BIG DVOR STARs, Holds and ATS Routes Documentation:
Stage 4 Update and Submit

Step 4A Update Design

Step 4B
BIG Airspace Change Proposal
V4.3

NATS Uncontrolled

Publication History

Issue	Month/Year	Change Requests in this issue
Issue 1.0	April 2019	Published and submitted to SARG
Issue 2.0	May 2019	Re-submitted to SARG following requested clarifications
Issue 2.1	May 2019	Re-submitted to SARG following further minor clarifications
Issue 3.0	June 2019	Following the submission of Issue 2.1, the replication of the WILLO 3B STAR into KIDLI 1G has been removed from this proposal. This is following operational issues related to the Descent Planning Levels on the STAR Charts, which arose from the SAM/ OCK and GWC deployments. The proposed KIDLI 1G change did not include a Level restriction at DISIT and will therefore have to be progressed separately to this ACP. The withdrawal of the ASTRA 2B STAR has been removed from this proposal, as this was predicated on the RNAV replication of the WILLO 3B STAR. Finally, the replication of the DELBO Hold has also been removed from this proposal; otherwise there would be a RNAV floating Hold for a Conventional STAR. Section 6.2 updated to reflect the above changes. The BIG VOR reference will no longer be removed or amended from AE to A in the AIP; as the en-route dependency will not be completely removed (until the above changes are implemented).
Issue 4.0	June 2019	Introductory paragraph (on this page, below) updated to explain the rationale behind using 5LNC designators for waypoints on en-route STARs. Updated references: Reference 4 (AIP changes), Reference 5 (NATS Design Report) and Reference 7 (AeroData Spreadsheet). Additional Appendix Section 15.7 added which includes redacted evidence of airport engagement. This is referred to in Section 7.2.
Issue 4.1	June 2019	Minor editorial changes following submission and review of Issue 4.0.
Issue 4.2	July 2019	The GODLU 1J truncation (into AVANT 1C) has been included in this proposal. This has been resubmitted as a separate IFP design package. Updated references: AIP changes document (Ref 4), AeroData spreadsheet (Ref 7) and the AVANT 1C PDG Report (Ref 8).
Issue 4.3	August 2019	Updated text on page 3 to reflect this ACP does not remove the BIG DVOR from the en-route environment. Updated date on page 4 for GAM DVOR from June to September. Updated table title on page 5 to be clear this only includes IFPs which are being amended/withdrawn. Updated references (Reference 4) AIP changes

Step 4A – Update Design

Since submitting the DAP1916 for this proposal, the Civil Aviation Authority (CAA) have requested that we do not collocate new 5-Letter Name Code (5LNCs) (WEALD) with existing 3LNCs (BIG), if the navaids are still functioning. This proposal will therefore amend the Biggin Hill (BIG) Doppler Very High Frequency Omni-directional Radio Range (DVOR)/ Distance Measuring Equipment (DME)[1], to facilitate the eventual removal of the en-route dependency on BIG DVOR[2], while the Biggin Hill (BIG) DME will remain in the enroute environment.

[1] DME and DVORs are types of radio navigation technology used by aircraft to determine their position

[2] As notified in AIP GEN 2.5; this will be completed once the WCO/BNN DVOR rationalisation has been implemented.

Following a meeting between the CAA/ NATS, it was agreed that where a 5 Letter Alpha Numeric Code (5ANC) on a UK STAR is published, it should be amended to a 5LNC to comply with ICAO Annexes relating to the use of waypoints for 'ATC purposes'. The waypoints on en-route STARs should be designated as unique 5LNCs for ATC purposes such as speed control or tactical short cuts; allowing controllers and pilots to easily pronounce them.

Unlike 5ANCs, the use of 5LNCs also allows them to be published in ENR4.4, Name-code Designators for Significant Points, of the Aeronautical Information Publication (AIP). We have therefore taken the opportunity to mark the Speed Limiting Point (SLP) for the proposed BEDEK 1G STAR as a 5LNC (TUFOZ), which has been selected and approved by ICAO Paris for this purpose. Aircraft may be tactically directed to TUFOZ hence the need for a 5LNC pronounceable name.

As covered fully in the BIG and AVANT 1C Design Reports (Ref 5 and Ref 8), some of the amended STARs (such as ALESO 1H) still have waypoints with 5ANC designators. The reason for this outstanding inconsistency is that the design work for the STARs was mostly complete when the decision to use 5LNCs was made. As the BEDEK 1G STAR required further work, the 5LNC 'TUFOZ' was allocated to this; the remaining waypoints will be renamed in the future.

