

Truncation of London Gatwick SAM and KENET SIDs (ACP-2017-65) – Post Implementation Review

CAP 2134

Published by the Civil Aviation Authority, 2021

Civil Aviation Authority
Aviation House
Beehive Ring Road
Crawley
West Sussex
RH6 0YR

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First published 2021

Enquiries regarding the content of this publication should be addressed to:

Airspace, ATM and Aerodromes
Safety and Airspace Regulation Group, Aviation House
Gatwick Airport South
West Sussex
RH6 0YR

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Executive summary

1. The CAA's airspace change process is a seven-stage mechanism that is set out in detail in CAP 725¹/CAP1616². Under this process NATS (in association with Gatwick Airport Limited and Air Navigation Solutions Limited who respectively own/operate Gatwick Airport and provide air traffic services in the airport tower) submitted an Airspace Change Proposal (ACP) to reduce the length of the "SAM" and "KENET" Area Navigation³ (RNAV) Standard Instrument Departures (SIDs) to the CAA on 19th December 2017. The aim of this ACP was to improve aircraft fuel efficiency by reducing the length of time aircraft would plan to fly at low level and thus reducing the amount of fuel needed to be carried (aircraft burn more fuel at lower levels than at higher ones and must carry sufficient fuel to fly the planned route).
2. The proposals were accepted by the CAA on 22nd February 2018 and implemented on 24th May 2018. Competing priorities for the allocation of resources meant that the CAA was unable to start the Post Implementation Review (PIR) one year after implementation as would normally be expected. Instead the CAA commenced the PIR of the impact of its decision and the implemented change on 17th April 2020. The content and outcome of the review process by the CAA is discussed in detail in this report.
3. On 2 January 2018 the CAA introduced a new process for making a decision whether or not to approve proposals to change airspace design. Irrespective of whether the CAA decision to approve the change was made under the previous process (set out in CAP 725), we will conduct all Post Implementation Reviews in accordance with the process requirements of CAP1616. However, when assessing the expected impacts against the actual impacts we will use the methodology adopted at the time of the original CAA decision in order to do so. In this particular case, the airspace change was conducted in accordance with the CAA's SID Truncation Policy⁴. As such, the change followed a "lighter touch" process than the full CAP 725 requirements, since it was aimed at delivering environmental benefits

¹ <https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=395>

² <https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=8127>

³ Area Navigation (RNAV) is a method of navigation for aircraft based on actual location (e.g. determined via satellite positioning systems) rather than by using relative distance and bearing to a series of radio transmitters.

⁴ <https://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=6027>

by removing a requirement to carry unnecessary fuel, without changing the vertical and lateral trajectories actually flown by aircraft.

4. During the review process, the CAA considered the formal response from the Sponsor which is contained in the Sponsor's documents:

- Post Implementation Review Feedback Form
- Post Implementation Review Report
- Post Implementation Engagement Evidence

Redacted versions of these documents are available on the CAA website.

5. As a result, the CAA has reached the following conclusion:

The CAA is satisfied that, following the adoption of mitigation actions to improve clarity (publication of a NOTAM, adding route information to the SID descriptions in the UK AIP, additional information added to some third party SID charts), the truncation of the SAM and KENET SIDs to NOVMA and IMVUR has satisfactorily achieved the intended objectives, and the change is confirmed.

6. This report provides the information the CAA has reviewed and taken into account before reaching these conclusions.

Scope and background of the PIR

What is a Post Implementation Review?

7. The CAA's approach to decision-making in relation to proposals to approve changes to airspace is explained in its Guidance on the Application of the Airspace Change Process, CAP [725/1616]. This detailed Guidance provides that the seventh and last stage of the process is a review of the implementation of the decision, particularly from an operational perspective, known as a Post Implementation Review (PIR).
8. The Guidance states that the purpose of a PIR "is for the change sponsor to carry out a rigorous assessment, and the CAA to evaluate, whether the anticipated impacts and benefits in the original proposal and published decision are as expected, and where there are differences, what steps (if any) are required to be taken".
9. If the impacts are not as predicted, the CAA will require the change sponsor to investigate why and consider possible mitigations or modifications for impacts that vary from those which were anticipated to meet the terms of the original decision.

