WOBUN/BUZAD SID Truncation

Post-Implementation Review (PIR)

Issue 1.2

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NATS Protected

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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 WOBUN and BUZAD SIDs from London Heathrow runways 27L/R and 09L/R were truncated to new waypoints UMLAT and ULTIB respectively. The UMLAT & ULTIB SIDs 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 CO_2 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; especially 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.

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 6000ft SID altitude for the WOBUN & BUZAD SIDs). By truncating the WOBUN SID at new point UMLAT, it would shorten the portion of the route to be flown at 6000ft by 20.9nm; and for the BUZAD SID being truncated at new point ULTIB, the distance was 19.8nm.

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 fuelled to be at SID altitude at the end of a SID (6000ft for WOBUN/BUZAD) 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 Northwest Departures who are the first sector that aircraft routeing via WOBUN/ BUZAD contact after departure. Post implementation we did learn anecdotally from Heathrow Tower controllers that, on occasion, flight crews would ask where they should route after BUZAD having flight planned via WOBUN if a runway change had happened due to change in wind direction. The usual response to this request was along the lines of ‘check with radar when you are transferred’.

TC Northwest departures would handle these departures according to the prevailing traffic situation and in accordance with any published ATC Procedures. They had the choice to vector traffic, keep it on the SID and/or climb it above 6000ft. They would also answer any routeing queries from flight crews; however, once a vector had been given, this made the question null & void. Very few, if any, ever got as far as BUZAD without being vectored and/or routed to the next waypoint – in this case WELIN.

Safety: at the time of implementation, there were no identified safety issues associated with this change. We were not aware of the WOBUN/BUZAD onward routeing issue and we hadn't been made aware of similar issues resulting from previous SID Truncations in the Manchester TMA or from Birmingham.

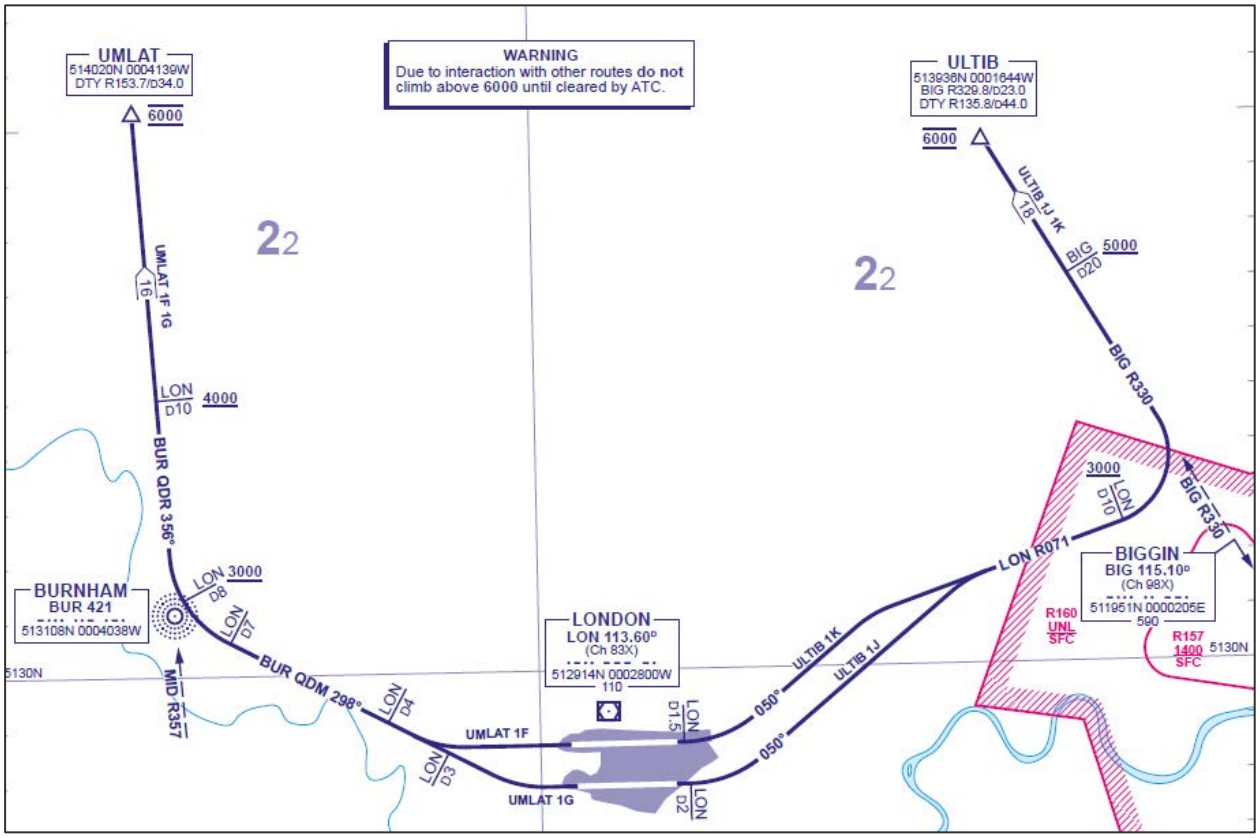
Delay: there were no delays associated with this change prior to, or subsequent to this change.

