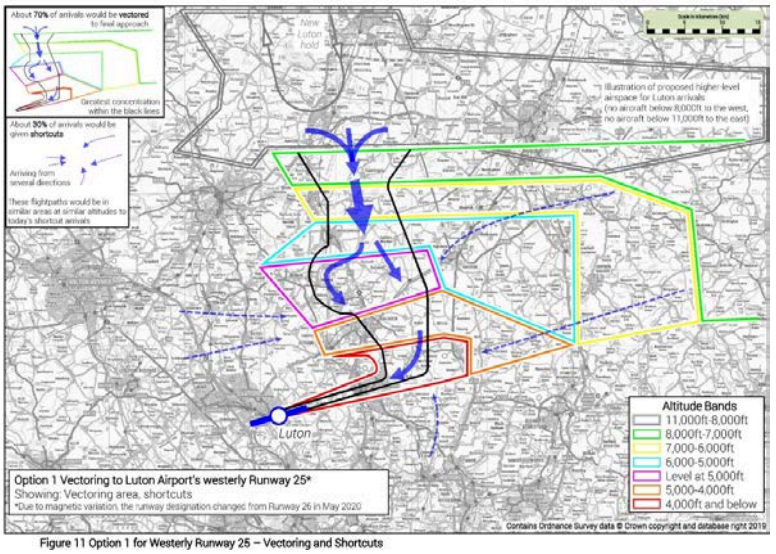


Figure 11 Option 1 for Westerly Runway 25 – Vectoring and Shortcuts

However, Luton has rejected most complaints about height relating to coloured bands above 5,000 ft with reasons including:

1. Referring complainants to Section 3.10 of the Stage 3 Consultation, stating that nothing is definitive due to weather changes affecting air pressure and actual aircraft altitude.
2. Lack of clarity whether the on the consultation diagram should be interpreted as flight levels or altitudes.
3. Leveraging the fact that the Luton Travis noise reporting system labels all aircraft as having a non-specific 'height', and adding un-verifiable height calculations in written responses. Luton refuses to accept complaints from 3rd party systems that might provide both flight level and altitude.
4. Commonly responding in a generic way to a specific complaint, quote, and see Annex in this document: "Furthermore, regarding the altitude of aircraft in your area, we check this daily as part of our ongoing monitoring. I have looked at recent data ***and can confirm that most aircraft are at the required altitude*** or higher. "

The consultation did not explain the implications for noise perception of the difference between nominal/stated altitude figures and the actual distance of aircraft from the ground. Consultees could not understand the details of height thresholds like the transition altitude, where noise prioritisation changes, or of interpreting the coloured height zones and measures in varying contexts.

It remains unclear

- whether the coloured bands are authoritative, or simply illustrative.
- whether the coloured zones act as consistent height references, or as shorthand for adjacent flight levels.
- whether barometric pressure ‘moves’ the '7,000-8,000 ft' green zone and if so, noise and consultation prioritisation in this zone.

In summary, height was poorly explained and consulted on, with only a single paragraph in Section 3.10 describing it for the layperson. More detailed explanations are only provided when complaints are made. This represents an oversight in setting expectations for understanding the wider consequences of height and approach procedures on noise levels experienced by communities.

7.5 Community & Formal NATS/LLA Interactions

Annex D of the PIR Report does not acknowledge that the change sponsors are already aware of noise issues being addressed by LLA.

7.5.1 Luton NTSC - Noise and Track Sub-Committee

Many of the noise issues in this report are accepted as work items that are under investigation by the NTSC - Luton Noise and Track sub-committee (https://www.london-luton.co.uk/corporate/the-llacc/ntsc). The parent body of the NTSC is the LLACC (London Luton Airport Consultative Committee) which fulfils the statutory DfT requirement for the operator of a major airport to consult with local stakeholders.

The relevant status from NTSC is as follows (for supporting evidence see the LLACC and NTSC minutes[7]):

> Luton Airport's Flight Operations team was depleted in resources during much of 2023 and on into 2024. This has caused significant delays effectively stalling noise initiatives within NTSC already identified such as:
>
> - Correlating instances of howling/wailing noises on AD6 descents with flight dynamics and likely causes (eg rate of descent and methodology of speed reduction) in order to seek mitigations (this issue has been very noticeable over South Cambridgeshire and Huntingdonshire since AD6 implementation, but also affects Hertfordshire and Bedfordshire)
> - Investigating the effects of a Noise Abatement Departure Procedure trial conducted in 2022 which has still not been analysed
> - Investigating possible causes of the greater than predicted noise of A321neo aircraft on departure, with these aircraft being deployed in ever-increasing numbers at Luton
> - Go-arounds: whilst increasing numbers of go-arounds (aircraft that have to make a second attempt at landing) are observed, no likely cause or amelioration has yet been ascribed
>
> Furthermore, the publishing of Community Noise Reports following local noise monitoring is around 1 year late – the most recent report on the Luton Airport website is for the monitoring period Jul-Oct 2023.