10. A PIR is therefore focused on the effects of a particular airspace change proposal. It is not a review of the decision on the airspace change proposal, and neither is it a re-run of the original decision process.

Background to our conclusions in this PIR Decision

11. On the 22nd February 2018 the CAA approved the truncation of the London Gatwick SAM and KENET SIDs from the westerly runways 26L/R back to point NOVMA and the SAM and KENET SIDs from the easterly runway 08R back to point IMVUR. These changes were implemented on the 24th May 2018.
12. Due to reports of confusion as to which route should be followed (particularly following runway direction changes where a NOVMA SID had been planned but an IMVUR SID was the one actually flown), the CAA required a full PIR to be undertaken for this ACP, rather than the abridged version which would be used where there were no operational, environmental, or stakeholder implications.

Conditions attached to the CAA's decision to approve the change.

13. No conditions were attached to the CAA decision.

Relevant events since change (if any)

14. None except as detailed elsewhere in this document.

Data collected for the purpose of the PIR

Sources of Information

Change Sponsor

15. In addition to the original SID Truncation submission and supporting material, the Sponsor provided a formal PIR Report and a Stakeholder Engagement Evidence document. The CAA has also seen examples of relevant Safety Investigation summaries produced by the Sponsor but these will not be published due to the confidential nature of the information they contain.

CAA

16. Confirmation was sought and received from the relevant CAA En Route ATM Inspector that the mitigating actions put in place by the sponsor had resolved the safety concerns⁵.

⁵ CAA internal discussion 27/11/20.

Objectives and anticipated impacts

The original proposal and its objectives

17. The objective for this airspace change was to reduce the amount of unnecessary fuel carried by airliners leaving London Gatwick to the west.
18. Airliners are required to carry sufficient fuel to fly their planned route, plus a defined reserve. Because modern aircraft fly more efficiently at higher altitudes, any restriction which causes them to stay lower increases fuel burn. This consequently requires more fuel to be carried in line with the anticipated consumption, which in turn requires extra fuel to be carried to account for carrying the additional weight. (Airliners do not routinely simply have their tanks filled at each refuelling stop due to the weight penalty of carrying unnecessary fuel.)
19. NATS submitted a proposal to the CAA to reduce the distance aircraft leaving Gatwick on certain routes formally have to plan to stay low by a range of 23-51 nautical miles, depending on the exact route flown.

Anticipated Impacts

20. The sponsor's submissions for the SAM and KENET SID truncations back to NOVMA stated that:

"This SID Truncation is justified on the basis of fuel saving. The [SIDs] will be truncated by 23nm [SAM truncations and 42nm [KENET truncations].

Currently for flight planning purposes these portions are flight planned to be flown at 4000ft however aircraft are invariably climbed to higher levels subject to the traffic scenario at the time.

Some Aircraft Operators calculate fuel required based on the flight plan. By truncating the SID and effectively reducing the 4000ft level portion of the flight, the calculated fuel required will be less. Hence after the SID has been truncated the aircraft will be able to fly carrying less 'excess' fuel.

The overall effect will be positive, and no flights will be penalized as a result of the change."

21. The sponsor's submissions for the SAM and KENET SID truncations back to IMVUR stated that:

"This SID Truncation is justified on the basis of fuel saving. The SAM SID will be truncated by 33nm and the KENET SID by 51nm."

[The remaining justification was as for the truncations back to NOVMA.]

