

Route 4 2012 ACP PIR Decision GAL Response Review Meeting Note

Date: 03/07/2020 and 05/08/2020

Time: 09:30 BST

Host & Chair: [REDACTED] (GAL)

Attendees:

GAL: [REDACTED], [REDACTED] (note taker)

ANSL: [REDACTED], [REDACTED]

NATS: [REDACTED], [REDACTED], [REDACTED], [REDACTED]

CAA: [REDACTED], [REDACTED], [REDACTED], [REDACTED]

Meeting Notes:

The purpose of the meeting was to provide further detail on Gatwick's proposal to implement CAP 1912 and specifically to answer the 5 key questions and topics that CAA have raised in the response letter dated 12/06/2020.

A follow up meeting was held on 05/08/2020 at 09:30 BST to provide further detail of the key factors driving Gatwick's proposed implementation.

The London airspace over recent years has developed taking increasing advantage of routes designed to a high navigational specification in order to improve safety and increase capacity to accommodate high levels of demand in this complex and intensely utilised airspace. Gatwick's Route 4 Conventional SIDs - that will be the only flight plannable Route 4 SIDs available after the withdrawal of the RNAV SIDs - connect to a portion of the air traffic route network beyond Gatwick designed to a lower navigation specification. This route network is designed to accommodate very small numbers of aircraft, less than 2% of Gatwick's Route 4 departures. The significant increase in utilisation of this portion of the route network - 100% of the Gatwick Route 4 traffic - generates hazards to the safe operation of the air traffic route network away from Gatwick across the Eastern and North Eastern quadrants of the London airspace. It is anticipated that using the Gatwick Route 4 Conventional SIDs in their current form would lead to:

- A significant increase to air traffic controller intervention to ensure separation between aircraft on different routes designed to different navigational standards;
- A commensurate increase in the uncertainty in the cockpit as routes - not programmed into the aircraft's Flights Management System (FMS) - are manually adjusted mid-flight to accommodate the tactical changes necessary to re-route aircraft;
- Increases in RT loading (radio conversations between pilots and controllers) as there is an increase in the challenge and response as aircraft are re-routed;
- Unsafe air traffic management planning assumptions and sector loadings as the air traffic management tools used to plan traffic flows and ensure safe ATC sector loading would be built on false premise planning assumptions as the flight plans filed by airlines incorrectly show aircraft intend to follow the route structure designed to a lower navigational specification because this is where the Conventional Route 4 SIDs are designed to enter the route network.

In summary, the plan proposed by Gatwick, NATS and ANSL aims to mitigate the operational and safety risks and issues identified by our air traffic service providers and is described in some detail in this

record of discussion. The rationale for the change project delivering all the necessary components synchronised for implementation on 25 February 2021 remains the significant safety and operational risks that are created in delivering disjointed changes that do not take into account the wider network impacts of removing the RNAV Standard Instrument Departures (SIDs) without implementing the necessary mitigations.

1. Why does denotification of the RNAV SIDs require a NAS (a NATS ATC system) AIRAC update?

NATS: Note: Route 4 SID and connectivity chart has been provided in Appendix 1 to accompany the explanations here and in following questions.

Whilst many believe that the route begins at the airport of departure, in flight planning terms the flight planned route begins at the first fix – often this is the end of a Standard Instrument Departure (SID) route. The SID is merely a clearance to get the plane to the first fix and has usually been designed and approved by Instrument Flight Procedure (IFP) Regulators considering a range of factors, such as flyability, noise preferential routes, obstacle clearances etc.

On RNAV5 routes (legacy routes designed to a lower navigational specification, servicing conventional SIDs) ATC often must assign vectors to aircraft. This is because the tracks flown by aircraft can be affected by winds, amongst other things, and therefore RNAV5 routes require increased separation between aircraft to maintain equivalent levels of safety. Additionally, ATC must actively manage the traffic to ensure aircraft remain on their assigned route and are separated from other traffic. RNAV1 equipped aircraft operate with a much higher degree of navigational specification. RNAV1 enables ATC to simply monitor the adherence of traffic to the routes, because aircraft, using their own navigation, automatically compensate for wind to ensure adherence to the route.