None of this work has been acknowledged in Annex D of the PIR Report, and this shows that Luton is not investing to meet its commitments within the community noise action plan: Noise Action Plan - London Luton Airport

7.5.2 Noise Surgeries

A small number of face to face meetings have been undertaken with LLA (and in some cases accompanied by NATS) to express the community concerns, where promised follow-up did not materialise. These include:

- Abbotsley 29 September 2022
- The Pavilion, Potton, 30 March 2023
- Histon, (Date TBD)
- Abbotsley 20 May 2024

Meetings with specific subgroups were also held to discuss noise, and to discuss operations over Histon. Most attendees at these meetings had no connection with the aviation industry, so their understanding of the LLA statements may not have been what LLA representatives were trying to convey. No substance of these meetings was reported in Annex D.

The authors of this report have engaged with attendees at these events and find the feedback and the reported discussions of concern. Attendees at the meetings perceived that:

- Documentation was highly complex and nuanced, and the sheer volume and technicality was a major barrier to layperson engagement, as well as to understanding of the extent of both stated and unstated/varied operation.
- The design and consultation process was implied to be a procedural exercise to approve a strategically compliant route (such as navigating existing airspace, airport and military airbase control zones), even though there was an assumption that tactical 'real-world' and operational behaviour would vary in practice.
    - This understanding would appear to be supported by the rejection of the stage 2 higher level options on the grounds of stated safety concerns (covered earlier at 2.4.6) , but to which operational data now shows some correlation.
- It was never clear that flights would ultimately be able to go almost anywhere, regardless of the published/consulted strategic routes.
- The consultation was the minimum that could be carried out, and many surgery attendees and local residents reported having low confidence their input would have any effect on the outcomes.

[7] LLAC January Minutes: item 4.14 second bullet on p 2/7 (PDF p7) and also entry 7 in the Action Log on p2/11 (PDF p11) https://www.london-luton.co.uk/LondonLuton/files/7c/7c7654c8-2cc8-441a-950b-48fc0eae1861.pdf

- The complaints process was not fit for purpose and the LLA ‘single reply’ complaints policy is intended to dissuade communities from ongoing engagement - despite legitimate grounds for continuing concern.
- When there is space in the system, controllers can take short-cuts.
- Southerly loops and repeated overflights are due to ‘controller sequencing’
- The reason given for not consulting villages in South Cambridgeshire was that “Full public consultations only have to be carried out below 7,000 ft.”
- Controllers can do pretty much what they like if they want to shortcut the strategic consulted approach. They want the aircraft ‘gone’ as quickly as possible.
- NATS/ATC tell aircraft to be at this location, this height, this speed – it’s up to the pilot how they get there.

At most events it was not clear to attendees that minutes were being taken by the sponsors. N.B. Local action groups are keen to see the minutes from these events, and we urge the Regulator to request the minutes for each event to ensure compliance with CAP1616 community engagement protocols.

Given these reports, either the design process has been flawed, or if the meeting attendees misunderstood LLA, then the consultation has lacked transparency or appropriate detail on the likely extent of ‘real-world’ tactical variation from strategic design.

7.5.3 Noise monitoring

In a few areas where noise complaints were particularly strong, LLA did respond with attempts at noise monitoring. We have no reports on any successful monitoring being completed and reported on within 2023, and none were reported in the PIR Report.

Reasons given for failing to monitor included failed installation of a monitor in an area with no 4G coverage. The noise monitors require 4G, and can not be left to collect noise statistics unconnected. Many rural areas experiencing high overflight have no 4G connection with the mobile carrier used by the noise monitors, and the SIM could not be changed to another carrier.

8 Operational Conflict With Design and Guidance(ANG 2017)

This section is intended for the regulator review, and assumes some review of early stages of the AD6 consultation and some background regulation and legislation.