Efficiency: previously, AOs would mostly flight plan via WOBUN (prevailing wind direction) which is to be flown at 6000ft and commence the climb phase of the flight plan after WOBUN. By truncating the SID back to UMLAT, the portion to be flown at 6000ft was c21nm shorter thereby reducing fuel uplift and reaching 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 Heathrow changed to easterlies meaning that runway 09R was used for departures. As a result of the airspace change this required the ULTIB 1J SID to be issued. It soon became clear that some flight crews were having difficulty working out where they should route after ULTIB. Some were asking Heathrow Tower ATC; to which the response was check when transferred to Terminal Control. Some flight crews were asking TC Northwest deps controllers which was found to be distracting and increased R/T and associated workload. There were also a few examples of aircraft reaching ULTIB and instead of carrying on to BUZAD - WELIN, would turn left back to UMLAT to re-join the originally flight planned route.

The AIP chart for the new UMLAT 1F/1G and ULTIB 1J/1K SIDs can be seen below.



UMLAT 1F RWY 27R	Climb straight ahead to be established on **BUR** NDB QDM 298° by **LON** D4. At **LON** D7 turn right onto **BUR** NDB QDR 356° (**MID** VOR R357), crossing **LON** D8 at or above **3000**, then continue to cross **LON** D10 at or above **4000** and cross **UMLAT** at **6000**.	Via T418 to **WOBUN**.
UMLAT 1G RWY 27L	Climb straight ahead to be established on **BUR** NDB QDM 298° by **LON** D3. At **LON** D7 turn right onto **BUR** NDB QDR 356° (**MID** VOR R357), crossing **LON** D8 at or above **3000**, then continue to cross **LON** D10 at or above **4000** and cross **UMLAT** at **6000**.	
ULTIB 1J RWY 09R	Climb straight ahead to **LON** D2, then turn left onto track 050° to intercept **LON** VOR R071, cross **LON** D10 at or above **3000** and turn left onto **BIG** VOR R330, cross **BIG** D20 at or above **5000** and cross **ULTIB** at **6000**.	Via T420 to **BUZAD**.
ULTIB 1K RWY 09L	Climb straight ahead to **LON** D1.5, then turn left onto track 050° to intercept **LON** VOR R071, cross **LON** D10 at or above **3000** and turn left onto **BIG** VOR R330, cross **BIG** D20 at or above **5000** and cross **ULTIB** at **6000**.	

Figure 1: SID Chart for EGLL UMLAT 1F 1G/ ULTIB 1J 1K

This unexpected behaviour was a significant cause for concern: the worst scenario being the left turn back to UMLAT which would take the aircraft back under the Bovingdon Hold. The SID Charts that are published in the UK AIP clearly stated that the ATS Route from ULTIB to be taken is T420 (and T418 from UMLAT), as shown above.

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 UMLAT - but the aircraft would be given a clearance to ULTIB 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.

This issue needed to be corrected swiftly. Reversion to the WOBUN/BUZAD SIDs would likely have required a Level 1 ACP and so would not have been a quick fix. Hence a NOTAM was published detailing the onward routeing from each SID:

UMLAT 1F/1G: UMLAT – WOBUN – WELIN (T418)

ULTIB 1J/1K: ULTIB – BUZAD – WELIN (T420)

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.

The NOTAM reduced the number of queries on the R/T and it stopped the occurrence of inappropriate turns from ULTIB to UMLAT or vice-versa. In addition, Jeppesen agreed to add indicative arrows on all SID Charts that have different end points, depending on the runway in use.

Since then the number of incidents has been much reduced. Discussions are on-going as to how the issue can be resolved. 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 Aircraft Operators. 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 redevelopment[1] 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.

As an example for a Boeing 747 flying a Heathrow–UMLAT SID on a 13-hour long-haul flight, a SID truncation of c.20.9 NM could reduce the fuel uplift to the aircraft by 940 kg, meaning the entire aircraft is 0.9 tonnes lighter. Over the course of the 13-hour flight , this lighter aircraft means 550 kg less fuel would be burnt (and saving c1.7 tonnes CO_2 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 - along with the variance of the North Atlantic Track (NAT) structure which these SIDs serve - it is not possible to determine the benefits definitively.

[1] The FASI-S programme currently in progress is aiming to achieve this.

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, in addition to the positive benefit to AOs of the reduction in fuel uplift due to the SID truncation, there was an unintended impact which resulted from the ambiguity of onward routing in some circumstances (primarily following a runway direction change). This issue has now been resolved.

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 WOBUN & BUZAD SIDs to UMLAT and ULTIB respectively, whilst providing some reduction in fuel uplift and associated fuel burn, did result in some confusion amongst some flight crews, irritation to TC North controllers and on some occasions ambiguity which resulted in 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 Heathrow 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 and Swanwick Investigations – following the implementation of these changes and issues summarised above.