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2. Introduction

The intent of this document is to summarise and satisfy the requirements of CAP1616 Stage 4: update design and submit airspace change proposal to the CAA. The CAA reference is ACP-2018-59, the link to the CAA progress page is here.

NATS operates 46 DVORs around the UK which are going through the first batch of rationalisation as part of NATS' DVOR Rationalisation Programme. This is due to the DVORs operating well beyond their design life and no longer being needed due to RNAV5 (Area Navigation – 5NM) mandated Air Traffic Service (ATS) routes. This extended period of use has also created continued and unnecessary maintenance costs; as well as impacting upon airport development work prevented by safeguarding the navaids.

Within the UK, there are several enroute Instrument Flight Procedures (IFP) which are dependent on these radio navigation aids (navaids). As a number of them are scheduled to be removed from service, the enroute IFP definitions require updating so that they no longer refer to the navaids scheduled to be removed. Proposals to

remove the enroute dependencies from the GWC, OCK and SAM DVORs were approved in February 2019, and subsequently will be implemented in the May Aeronautical Information Regulation And Control (AIRAC) build. The proposal to remove the enroute dependencies from the GAM DVOR has also been approved, for the September AIRAC.

This airspace proposal is primarily focussed on enroute IFPs, in the UK AIP, which use the DVOR Biggin Hill (BIG) as a materially important navaid. The scope of the proposal is limited to standard instrument arrival routes (STARs) and their associated holding patterns, referring to BIG as a conventional navaid; where NATS is the primary air navigation services provider (ANSP).

This proposal also includes a number of administrative changes to ATS routes, including the removal of 'U' designators and the re-designation of a route. These changes will assist in rationalising the overall ATS route network. Airport-based procedures such as Standard Instrument Departures (SIDs) and instrument approaches are not relevant to the enroute scope of this proposal. Airport operators are separately developing their own equivalent procedures to mitigate the removal of the BIG DVOR.

As described in Section 8.2.1 below, there are several methods in which a STAR/ hold navaid dependency can be removed. As such, each STAR and hold has been evaluated in order to determine the most appropriate method in which to remove the dependency from BIG. This method improves the overall network connectivity, reduces duplication and accounts for the current usage levels.

3. Executive Summary

In support of the DVOR Rationalisation Programme, NATS has identified all AIP en route references to, and dependencies on, the BIG navaid. In order to remove AIP IFP dependencies from this navaid, a list of seven design principles have been created which have been used to assess the individual IFPs against. The Design Principle (DP0) with overriding priority is that the airspace change must "maintain or enhance the current level of safety". The Design Principle (DP1) driving this change is that none of the proposed technical changes would result in a change to flight behaviours. The remaining design principles focussed on techniques which could be used to remove the dependencies, such as IFP replication or truncation.

As described in the Stages 1-3 multi-gateway documentation (Ref 3), four separate design options were developed in order to remove the enroute IFP dependencies on the BIG DVOR. The first considered option, of doing nothing, would retain all of the current STARs and holds unchanged from today's AIP definition. Option 1 would replicate each IFP with a BIG dependency, exactly as defined today. Option 2 would evaluate each IFP individually, as used in practice, using replication and/or truncation where appropriate. Finally, Option 3 would completely remove each IFP with a BIG dependency.

The design principles mentioned above were used to qualitatively assess each of the four options (Ref 3). This process reduced the four options down to one, known as Option 2, which is the preferred concept option presented here. Consultation regarding DVOR rationalisation was undertaken in 2009. Due to the technical nature of the changes which will not result in changes to flight paths, no further consultation has been required.

This proposal also contains a number of administrative changes to other ATS Routes on STAR charts, which are not impacted by the BIG DVOR removal. These changes are included as we are also taking the opportunity to reassess and rationalise the ATS route network.

4. Current Airspace Description

The current enroute IFPs which are dependent on the BIG DVOR as an essential navaid, are associated with Heathrow Airport. There are also a number of additional IFPs which, although not dependent on BIG, feature the BIG VOR on the charts; these are associated with Gatwick, Heathrow and London City Airports.

These have all been summarised in Table 1 below and the relevant charts can be found in the Stages 1-3 multi-gateway document [Ref 3].