The design of AD6 was based on a number of Design Principles, stated at Stage 2 of the CAP1616 change process. These principles effectively form the requirements specification, and guide the evaluation of the implementation. We believe they are not all met. Significantly we believe AD6 also does not meet the guidance in Air Navigation Guidance 2017 - GOV.UK, which is both the statutory framework for AD6, and also explicitly built into the Design Principles.

Principles which we believe are not met are listed below:

Design Priority	Design Principle Number	Statement of AD6 Design Principles
2	2	*"Compliance with ANG 2017", which provides the legal framework authorising the CAA to permit airspace changes, and states:* • *1.2a "objectives are..to ..reduce the number of people in the UK significantly affected by adverse impacts from aircraft noise"* • *1.2b "ensure that the aviation industry makes a significant and cost-effective contribution towards reducing global emissions"* • *2.9 "consultation… should... meet the principles set out in the Cabinet Office Guidance on Consultation principles"* Consultation Principles 2016 - GOV.UK • *2.9d. "In the airspace at or above 7,000feet, the CAA should prioritise the reduction of aircraft CO2 emissions…"* • *2.11a. "Consultation includes an assessment of effects based on traffic levels expected at the time of implementation…"* • *Objective "Emphasise that the environmental impact of aviation must be mitigated as much as is practicable and realistic to do so."*
3	7	*"Enable continuous descent from at least 7000 ft & facilitate continuous descent above that"*
4	8	*"Minimise the requirement to change future low altitude arrival flows within the next ten years"*
4	10	*"Provide an equitable distribution of traffic where possible, through e.g, use of multiple routes, new route structures, options/mechanisms for respite."*
5	11	*"Reduce fuel burn"*

Note here that both Noise and CO2 are design and assessment criteria, and the target metric for optimisation of operation is not time to ground, but CO2. 'Efficiency' as measured in distance over ground is not a design goal. The PIR Report continually uses 'flight efficiency' as the prime metric to determine how well the airspace operates. Their optimisation of 'Flight efficiency' appears to be simply minimisation of track length. However, as discussed in Section 4.1, track length is not a valid proxy for CO2 efficiency. Use of track distance goes against Principles 2 and 11.

The PIR Report shows that Continuous Descent operates to some extent below 5000 feet. Above 5000 feet, Continuous Descent not considered, or reported at all. Our analysis shows that CDO is not operated in these intermediate altitudes. This goes against Principles 2, 7 and 11.

The evolving Future Airspace design principles require consideration of CDO from Top of Descent. Failure to implement this in AD6 will require future changes to match the Future Airspace design. Changes at these intermediate altitudes will almost certainly impact low altitude arrival flows. This implementation is therefore counter to Principle 8.

The narrow shortcut corridors and intense convoying discussed in Sections 3 to 6 show that traffic distribution is not equitable. This is counter to Principle 10.
ANG2017 states that consultation should meet the principles set out in the Cabinet Office Principles on Consultation and in particular that (Principle C) consultees should be able to give informed responses. We believe the consultation fell far short of this guidance. This is detailed in Section 7.

9 Formal CAA Response - Feedback To PIR

This section is in summary form to be read in conjunction with the post implementation questionnaire. This section may not be clear to readers unfamiliar with the questionnaire.

Readers notes:

- The header of each section is of the form “Feedback to XXX”, where XXX is the question/request number in the CAA Data Request.
- Text in blue is taken directly from the CAA Data Request, as listed in the change sponsors’ PIR Main Report.
- Reference to the change sponsors reports on the Trial Implementation are given in red.

In general we have observed that, in the PIR Report Data analysis,

- Terminology is often inexact, and varying, eg.
    - Shortcuts
        - At Consultation: understood to be previous routes
        - PIR Main report: (unclear, but possibly) direct routes avoiding ‘local’ STARs completely
        - Noise reports: specific delineated routes - not necessarily matching anything consulted
- Periods of analyses are often not stated, making interpretation unreliable, and review impossible.

9.1 Data requests

9.1.1 Feedback to 7

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.

RELAS notes that processing and visualising data for months worth of flights, rather than just 7 days is quite practical, and we find the limited duration data in some parts of the PIR Main report disappointing. RELAS will accept requests for additional data. RELAS requests that any significant data provided to the CAA as follow up is also published via the CAA AD6 web portal.