The Swanwick Airspace Improvement Programme (SAIP) AD4 Airspace Change of February 2019 established a RNAV1 ATS Route structure through the TC East and AC Clacton airspace sectors to enable the more efficient use of the airspace and minimise workload of controllers working aircraft in those sectors.

To access this route structure the CLN RNAV SIDs (from both runways) were truncated to a new waypoint called FRANE and so FRANE then became the first waypoint on the flight planned route. FRANE is on ATS Route M604 and that route passes subsequently through waypoints GASBA, PAAVO and LEDBO which enable aircraft to switch routes, operating akin to a motorway intersection. GASBA provides connectivity onto M197 for traffic routeing via REDFA. PAAVO provides connectivity onto Q295 for traffic routeing via SOMVA. LEDBO is a waypoint further along M604 through which traffic passes on its way northeast towards Norwegian Airspace.

Traffic routeing via M197 eastbound must be RNAV1 equipped to ensure separation against traffic on the westbound route M40 which is also only suitable for RNAV1 equipped aircraft, since these aircraft are able to maintain track keeping accuracy on route using their own navigation as explained above.

CAP 1912 requires FRANE SIDs to be removed. The consequence is that the flight planned route (at the end of the SID) will need to commence at CLN. Whilst there is flight plannable connectivity from CLN to both REDFA and SOMVA the ATS routes required to get to these waypoints (L620, P44) are not RNAV1 enabled nor are they sufficiently spaced from M40 to allow safe operation without ATC providing vectoring instructions. To elaborate further, not only would the eastbound traffic need to be assigned vectors but also, in line with CAA rules and ATC Standard Operating Procedures, the westbound traffic on M40 would need to be vectored. It is estimated that this situation would result in a significantly increased ATC workload and increased inherent safety risks on these routes.

For traffic routing via LEDBO, rather than continue on M604 from FRANE, the Flight Plannable Direct (DCT) route between CLN and LEDBO, established as part of AD4 to enable non-RNAV1 aircraft to route via LEDBO, will need to be amended in various systems to allow RNAV1 traffic to access the routing. Whilst this routing would not ordinarily be considered as separated from the westbound traffic per se it will require far more ATC interaction if all traffic routed this way, again resulting in increased ATC workload.

Additionally, if only the FRANE1X SID is removed as required by CAP1912, an issue arises when a change in wind direction necessitates a change in runway direction from 26 to 08. In this situation the flight planned route would begin at CLN and yet the ATC Clearance would begin at FRANE. This would create a Discontinuity (DISCO) in the aircraft's Flight management System (FMS) on the flight deck resulting in flight crews questioning ATC as to where they should route next or worse, simply routing from FRANE to CLN which passes through a Danger Area at Shoeburyness in Essex. A similar issue, although not quite as severe, occurs with the DVR/ADMAG SIDs and hence it would be ideal to truncate the Conventional DVR SID from runway 26L/R to ADMAG – unfortunately ADMAG itself is about 1300 meters from ATS Route Y312 which takes traffic to DVR and so a new waypoint abeam ADMAG and on Y312 would need to be created. Whilst this may look like a change in track over the ground aircraft at this point are usually well above 7000ft and climbing and often assigned headings to facilitate that climb against Heathrow traffic.

The solution to all issues described above, namely M197 separation, LEDBO access and runway change routing discrepancy, would be to truncate the Conventional CLN and DVR SIDs back to a point on or around current FRANE and ADMAG SIDs, respectively – this would preserve all the connectivity currently available and enable the appropriately equipped aircraft to flight plan via and operate safely on the correct routes, as they do today. In terms of compliance with the October implementation of CAP1912, this unfortunately requires multiple system changes as well as CAA approval.