22. Because the numbers of flights operated with a fuel load based on the formal plan of flying the extra 22.9/42.9nm (westerly SIDs via NOVMA) or 33.5/51.1nm (easterly SIDs via IMVUR) at 4000ft, rather than the daily experience of an early climb was not known, the sponsor considered that an aggregated quantitative fuel saving could not be identified. However, since every aircraft which carried, and thus burnt, less fuel as a result of the change would derive a positive financial and environmental benefit through the fuel and CO₂ saving, the sponsor considered the overall benefit must be positive since the change was identified as delivering no negative impacts.
23. Figure 1 shows the current SIDs after truncation (green), the truncated sections of the previous SIDs (yellow with orange highlight) and the relevant parts of the main route network (yellow). Prior to the truncations, airlines would be expected to plan to fly all the way to SAM or KENET at a maximum of 4000ft, and to carry the necessary fuel accordingly. Following the truncations, airlines can plan to start climbing above 4000ft from IMVUR or NOVMA, taking the corresponding reduced fuel consumption into account.



Figure 1 – The SID Truncations

- Green paths represent the truncated SIDs to points IMVUR and NOVMA
- Yellow paths are ATS routes (with names)
- Yellow paths highlighted in orange are the sections of the original SIDs to points SAM and KENET which duplicated ATS routes and have been removed.
- As the SIDs were originally designed, flight crews were expected to plan remain at 4000ft all the way to SAM or KENET. However, the reality is that air traffic controllers have been able to allow them to climb much earlier than this.

CAA assessment

24. We have taken into consideration the interval since implementation and the change in utilisation of UK airspace when conducting this assessment.

Operational Assessment

Safety

25. The Sponsor reported that initially there was a degree of uncertainty/confusion about where aircraft should head once they had flown the truncated SID. In particular, this occurred when the wind, and thus runway, direction changed, as follows:
- Aircraft leaving London Gatwick file a flight plan for the expected departure direction. 70% of the time this is Westerly, so aircraft heading for either SAM or KENET would do so via a NOVMA SID, then talking ATS Route L620 (for SAM) or initially ATS Route L620 and then ATS Route N14 at NIBDA (for KENET).
 - When the wind changes direction, aircraft will need to initially head in the Easterly direction before turning West, using the IMVUR SID. Aircraft heading for SAM would take ATS Route N63 after IMVUR. Aircraft heading for KENET would take ATS Route N63 at IMVUR and then ATS Route N14 at VOUGA.
 - While changing the aircraft navigation systems to fly an IMVUR SID rather than a NOVMA SID ensured the aircraft departed London Gatwick correctly, it would not change the list of expected subsequent points after the end of the SID. In some cases, the aircraft onboard navigation computers attempted to send the aircraft to NOVMA in the mistaken belief that this was the next relevant navigation point.
26. The relatively short flying time to IMVUR (only a few minutes) meant that flight crews were faced with an unclear route while dealing with the other tasks associated with take-off, a point in the flight at which such distractions are extremely unwelcome.
27. The uncertainty of where to go next meant that flight crews called the air traffic controllers for information. This was a non-standard request and introduced additional workload for the controllers. As noted in the Sponsor's Engagement Evidence document, on one occasion this was considered to contribute to an "overload" (a situation in which the controller formally reports that they had more work to do than they believed appropriate). Additionally, the Sponsor's PIR document notes that on a separate occasion, the tactical workarounds introduced by controllers to resolve this issue were a contributing factor to one aircraft

inadvertently leaving Controlled Airspace and thus failing to maintain the prescribed level of separation from another aircraft.

Operational Feedback

28. Airlines reported initial Flight Crew uncertainty and track deviation issues, as discussed under Safety.
29. Following the resolution of these through the production of revised planning and briefing materials (publication of a NOTAM, adding route information to the SID descriptions in the UK AIP, additional information added to some third party SID charts), no further issues have been raised.