9.2 General Observations

9.2.1 Feedback to 16(a)

16(a). 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. REF: AD6 PIR *Main Report 3.1*

We believe the proposal did not meet all the intended objectives:

- Minimisation of CO2 emissions — See Sect 4
- Facilitation of CDO from TOD — See Sects 4,6
- Meet the requirements for future flows within the next 10 years - not proven for 19m passengers, and not addressed for 32m passengers per annum
- Provision of equitable traffic distribution (including allowing for time of day) — See Sects 2, 3
- Minimise overflight (allowing for time of day) — See Sect 2.4

9.2.2 Response 16(e)

16(e). Identify whether any other issues of significance have occurred during the period 12 months after date of implementation. REF: AD6 PIR *Main Report 3.5*

See our response to the previous section for issues we believe to be of significance, especially to residents under the flight paths of AD6.

9.3 Safety Data

9.3.1 Feedback to 19(a)

19(a). Data concerning any recurring instances of Instrument Procedures (IAPs, SIDs, (flight data). STARs, Holds) not being flown correctly. See specific requirement 5 in the Op Assessment.

9.3.1.1 Expectation

- Arrivals from the East would fly a STAR route from OFJES, via UDDIZ to COCCU. From here they would either be directed further west to the new hold at ZAGZO/JUMZI, or would turn south into the approach funnel.
- Arrivals from the South would fly a STAR route to OZZOT then turn north east to ILLOC, avoiding the Stansted hold at LOREL, and join the traffic from the East near UDDIZ.
- Arrivals from the North and West would fly a STAR route to EDCOX then turn east to the new hold at ZAGZO/JUMZI, and merge there with traffic from the other directions, before turning south towards Luton.
- Expectation was that 70% of traffic would use the hold, and around 30% would be given shortcuts, along the routes used before the AD6 change.

9.3.1.2 Our observations

See Section 2.4.1 in this document that provides track information on STARs flown. We believe that less than 6% flights fly the STARs as consulted.

9.4 Utilisation of Continuous Climb Operations and Continuous Descent Operations

9.4.1 Feedback to 25(a)

25(a). The % of traffic achieving CCO and/or CDA, compared monthly by supporting data using the standard definition set before and after the change (flight data) (e.g. comparing the month of their Arrivals and Departures for July before and after the change. CDA/CCO should be analysed using the standard definition set out by Sustainable Aviation in their Arrivals and Departures Code of Practice.

9.4.1.1 Expectation

The definition of CDO set out by Sustainable Aviation requires a CDO from 7000 feet, with no sections of level flight longer than 2.5 nm. AD6 enables CDO from 7,000 ft or ToD (see AD6 design requirements).

9.4.1.2 Our observations

There is no CDO data from 7,000 ft as expected. See Section 4.3 for extracts of Eurocontrol reports of CDO statistics, and note that LLA performance is at the bottom of the rankings for CDO performance, compared with the other London airports. There is no significant improvement.

9.5 Infringements

9.5.1 Feedback to 28(a)

28(a). Data on the % change 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 [Stansted]

We don't see significant numbers of airspace infringements, but we do see many instances of excess speed, especially at night, and heights are frequently inconsistent with the per 1,000 ft height bands predicted and publicised for AD6.

9.6 Traffic figures (Air Transport Movements ATMs)

9.6.1 Feedback to 31c:

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
REF: AD6 PIR *Main Report 8.3*

We note that traffic has reached pre-Covid levels, so any 'noise mitigation' from reduced traffic has stopped. Fleet Mix includes a high proportion of 'howling' airframes.

LLA currently intends to expand to 32m passengers per annum. While the PIR report suggests (rather unconvincingly) that passenger numbers can be increased to 19m without adding extra flights, they do not address the increase to 32m. It is unreasonable to believe that these additional passenger numbers can be accommodated without a significant change in traffic volumes. Given the existing divergence between the AD6 consulted plan and the current operation it is impossible to determine, and therefore approve, what tracks might be flown to deliver double the passenger volumes (more than double at night).

9.7 Traffic Dispersion Comparisons

9.7.1 Feedback to 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….

General requirements:

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 3000 ft swathes depending on the procedure being considered and can be combined with the individual track plots.

See Section 2 - routes are not being flown as predicted and publicised.

9.7.2 Feedback to 34(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 7000 ft and 7000 ft to touchdown for each RWY. ZAGZO Hold density plot showing aircraft at FL80 to FL 140.)

Narrative supported by heat/density plots showing where aircraft have concentrated within the acceptable tolerances of the procedure design. REF: AD6 PIR *Main Report 9.1, REF:* AD6 PIR Traffic / Annex A

We note that the 'acceptable tolerance' is never defined, and certainly was not publicised in advance.

We show actual routes in Section 2, above. Section 6.5 shows where aircraft left the STAR. Utilisation of STARs is tabulated in Section 10.9, below.

