

SAM/KENET SID Truncations

Post-Implementation Review (PIR)

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NATS

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1. Post Implementation Review

1.1. Introduction

As part of an on-going programme of SID Truncations aimed at reducing the length of SIDs in the UK and the corresponding fuel uplift/burn required to fly them; the long-standing Southampton (SAM) and KENET SIDs from London Gatwick runways 26L/R and 08R (RNAV only) were truncated to new waypoints NOVMA and IMVUR respectively. The NOVMA & IMVUR SIDs (RNAV only) became effective on 24th May 2018 (AIRAC 6/2018).

This PIR seeks to provide an assessment as to whether the change has been effective, impacts of the change, and whether the change has achieved its objectives.

1.2. Background

The NATS 10% Programme was established in 2014 to reduce fuel and CO₂ burn/emissions before the end of RP2. Since then, a number of the UKs long standing SIDs have been truncated to make them shorter; thereby reducing the length at which an aircraft needs to flight/fuel plan to be at SID altitude, which can be as low as 4000ft in some cases.

This has been generally well received by Aircraft Operators (AOs) and operational controllers alike. However, it has become apparent that controllers did notice some confusion amongst aircrews operating on some truncated SIDs e.g. London Heathrow UMLAT/ ULTIB SIDs introduced on the same AIRAC. This problem was particularly pronounced where a common point SID was truncated, resulting in two different SID termination points (dependent on the runway in use). This fact was not made clear to the team tasked with subsequent truncations nor was it identified in any previous PIRs for early SID Truncations. For example: the EKLAD/ASMIM, KUXEM/ASMIM, DESIG/SONEX, LISTO/SANBA SIDs from Manchester and the CPT/ADMEX, COWLY ADMEX, UNGAP/DTY SIDs from Birmingham were earlier SID Truncations where the issues existed but were not communicated back to the Airspace Development Team.

1.3. Key Objectives

The proposed change was designed to enable a shorter portion of the flight plannable route to be flown and fuelled for (at 4000ft SID altitude for the SAM & KENET SIDs). By truncating the SAM/KENET SIDs at new point NOVMA (from runway 26L/R), it would shorten the portion of the route to be flown at 4000ft by 22.9/42.9nm; and at IMVUR (from runway 08R) by 33.5/51.1nm.

Not only was there a fuel saving but previous airspace changes had raised the base of Controlled Airspace (CAS) in some areas above 4000ft meaning the SAM/KENET SIDs actually went outside CAS, contrary to the purpose of issuing a SID as a clearance to remain inside CAS. The truncation points of NOVMA & IMVUR ensured that the SIDs remained inside CAS; alongside the clearance given to aircraft.

As part of the project no specific fuel savings were given for any of the SID Truncations as it was considered impossible to assess how many operators/flights actually fueled to be at SID

altitude at the end of a SID of 4000ft and how many used historical data to override the fuel plan/uplift.

1.4. Air Traffic Management Requirements

This change affected NATS Swanwick Sector TC Southwest Departures who are the first sector that aircraft routeing via NOVMA/IMVUR contact after departure. TC Southwest departures would handle these departures according to the prevailing traffic situation and in accordance with any published ATC Procedures.

From runway 26L/R the SID has a continuous climb to 4000ft by Midhurst (MID) – consideration was given to truncating the SID at MID but at the time, London Heathrow also had MID SIDs and so it was felt better to truncate at a different point to help differentiate from Heathrow departures which also communicate with TC Southwest Departures on first contact after departure.

However, the IMVUR SID from runway 08R, due to interaction with Heathrow DET SIDs and a legacy of previous airspace design based on outdated aircraft performance, has a step built into it at 3000ft at KKN09 until KKW19 when climb to 4000ft occurs.

The standard method of handling IMVUR departures which contact TC Southwest Deps on first call is for the controller to contact the TC Southeast Deps controller to a request climb in their airspace to 4000ft; negating the need for levelling at 3000ft until KKW19 or until the aircraft enters the lateral confines of the TC Southwest Deps sector.

Safety: at the time of implementation, there were no identified safety issues associated with this change. As stated above, we were not aware of any onward routeing issues created by previous SID Truncations to differing points dependent on the runway in use at a given airport.

Delay: there were no delays associated with this change prior to, or subsequent to this change.