For any significant airspace change, such as the change required by CAP 1912, which adds, changes or removes SIDs/STARs, ATS routes, traffic presentation et al., it is essential that thorough testing and pre-validation of the change is undertaken at Eurocontrol, Brussels. This testing is constrained by defined timescales, to enable precise change data to be submitted, coded, tested and implemented by the teams at Eurocontrol in time to implement with full assurance for the operational AIRAC date. As a rule, draft data for significant airspace changes will need to be provided to Eurocontrol 14-16 weeks ahead of the operational AIRAC date, although this may need to be further extended in cases where this period crosses a significant holiday period such as Christmas. Pre-validation will comprise a comprehensive set of test flight plans (FPLs) being fed through the test airspace. This enables checks to be made to ensure the following: SIDs/STARs/ATS routes are correctly encoded; Route Availability Document (RAD) restrictions accurately trigger acceptance/rejection of the FPL as appropriate; traffic profiles are correct, ensuring accurate sector sequences and capture of traffic in the appropriate ATC sectors; any traffic volumes are amended to ensure they are working and fit for use by flow management positions (FMP).

In addition, further changes will need to be undertaken in internal NATS systems. The NAS AIRAC build schedule is pre-defined and any airspace changes of this nature will need to be fitted into a build with due allowance for the appropriate cut-off timescales to enable coding/testing to take place. Other ancillary systems will also need to be updated, again in accordance with their own individual AIRAC cut-off timescales. The process for implementing CAP 1912 has begun but due to the limited number of system builds per year plus the extent of change required, the earliest date for implementation would be 25 February 2021.

CAA: Why is the conventional route different to the RNAV route?

NATS: When SAIP AD4 was implemented the conventional route 4 CLN SID was intentionally set up to facilitate access to the airspace network for non-RNAV equipped aircraft. Very few aircraft fly the conventional route.

SAIP AD4, including the routeing via FRANE, implemented an airspace design that is more fuel, performance and environmentally efficient. In designing and promoting the use of RNAV1 routes within the London Terminal Manoeuvring Area (TMA) as part of SAIP we were guided by the “best equipped, best served” principles.

CAA: Is there tactical intervention in aircraft routeing now?

NATS: Yes, however currently this only affects under 2% of aircraft flying Route 4. Without the proposed truncations and system changes, CAP1912 would necessitate tactical intervention for 100% of traffic using the CLN route and impact other traffic adjacent to the CLN route, with significant safety and operational consequences as described above.

2. [The Conventional Route 4 SIDs at Gatwick are pre-existing and not amended by the denotification of the RNAV SIDs. If there are “industry acknowledged” issues with RNAV overlay coding, why have these not been addressed earlier?](#)

ANSL: Airspace development in the last ten years has been concentrated towards satellite technology-based navigation (RNAV) within the London TMA and therefore this change is unique in that it is unwinding the progress made in that period, particularly on the technically challenging first turn of the Route 4 SIDs.

ANSL safety assessments of the potential removal of the Route 4 RNAV SIDs earlier this year identified the intent of most airlines at Gatwick to fly RNAV overlays of conventional routes, rather than the conventional routes themselves. This means they will use their own coded data within the aircraft’s onboard FMS to replicate the conventional route but using satellite navigation. Coded overlays are widely used but are not regulated and are created by several different organisations depending on the operating company.

Since the conventional routes at Gatwick have been used sparingly since 2013 (98%+ flights flew RNAV1 routes), we have no recent evidence that the RNAV coded overlays of Route 4 conventional routes deliver sound track conformance. Historically, this risk manifested as loss of separation due to variation in track keeping on Route 4, particularly in relation to the first turn performance. To elaborate, if two aircraft departed on Route 4, with the second (following) aircraft being positioned two minutes behind the first and the speed and turn performance of either aircraft varies in relation to the other, there is a risk that separation between the two aircraft is eroded in this, critical stage of flight. This behaviour is minimised when RNAV route(s) are flown due to RNAV routes being more strictly regulated and scrutinised, resulting in more uniform and predictable flight paths.