9.7.3 Feedback to 34(b)

Lateral and vertical analysis. From 7000 ft to touchdown. Narrative supported by traffic density plots per 1000 ft climbed, that shows aircraft dispersion along with height gained or lost for each plot. REF: AD6 PIR *Main Report 9.1, REF:* AD6 PIR Traffic / Annex A

See Sections 2 - 6 of this report

9.7.4 Feedback to 34(c)

Weather/MET impacts. Should be considered if there was a significant weather event that can explain an anomaly in the plots. REF: AD6 PIR *Main Report 9.1, REF:* AD6 PIR Traffic / Annex A

While few significant weather events were reported in the PIR report, or visible in the data, at Face to Face meetings with residents (e.g. noise surgeries), weather was frequently given as a possible reason for routine expedited descents over noise hotspots to the north of Cambridge.

9.7.5 Feedback to 34(d)

Any changes to operating fleet mix. That have occurred since implementation for comparison with pre-implementation

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). PIR Main Report 9.1, PIR Annex A

The PIR Noise Report (Annex A - Noise) states that the fleet mix has changed, but does not give the nature of the change. This makes comparison impossible.

We note that a large proportion of aircraft are noisy, adding 10-15dB to the standard models used for noise calculations. This should be included in the analysis, see Section 6 in the above report.

9.8 Operational Feedback

9.8.1 Feedback to 37(b)

Additional feed from relevant flight operation sub-committee. Narrative supported by evidence of minutes or notes of actions from meetings.

See our Section 7.5.1 reports on Luton NTSC, not reported in the PIR Main Report or PIR annex D.

9.9 Utilisation of SIDs/STARs/IAPs

9.9.1 Feedback to 43(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. Narrative evidenced by supporting data (table format).
PIR Main Report 12, PIR Annex A

The plots throughout this report show routes taken by air traffic.

We have investigated the numbers and percentages of traffic passing near (within 2 km of) each waypoint.
For clarity we have performed separate analyses according to runway used and direction of origin of traffic. A sample of these is tabulated below. We give the numbers of flights at each waypoint, and also show this as a % of the total number of flights from this direction to the runway.

Origin East, landing Runway 25
Arrivals from E should fly OFJES -> UDDIZ -> COCCU -> ZAGZO

The tables below show how many actually follow this path. Grey columns show numbers of flights, white numbers show this as a percentage of all flights. For instance, in month 4 (April 2023):

1216 flights originating in the East were positively identified as landing on Runway 25. Of these:
924 (76.0% of total) passed within 2km of OFJES, of these
890 (73.2% of total) passed within 2km of UDDIZ, of these
325 (26.7% of total) passed within 2km of COCCU, of these
52 (4.3% of total) passed within 2km of ZAGZO

All arrivals from E, to Runway 25 by month:

month	total	OFJES	&UDDIZ	&COCCU	&ZAGZO	OFJES%	&UDDIZ %	&COCCU %	&ZAGZO %
4	1216	924	890	325	52	*76.0*	*73.2*	*26.7*	*4.3*
5	1062	761	729	289	96	*71.7*	*68.6*	*27.2*	*9.0*
6	1099	861	838	301	37	*78.3*	*76.3*	*27.4*	*3.4*
7	2705	2009	1947	590	92	*74.3*	*72.0*	*21.8*	*3.4*
8	2597	2058	2023	690	98	*79.2*	*77.9*	*26.6*	*3.8*
9	494	375	360	182	58	*75.9*	*72.9*	*36.8*	*11.7*
total	9173	6988	6787	2377	433	*76.2*	*74.0*	*25.9*	*4.7*

Here we can see that only around a quarter of these flights follow the planned route as far as COCCU Similar statistics apply for flights landing on Runways 5. These show that 43% of traffic originating in the East, landing on Runway5 followed the STARs to close to COCCU:

Origin South, landing Runway 25
Traffic from the south was proposed to follow the route: VATON -> OZZOT -> ILLOC -> OXDUF -> COCCU -> ZAGZO. As above, we have tabulated traffic at each of these waypoints - this may slightly underestimate the numbers passing near OXDUF, as much traffic takes a wide turn short of the waypoint but a wider gate did not significantly add flights.