Efficiency: previously, AOs would mostly flight plan to be 4000ft at SAM/KENET dependent on their routeing. It should be noted that KENET departures are restricted by the RAD to aircraft departing Gatwick/ arriving at Ireland aerodromes only. By truncating the SID back to NOVMA/IMVUR, the portion to be flown at 4000ft miles was c25/50nm shorter and the climb phase of the flight plan was shorter; thereby reducing fuel uplift and getting to cruise levels sooner. In terms of airspace efficiency, there was no change as the track over the ground and sector sequence is unchanged by SID Truncations.

1.5. Areas of Contention

Soon after the implementation of the change, the winds affecting Gatwick changed to easterlies meaning that runway 08R was used for departures. As a result of the airspace change this required the IMVUR 1Z SID to be issued whereas previously the NOVMA SID had been issued.

It soon became clear that some flight crews were having difficulty working out where they should route after IMVUR. Some were asking Gatwick Tower ATC, to which the response was to check when transferred to Terminal Control; some were asking TC Southwest deps controllers which was found to be distracting and increased R/T and associated workload in what is a very busy sector and at a busy time of the year (early June 2018 – the busiest June on record). Since then there have been instances of aircraft turning left at IMVUR to either NOVMA or on one occasion to MID to pick up the track of the NOVMA SID to NOVMA.

The AIP chart for the new IMVUR 1Z and NOVMA 1X SIDs can be seen below.

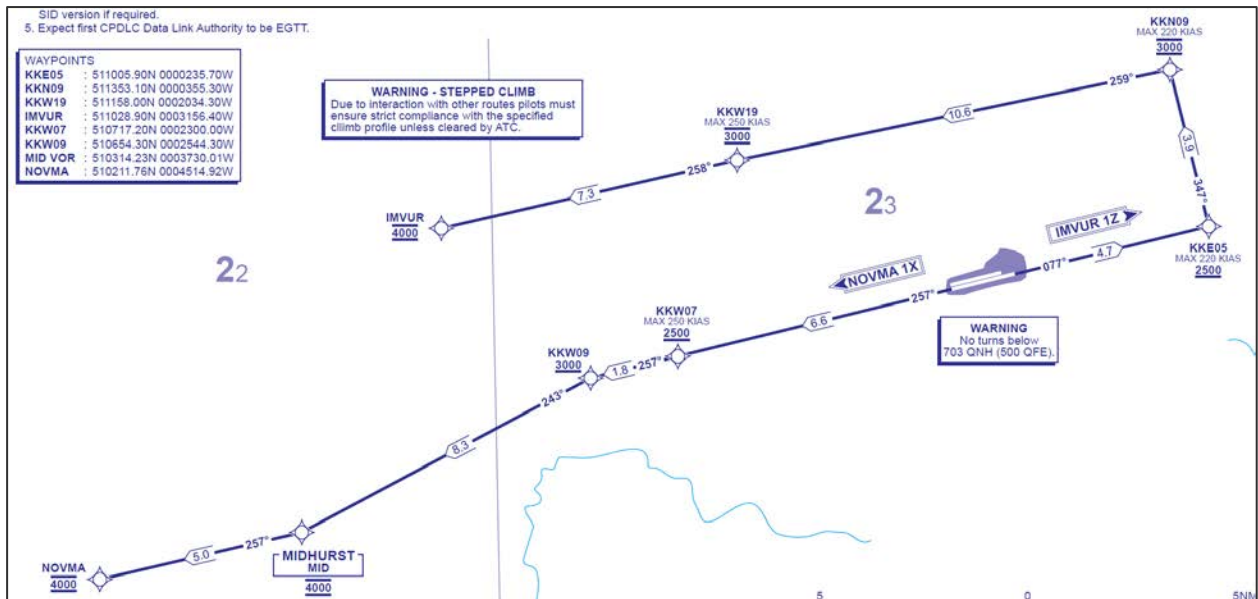


Figure 1: SID Chart for EGKK IMVUR 1Z/ NOVMA 1Z

This caused significant issues with controllers often assigning headings needlessly just to reduce the likelihood of them being asked where to route after IMVUR. In one incident this was a contributory factor in a KENET departure maintaining the step of 3000ft after being assigned a heading; consequently, leaving CAS and not being 5000ft separated from an unvalidated/unverified unknown target operating outside CAS.