Air Navigation Service Provision

30. As discussed under Safety, the Sponsor's Air Traffic Controllers initially experienced some disruption and additional workload due to the Flight Crew uncertainty and track deviation as discussed under Safety.
31. As both the Sponsor and the Air Navigation Service Provider, the Sponsor was responsible for ensuring the development and implementation of suitable resolutions to the issues. This involved publishing a NOTAM⁶ in the first instance to ensure that flight crews and other relevant staff were aware of the potential issue.
32. Further discussions then followed with the companies which provide the airlines with their navigation databases, and at NATS Lead Operator Panel, a forum which brings operational and flight planning experts together to discuss operational issues. The inclusion of a "reference track" to indicate the normal next direction to flight crews was raised as a potential solution, but each navigation data provider is entitled to implement a solution in the way which best works for their systems.

Utilisation and Track Keeping

33. As the new SIDs represent truncated versions of the previous SIDs, their utilisation remains unchanged (traffic heading west from London Gatwick, from the westerly or easterly runway as appropriate).
34. However, as noted under Safety, there have been acknowledged issues with flight crews and aircraft navigation systems being unclear what track they should be following, which is why this ACP has undergone a full PIR, rather than the shortened version which is applied to ACPs which have no material change on aircraft behaviour.

⁶ NOTAM – Notice To Airmen. The aviation industry's standard method for notifying operational staff of urgent issues. Operational staff are required to check information such as NOTAMs at the start of any duty period.

Traffic

35. This ACP had no impact on traffic levels.

Infringements and Denied Access

36. Not applicable as this ACP relates to the definition of routes within controlled airspace. The airspace boundaries themselves have not changed.

Letters of Agreement

37. Not applicable as the affected airspace is all under the control of NATS. The SID truncation has no impact on the division of responsibility between NATS and Air Navigation Services Ltd (the tower air traffic control provider at Gatwick airport).

Environmental Assessment

38. The sponsor considers that no meaningful quantitative environmental assessment can be undertaken as the overall reduced amount of fuel used by the airlines (and thus greenhouse gases produced) as a result of the SID truncations is not known. Information at this level of detail is considered commercially sensitive by airlines and is not generally released.
39. However, as an example, the sponsor identified that a Boeing 747 on a 13 hour flight using the new NOVMA SID could save up to 550kg fuel burn and produce up to 1.7 tonnes less CO₂ than the previous SAM SID. The equivalent savings would be 1130kg of fuel and 3.6 tonnes of CO₂, when compared to the previous KENET SID. Aircraft using the IMVUR SID from the easterly runway would produce even greater savings as the truncations are larger. Smaller aircraft, or those on shorter overall routes, would deliver proportionately smaller savings.
40. The sponsor therefore considers that the ACP does deliver a meaningful environmental improvement, even if this cannot be quantified.

Community Stakeholder observations

41. Ground community stakeholders would not be consulted about a SID Truncation ACP in accordance with the SID Truncation Policy, and were thus not contacted about this PIR.

International Obligations

42. Not applicable as this airspace change is wholly contained within the London FIR and does not reach any international borders.

Ministry of Defence Operations

43. This ACP only affects General Aviation Traffic using the formal Instrument Flight Rules route structure within Controlled Airspace. As such, it has no impact on MoD

operations except where MoD aircraft use these routes in the same way as civil traffic. It has no impact on military training areas.

Any other impacts

44. No other impacts have been identified.

Conclusion

45. The CAA is satisfied that, following the adoption of mitigation actions to improve clarity (publication of a NOTAM, adding route information to the SID descriptions in the UK AIP, additional information added to some third party SID charts), the truncation of the SAM and KENET SIDs to NOVMA and IMVUR has satisfactorily achieved the intended objectives, and the change is confirmed.

Note on plain language

46. The CAA has attempted to write this report as clearly as possible. Our approach has been to include all the relevant technical material but also to provide a summary and of the conclusions the CAA has reached in reliance on it in as understandable a way as possible. Nevertheless, when summarising a technical subject there is always a risk that explaining it in more accessible terms can alter the meaning.