Runway25. Count of LLA Arrivals from South at waypoints (2km gate):

month	total	Pass VATON	&OZZOT	&ILLOC	&OXDUF	&COCCU	&ZAGZO	*Pass VATON*	*&OZZOT*	*&ILLOC*	*&OXDUF*	*&COCCU*	*&ZAGZO*
4	1675	684	458	81	33	10	5	*40.8*	*27.3*	*4.8*	*2.0*	*0.6*	*0.3*
5	2041	785	436	101	41	21	9	*38.5*	*21.4*	*4.9*	*2.0*	*1.0*	*0.4*
6	2109	860	540	109	46	24	11	*40.8*	*25.6*	*5.2*	*2.2*	*1.1*	*0.5*
7	2185	1302	922	255	101	32	8	*59.6*	*42.2*	*11.7*	*4.6*	*1.5*	*0.4*
8	2032	1233	876	223	104	29	7	*60.7*	*43.1*	*11.0*	*5.1*	*1.4*	*0.3*
9	945	468	287	54	27	11	6	*49.5*	*30.4*	*5.7*	*2.9*	*1.2*	*0.6*
Total	10987	5332	3519	823	352	127	46	*48.5*	*32.0*	*7.5*	*3.2*	*1.2*	*0.4*

Origin West - either runway

Traffic from the west, or diverted from the south west of Luton was proposed to fly north to EDCOX, before turning south to merge in through the vectoring funnel. This route is virtually unused. Only around 1% of predicted traffic approached EDCOX.

9.10 Impact on environmental factors

9.10.1 Feedback to 47 et seq.

CO2 - See Section 4 of our report.

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

PIR Main Report 13.2, PIR Annex A(Noise)

The noise report states that the fleet mix used in the noise modelling has changed from that used in the performance predictions, but does not state how the mix is changed. Instead of using the full range of aircraft arriving at LLA to model the noise, the report states that it estimated the fleet mix from samples taken at 2 gates. It does not state where these gates are, so this analysis can not be scrutinised or repeated.

Custom procedural descent profiles are noted in the noise report for each aircraft type operating at LLA. However, descent profiles vary so significantly between those descending along the STARs route to the runway, those operating ad hoc speed absorption areas by snaking in and around the descent funnels, and those shortcutting direct to the line of the runway, that it is hard to see how a single profile can model all these paths with any degree of accuracy.

The noise report discusses population overflown. It states (Annex A 4.8) that it uses a population dataset which includes forecasts for years out to 2050, but only reports population in the overflown areas in 2021. Over the last few years, South Cambridgeshire has had some of the fastest housing growth in the country. With this expansion and anticipation of new towns at: Northstowe, Tempisford, Cambourne West, Bourn Airfield, etc the estimates of population overflown, schools, places of worship etc are out of date now, and will be massively underestimated within 5 years.

Note: CAP1498 defines cones with 60 and 48.5 degree elevation angle. The diagram in Stage 3 Consulation Doc shows use of the inverse angle measured from vertical - this will not make a big difference to the numbers at 48.5, but does lead us to question processing accuracy.

See Sections 4-6, which evidence instances of:

- Short cuts leading to increased use of speed brakes
- Short cuts being used during shoulder period
- Poor dispersal
- Different engine types producing markedly different pitches and sound profiles A320 resonance issue
- Significantly higher speeds than the recommended 220 - 250kt.

9.10.3 Fuel and CO2 emissions PIR Items 49p-49t

PIR Main Report 13.3, PIR Annex A

See Section 4

9.10.4 Feedback to 49(u)

Operational diagrams clearly identifying AONBs, National Parks, designated quiet areas and any noise sensitive areas identified during Stage 1 (1B Design Principles). Narrative and Operational diagrams overlaid on Ordnance Survey maps (or similar)

We note that the unpublicised shortcut routes, eg over central Cambridge bring significant air traffic over designated quiet areas, such as hospitals, schools and places of worship, which are not included in the current calculations.

9.11 Stakeholder feedback

Context:
56. Feedback is needed to identify any issues from a community perspective that were not anticipated as 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.

9.11.1 Feedback to 58(a)

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). PIR Main Report 15, PIR Annex D

The PIR Report simply counts, rather than addresses issues. Complainants were told that the number of complaints they could make would be capped - it is not clear whether the list of complaints is complete. See Section 7 for more detail.

9.11.2 Feedback to 58(a)

Details of location of complaints(Under the ZAGZO Hold and between 7000-5000ft in clusters of>10 respondents). Ordnance Survey map identifying pinned locations. PIR Main Report 15, PIR Annex D

Residents under the hold, taking a tiny proportion of traffic at around 8000 feet, were consulted.
Residents of areas where traffic is heavy and much lower were not, even though the snaking and looping tracks acted as ad hoc holds. See Section 7 for complaint hotspots, issues and responses.