As with the UMLAT/ULTIB issue, when we investigated the issue with AOs and the Coding Houses, we found that the onward route information published on the State version of the SID Chart against a given SID in the UK AIP, was not transposed into the customer version of the chart, as produced independently by the Coding Houses. Within the aircraft FMS it is the waypoints (as opposed to the ATS Routes) that are the key element in onward navigation.

Consequently, in some circumstances flight crews using the 3rd party versions of the charts did not have a clear indication where they should route at the end of the SID. This was particularly problematic in the hours following a change in the direction of runway in use. The FMS would have the original flight plan route - starting in most cases from NOVMA - but the aircraft would be given a clearance to IMVUR and hence a discontinuity error (DISCO) would appear in the FMS for the crew to fix.

Crews that were not assigned vectors or routed to a point further in the flight plan would ask ATC where they should route – the fact the SID was so much shorter than the original SID made this occurrence more prevalent than hitherto had been the case. This caused additional workload to controllers as well as increasing the R/T in what is already one of the busiest sectors in Europe.

As with UMLAT/ULTIB we needed to address the issue swiftly. A reversion to the SAM/ KENET SIDs would likely have required a Level 1 ACP and so would not have been a quick fix. We would have also likely encountered Regulatory opposition to establishing SIDs that went outside CAS and, in the subsequent time period and whilst not approved/ implemented, the Farnborough

Airspace change assumed that the SAM & KENET SIDs would no longer exist and so to re-introduce them would have impacted the Farnborough ACP.

We wanted to publish a NOTAM detailing the onward routeing from each SID, but this is complicated because each SID serves two distinctly different routeings:

NOVMA 1X/1M/1V: 1) NOVMA – L620 SAM (for traffic routeing via SAM)

2) NOVMA – L620 – NIBDA – N14 KENET for traffic routing via KENET)

IMVUR 1Z: 1) IMVUR – N63 SAM (for traffic routeing via SAM)

2) IMVUR – N63 – VOUGA – N14 KENET (for traffic routeing via KENET)

There was some discussion with the CAA, after which it was agreed to issue the NOTAM, and to add the information to the SID Chart in the UK AIP. In addition, Jeppesen agreed to add indicative arrows on all SID Charts that have different end points, depending on the runway in use. These can be found in Annex A below.

Since then the number of incidents has been much reduced. Discussions are on-going as to how the issue can be resolved, given that the Conventional SAM & KENET SIDs are still published. We discussed with ANS¹, not issuing IMVUR SIDs but issuing the Conventional SIDs regardless of the equipage of aircraft stated in Field 18 of the Flight Plan.

However, the logic which dictates which SID is assigned is determined by the IFPS system. The system will read the flight plan and issue the appropriate SID according to Field 18. In most cases this will be the NOVMA 1X, but it could quite easily be the NOVMA 1Z if easterly operations are forecast or in place. The SID is then sent to the EFPS system at Gatwick Tower and issued to the aircraft. Manually overruling/ instructing the IMVUR/NOVMA SID to be SAM/KENET was considered by ANS to be too arduous for the controllers, alongside no clear way of making it obvious as to which SID (SAM or KENET) should be issued. ANS requested that if this was to be the case then the IMVUR SIDs should be withdrawn from the AIP but the owner of the SIDs (GAL) was against this because re-establishing the SIDs in the future (once a solution was found) would require a Level 1 ACP and all the work/cost associated with it.

In an ideal world, the SID would end at the same point regardless of the runway in the use, however this has local environmental issues to those on the ground as well as to AOs. Departure Transitions to a common point from all runway ends have been considered and are in use elsewhere in the world; but this would need to form part of a significant TMA airspace redevelopment² and require approval of CAA SARG as well as IFP Regulation.

1.6. Environmental Conclusions

There is no doubt this airspace change has enabled reduced fuel uplift and associated reduced fuel burn.

¹ ANS – Air Navigation Solutions is the company which operates the Gatwick Tower ATC service

² The FASi-S programme currently in progress is aiming to achieve this.

As an example, for a Boeing 747 flying a Gatwick – NOVMA SID as opposed to the previous SAM/KENET SID on a 13-hour long-haul flight, a SID truncation of 20.9/42.9 NM could reduce fuel uplift by 940/1930 kg, meaning the entire aircraft is 0.9/1.9 tonnes lighter. Over the course of a 13-hour flight, this lighter aircraft means 550/1130 kg less fuel would be burnt (and saving c1.7/3.6 tonnes CO₂ being emitted as a consequence).