With the intended change, air traffic control faces reduced uniformity of performance of individual aircraft (using conventional navigation or RNAV overlay of the conventional route) and consequently reduced flow, predictability and resilience. Feedback from airlines, gathered through safety assessments and other communications, has indicated that this will indeed be the case.

In the UK, there has not been a navigational performance reversion of this kind and so there are no previous examples or best practice to guide us in how best to address this issue.

Consequently, in the short to medium term, we expect to place minimum departure intervals on traffic in order to maintain separation, but from an operational perspective this would invariably negatively affect the 33% of GAL's departure traffic that uses Route 4 and would constrain the traffic flow into the TMA. Using pre COVID volumes, this would translate to in excess of 150 departures per day directly impacted by this restriction.

Using the existing offload SID is an option but depending on the flow of arrivals traffic it is often not possible to use.

In the absence of other safety assurance, such as the ANSL safety work described in the following paragraph, ANSL would estimate needing a sample of a couple of months of traffic data to analyse aircraft navigational performance in order to provide the required assurance, before being in position to remove separation restrictions.

The ANSL safety work, as outlined in GAL letter, aims to gain some assurance of predictable performance on the conventional route 4 SIDs, by reviewing the RNAV based overlay coding of different operators and determine and address variation ahead of the implementation of these changes. Work has already commenced and is progressing but follow up has been difficult and slow due to the COVID19 impact on airlines and loss of key resources.

3. [Absent a specific safety issue, the CAA does not consider truncation of conventional SIDs relevant to the CAP 1912 timeline for denotification; if GAL wish to truncate the CLN and DVR SIDs it should do so via the CAP 1616 SID Truncation Policy.](#)

NATS: The truncation of the conventional SIDs is the collective preferred option as it enables safe and orderly denotification and withdrawal of the Route 4 RNAV1 SIDs thus mitigating the identified operational risks as detailed above. There is also an added benefit of reduced environmental impact from flying (or planning) the longer routes at relatively low altitude that the removal of the conventional SIDs, without mitigation, would introduce.

As detailed in Q.1, the changes required by CAP 1912 result in different SID end points from opposite runway directions (i.e. the existing truncated RNAV on runway 08 vs a long conventional SID on runway 26). Recent lessons learned show that the use of 'corresponding' SIDs with differing end points from opposite runway directions introduces additional safety risk into the operation. This manifests in confusion on the flight deck when planned routings do not align with those expected. This confusion leads to risk and is especially acute for the combination of runway 26 CLN and runway 08 FRANE departures at Gatwick, where we have identified a risk of potential Danger Area incursion in addition to increased pilot and controller workload from resulting R/T.

To address this, NATS requires the truncation of the conventional SIDs, for both DVR and CLN, so that regardless of direction of departure (runway 26 or 08), the SIDs will have a common end point/routing and thus remove this potential risk from operations.

Truncating the conventional SIDs as part of this exercise delivers two benefits. The first is the reduction in confusion on the flight deck with flight planned routings.

The second is that the route connectivity issues, also detailed under Q.1, are no longer relevant as the truncation of the CLN SID to FRANE enables all aircraft to utilise the existing route structure without the need for system updates.

CAA: Does all traffic on Route 4 go to CLN and DVR?

NATS: No. The removal of LAM1X is easier to accommodate. LAM conventional and RNAV SIDS share common lateral profiles and end points. Our systems do not differentiate between RNAV1 and 5 equipage on aircraft flying these routes and therefore a swap from RNAV1 to conventional will not require any changes to systems or ATC Procedures.