9.12 Other information of relevance (if appropriate)

9.12.1 Feedback to 58(a) - Use of Hold

How often have the new holds been used: ZAGZO, WOBUN and MUCTI
Time periods that the holds have been used and the total number of EGGW arrivals that completed at least 1 hold. PIR Main Report 16.2

See Section 2.3

Prediction at Consultation	PIR Report	Observed
70% traffic to go to the area of the hold and be vectored.	Main report 16.2 discusses use of holds by Stansted traffic, but not LLA arrivals Annex A 3.3 258 flights used the new holds. 35 flights used the contingency holds - while this is a very small proportion of flights, it seems a large proportion (13.8% or more than 1 in 8) of hold usage.	33% traffic came within 15km of hold On average, in July, only 1.7% of traffic used the stack. Even during the peak periods (July 6am to 7am GMT) stack usage only rose to 6%. [RELAS summary 3.1]

9.12.2 Feedback to 58(b) - details of locations of complaints

PIR Item 24
See Section 7

10 Data Validity & Acknowledgments

Data periods:

- Where data is over a period we have, unless otherwise stated, used 16 June 2023 to 15 September 2023 (inclusive) to match both the Annex D noise report and CAP 1616i Section 5.1.8.
- We have excluded data for 28-31 August 2023 due to NATS failures.
- Where east/west arrival separation is needed and we have to present data as overflights per day we have only included days where 95% of the landings are in one direction on that day. So in this period there were a total of 88 days of data of which:
    - 56 days where more than 95% were landings towards the West.
    - 10 days where more than 95% were landings towards the East.
    - 22 days where landings were in a mixed direction.
- All times are local London time (summer time correction has been applied where needed).

Flight verification:

- **All references to aircraft behaviour have resulted from pilot interviews and/or** simulation using UK CAA approved full sized simulators certified for airline type approval training, with a professional training captain with local and London flight experience in the left hand seat. There has been no use of desktop or uncertified flight simulators.

Data validity:

- **Location data is accurate.**
    - The CAA has previously accepted the accuracy of ADS-B for noise reporting in CAP 2046 (Accuracy of data in the Gatwick Noise and Track Keeping System) and note that this report showed alignment between ADS-B and Radar position data to be less than 30 metres in any direction.
    - We separately confirmed the horizontal accuracy by observing tracks align exactly within the runway at LLA.
- **Altitude information is correctly processed.**
    - **Flight level (barometric):** directly from aircraft track dataset, using reference of 1013.2hPa
    - **Altitude above mean sea level (AMSL barometric)**: derived from barometric flight level corrected with per flight QNH data using International Standard Atmosphere equations (approx 30 ft / hPa).
        - Altitude (QNH) correction validated for every day of flight data by checking reported altitude AMSL of Luton on landing corresponding closely to the declared airport height (approx 530 ft).
    - **Heights.** Where heights have been used for overflight the local overflown terrain height has come from the high resolution Ordnance Survey Terrain 50 data.
- **Correct distance processing.**
    - Latitude and longitude information has been converted for local UK use to the Ordnance Survey OSGB survey grid for accurate gridded local distance calculations.
- **Indicated Air Speed (IAS**) and ground speed are reported separately by ADS-B.
    - In general IAS is used in the analysis. We have correlated IAS with ground speed where needed.
- **Full datasets,** not samples.
    - Unlike NATS we have processed the full June 16th to September 15th 2023 CAP 1616i time window using geospatial databases and professional GIS tools.
- **Rendering**
    - All maps have been rendered with state-of-art desktop GIS tools.
- **CAA CAP 1498 aligned overflight processing:**
    - Software able to process every flight location, over months of data, against CAP 1498 compliant inverted cones on a 100 metre grid. There is no sampling.

Acknowledgements:

- Map data OpenStreetMap.
- Flight data from ADSB.LOL under Open Database License (ODbL), unless otherwise acknowledged.
- CO2 and noise data from Eurocontrol Aviation Intelligence Unit.
- Terrain data from Ordnance Survey Terrain 50 data set under Open Government Licence for public sector information
- For copyright of extracts from 3rd party documents see original documents.

11 Annex TBD - Standard LLA Response

Dear <redacted>

Many thanks for your recent email noise report to the Flight Operations team at London Luton Airport. I can confirm this complaint has been logged accordingly within our complaints database.