However due to the uncertainty regarding which and how many operators used to fuel for the whole length of the original SIDs it is not possible to determine the benefits definitively.

1.7. Effectiveness of Change

The change has been effective in terms of enabling reduced fuel uplift and fuel burn however, it has uncovered previously existing issues that very rarely materialised as detailed in para 1.5 above.

1.8. Other Benefits

None identified.

1.9. Operational Impact

Feedback on the implemented change was sought from affected stakeholders – primarily AOs and operational controllers in Terminal Control, Swanwick. As detailed above, there was a significant impact to both stakeholders. This has been largely resolved however the latent issue remains.

1.10. Airspace Change process issues and recommendations for refinement

As a result of this experience it is now recommended that no further SID truncations, that will result in different waypoint termination points relating to the runway in use, should be progressed, without strong mitigation that the issues detailed above will not be repeated.

1.11. Conclusions

The truncation of the SAM & KENET SIDs to NOVMA & IMVUR, whilst providing some reduction in fuel uplift and associated fuel burn, resulted in confusion amongst some flight crews; increase in workload for TC Southwest controllers and on some occasions, gross navigational errors of aircraft.

The issues that were inadvertently caused by this airspace change are now considered to be manageable. However, a longer term solution resulting in definitively clear routings in all circumstances is desired to resolve them completely. The FASI-S programme of airspace change, in which Gatwick Airport is actively participating will address this issue.

A separate document containing evidence of stakeholder engagement has been provided to the CAA in support this report. This contains communication evidence with relevant stakeholders - including the CAA, operators, coding houses and Swanwick Investigations – following the implementation of these changes and issues summarised above.