4. [Detail the consequences if BIG SID were removed, and why have the considered alternatives not been progressed when GAL have been aware that this denotification was pending.](#)

The Conventional BIG SID was removed some time ago only leaving the RNAV BIG SIDs. The BIG SID is used to enable aircraft (usually empty) to fly from Gatwick back to Heathrow either for operational reasons or following a diversion. In this case, due to the very short distance there is no flight plannable route as such and operators simply flight plan Gatwick direct Heathrow. However, an ATC Clearance is still required to enable the aircraft to get airborne. The safest way to ensure this is to issue a SID as a SID has been approved by the required regulatory body and has been checked for flyability and obstacle clearance. That said, traffic positioning between the two airports is usually tactically agreed between the two ATC Approach units such that it is fitted into the traffic sequence and often doesn't route as far as BIG. However, in the event of R/T failure or other such non-standard occurrence having the SID as an ATC Clearance provides a known environment to both flight crew and ATC alike. Without this the crew would need to be issued with a Non-Standard Departure which they will probably not be familiar with and whilst this is part of their role as flight crews it still requires accurate readback and accurate input into the FMS and does not provide a stable Clearance Limit in the event of an issue in the same way as the BIG SID would. For the very few numbers of aircraft that are likely to use the BIG SID it is recommended that despite CAP1912 the BIG1X and BIG 1Z SIDs are retained on safety grounds.

5. [Re Implementation timeline and delay: CAA accept the impact of COVID-19, however, the CAA requires further information to understand GAL concerns.](#)

The withdrawal of the Route 4 RNAV SIDs is unprecedented and therefore the execution of this change should be conducted with care and caution to ensure safe and orderly denotification and withdrawal of Route 4 RNAV SIDs. In doing so we will aim to maintain the integrity of current airport operation and minimise risk and disruption to the operation of the wider London TMA network. With this in mind, we assess the resulting overall risk of different likely implementation deadlines as follows:

October implementation of CAP 1912 represents the highest safety and operational risk due to the following:

- Route connectivity for conventional navigation on Route 4 may be potentially unavailable for a period after implementation as described under Question 1;
- NATS ATC systems adaptation and routing ruleset testing cannot be completed by the October deadline and therefore will not comply;
- Increased safety and operational risk due to increased workload and complexity plus performance variation in the first turn as result of different interpretation of conventional route as described under Questions 1 and 2;
- Likely operational restrictions on Route 4 due to previous points;
- Suppression of FRANE, ADMAG and ODVIK RNAV SIDs in runway 08 operations to avoid differing SID end points from opposite runway directions, until CLN and DVR conventional SIDs from Runway 26 are truncated (Question 3);
- Environmental disbenefits from flying (or planning) the longer routes at relatively low altitude until the conventional SIDs are truncated.

December implementation is technically possible to address only the basic requirements of CAP1912, namely the removal of RNAV SIDs from Route 4, including the related systems adaptations and testing. Nevertheless, this option is highly undesirable due to unresolved problems as outlined earlier, namely:

- Increased risk and operational restrictions on Route 4 until runway 26 conventional SIDs CLN and DVR are truncated;
- Suppression of FRANE, ADMAG and ODVIK RNAV SIDs in runway 08 operations to avoid differing SID end points from opposite runway directions, until runway 26 CLN and DVR conventional SIDs are truncated, consequently exacerbating the problems outlined above;
- Environmental disbenefits from flying (or planning) the longer routes at relatively low altitude until the conventional SIDs are truncated.

Finally, December implementation introduces a “change upon change” risk due to December change followed by a desired February truncation of runway 26 CLN and DVR SIDs to address the above open issues.

February 2021 implementation allows sufficient time to address all identified systems and testing issues, conduct assessments of overlay coding with key airline operators, and truncate runway 26 conventional SIDs CLN and DVR to facilitate the safest and most orderly denotification and withdrawal of the Route 4 RNAV SIDs.

Appendix 1 – Runway 26 CLN and DVR SID Routes and Upper Airspace Connections and Interactions