Earlier last year (February 2022) we implemented an airspace change which would have changed the tracks from aircraft in your area, this was a co-sponsored proposal from both NATS and London Luton Airport. The aim of this airspace change was to separate Luton's arrival routes from Stansted's arrival routes. The new routes were consulted upon from October 2020 – February 2021. We then submitted the airspace change proposal to the Civil Aviation Authority (CAA) in June 2021 with them granting approval in November 2021.

Furthermore, regarding the altitude of aircraft in your area, we check this daily as part of our ongoing monitoring. I have looked at recent data and can confirm that most aircraft are at the required altitude or higher. There may be some aircraft lower than 7,000ft and this is due to the weather conditions on the day. Aircraft use altimeters which is an instrument used to measure the altitude of an aircraft above a fixed level. This level is based on barometric pressure used to interpret how high they are – air pressure reduces with height, so the lower the pressure, the higher an aircraft altimeter will indicate. However, the weather also changes the air pressure so it may be slightly higher or slightly lower depending on the air pressure in the area, at the time.

When redesigning airspace we must follow the government guidance, this is currently to overfly the least number of people and therefore typically routes will overfly rural areas. I understand that this may cause more disturbance due to the lower ambient noise level, but we must comply with the government guidance in this regard. We will shortly be conducting noise monitoring around the area and once complete will create a community noise monitoring report.

Aircraft in your area will be receiving individual instructions from Air Traffic Control and therefore may not be at the same altitude or follow the same track each time. There are no set arrival routes or set altitudes for arrivals into Luton. The track and altitude will be based on other aircraft in the airspace at the time and this typically disperses the aircraft tracks over a wider area. This was the preferred option within the consultation (Option 1 in the consultation document).

There is a 7-stage process for changing airspace, the final stage is a post implementation review (PIR) this is for 12 months after implementation. During this period, we collect data on complaints, tracks and altitude of aircraft on this route. This will be provided to the Civil Aviation Authority (as regulators of the airspace) who will decide if the route can be made permanent or if changes are required. You can find out more about the Post Implementation Review on the airspace change portal.

We do recognise that our operations can have an impact on neighbouring communities, and we of course have every sympathy …

12 References

AD6 PIR Main - AD6 PIR Main Report Issue 1.0 (2.8MB PDF)
AD6 PIR Traffic / Annex A - AD6-PIR Annex A Issue 1.0 Traffic Dispersion and Environmental Data (6.3MB PDF)
AD6 PIR Noise / Annex A (two annex A?) - AD6-PIR Annex A Issue 1.0 Appendix Noise Technical Report (10.8MB PDF)
AD6 PIR Operational / Annex B - AD6-PIR Annex B Issue 1.0 Operational Feedback (360.1kB PDF)
AD6 PIR Climb / Annex C - AD6-PIR Annex C Issue 1.0 Stansted SID Climb Evidence (2.4MB PDF)
AD6 PIR Stakeholder / Annex D - AD6-PIR Annex D Issue 1.0 Stakeholder Feedback (1.2MB PDF)

AD6 Stage 3 Consultation Document
https://consultations.airspacechange.co.uk/london-luton-airport/ad6_luton_arrivals/supporting_documents/LLA%20Arrivals%20Consultation%201.1%20Screen%20View.pdf

CAP 1554 - CAA review of Arrival Noise Controls
https://www.caa.co.uk/publication/download/16144

CAP 2046 - Accuracy of data in the Gatwick Noise and Track Keeping System
https://publicapps.caa.co.uk/docs/33/CAP1246_Gatwick_Noise_and_Track_Keeping_System.pdf

CAP2302 - A Low Noise Arrival Metric
https://www.caa.co.uk/our-work/publications/documents/content/cap2302/

Getting To Grips With Aircraft Noise (Airbus)
https://www.smartcockpit.com/docs/getting-to-grips-to-aircraft-noise.pdf

LLA Noise Policy
https://www.london-luton.co.uk/LondonLuton/files/9c/9c30954f-aaa1-4df0-8f17-2f7d66c38a10.pdf

NATS Sustainable Aviation Guide - A Guide To Continuous Descent Operations
produced by NATS for Sustainable Aviation
https://www.sustainableaviation.co.uk/wp-content/uploads/2018/06/A-Guide-to-CDOs-Booklet1.pdf

Noise Action Plan - London Luton Airport
https://www.london-luton.co.uk/corporate/community/noise/noise-action-plan

NATS Airspace Efficiency
https://www.nats.aero/environment/airspace-efficiency/