1.12. Annex A: Jeppesen Charts

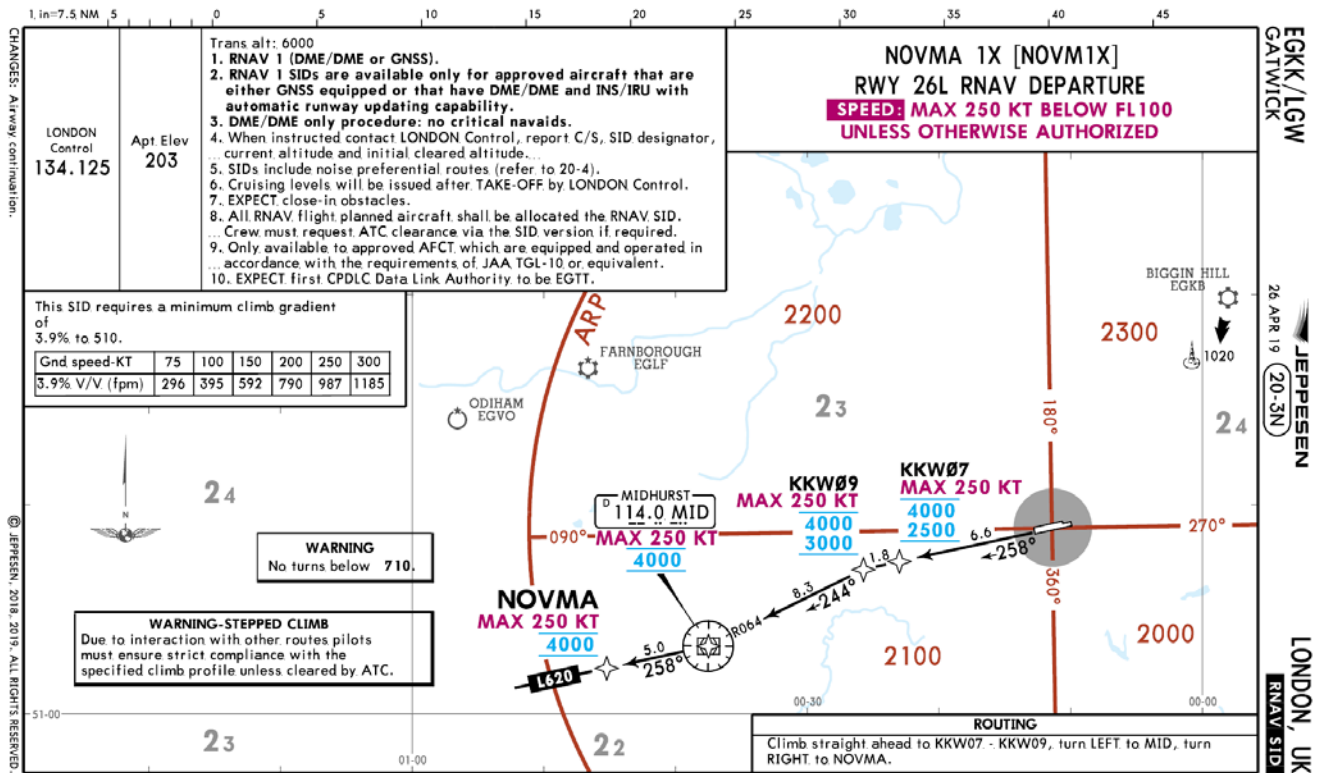


Figure 2: EGKK NOVMA 1X Chart

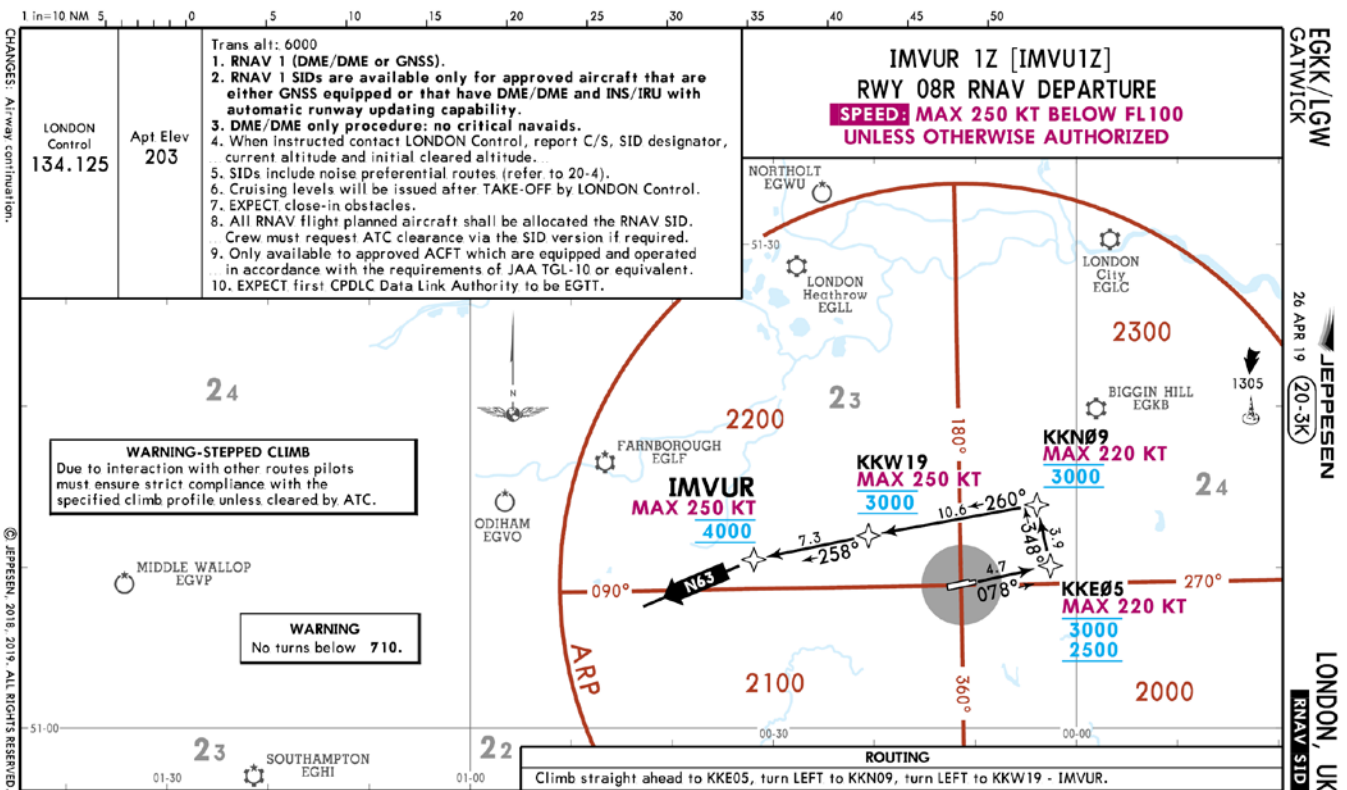


Figure 3: EGKK IMVUR 1Z Chart