Associated Airport	Current IFP	Current Routing	BIG Dependency
Gatwick	ASTRA Hold	N/A - Hold	No – features on the same chart as the ASTRA STARs below
Gatwick	ASTRA 1F STAR	KENET - WOD - SFD - ASTRA	No – no reference to BIG but will be defunct when WILLO STARs are RNAV'd
Gatwick	ASTRA 2H STAR	BEDEK - NIGIT - ASTRA	No – no reference to BIG but will be defunct when WILLO STARs are RNAV'd
Gatwick	WILLO 1F STAR	KENET - MID - HOLLY - WILLO	Yes – WILLO is defined by a reference to BIG
Gatwick	WILLO 2H STAR	BEDEK - NIGIT - MID - HOLLY - WILLO	Yes – WILLO is defined by a reference to BIG
Heathrow	BIG 1E STAR	N/A - stack-swap STAR (not flight plannable)	Yes
Heathrow	BIG 3D STAR	N/A - stack-swap STAR (not flight plannable)	Yes
Heathrow	BIG 4B STAR	ALESO - ROTNO - ETVAX - TIGER - BIG	Yes
Heathrow	TIGER Hold	N/A - Hold	Yes
Heathrow	WEALD Hold	N/A - Hold	No – exists when BIG is u/s
Heathrow	WEALD 1E STAR	LOGAN - KOPUL - TANET - DET - WEALD	No – exists when BIG is u/s
Heathrow	WEALD 3D STAR	LAM - WEALD	No – exists when BIG is u/s
Heathrow	WEALD 4B STAR	ALESO - ROTNO - ETVAX - TIGER - WEALD	No – exists when BIG is u/s
London City	GODLU 1A STAR	BEDEK - BIG - UMTUM - GODLU	No – passes through, but not dependent on BIG
London City	GODLU 1C STAR	KONAN - GODLU	No – reference to BIG on the STAR chart
London City	GODLU 1D STAR	SOVAT - ERKEX - OKVAP - GODLU	No – reference to BIG on the STAR chart
London City	GODLU 1F STAR	NEVIL - OSPOL - NETVU - SOXUX - OKVAP - GODLU	No – reference to BIG on the STAR chart
London City	GODLU 1J	GIBSO - BEGTO - AVANT – BIG - UMTUM - GODLU	No – passes through, but not dependent on BIG

Table 1: Current IFPs associated with BIG DVOR which are being amended/withdrawn

This proposal also contains a number of administrative changes we are proposing; alongside removing the BIG DVOR dependencies from the above IFPs. These administrative changes are included as we are also taking the opportunity to rationalise and improve the overall ATS network in a logical manner. They will not introduce any practical changes to the operation, nomenclature only.

NATS are including these administrative changes as the ATS Routes are geographically adjacent to the IFPs impacted by the BIG DVOR removal; existing on the same operational charts, which will be updated. The 'U' designator will be removed from a number of ATS routes, which historically denotes 'Upper' route. This is no longer required due to RNAV routes, therefore allowing identical 'Upper' and 'Lower' routes to be combined and thus, rationalising the route network.

Specifically, administrative changes are being proposed to the naming/designation of following ATS Routes: L18, M140, UL6, UL10, UL15, UL607, UL613, UM140, UQ70, UT421, UY311 and UY312.

4.1 Structures and Routes

The full technical notes and associated charts for each of the above current IFPs, listed in Table 1, can be found in the following references:

- Gatwick IFPs – Slides 15, 16 and 19 of the Assessment Meeting slide pack (Ref 2)
- Heathrow IFPs – Slides 9-11, 14 and 17 of the Assessment Meeting slide pack (Ref 2)
- London City IFPs – Slides 12, 13 and 18 of the Assessment Meeting slide pack (Ref 2)

Diagrams of the current ATS Routes we are proposing administrative changes to can also be found in the Stages 1-3 multi-gateway document (Ref 3) on Slides 21 – 26.

4.2 Airspace usage and proposed effect

The proportions of aircraft, including fleet mix and operators, using any of the IFPs related to this project would not change as an outcome of the proposed changes. The proposed connectivity remains entirely unchanged due to RNAV5 replication, therefore the usage would remain the same as today. There would be no change to pilot or controller behaviour, and no change to lateral or vertical traffic dispersion, nor to impact adjacent IFPs. Therefore, the airspace capacity, usage and current operation will stay the same as today with no change.

4.3 Operational efficiency, complexity, delays and choke points

There are no specific issues relating to operational efficiency, complexity, delays or choke points associated with any of the IFPs related to this project, to be solved by this airspace change proposal.

4.4 Safety issues

There are no specific safety issues associated with any of the IFPs related to this project, to be solved by this airspace change proposal.

Ensuring the safety of the proposed changes is a priority for NATS. NATS has a dedicated safety manager for the DVOR project who ensures that the safety representatives from SARG have oversight of the safety assurance process. Section 10 contains further details on the safety assessment for this proposal.

4.5 Environmental issues

There are no specific environmental issues associated with any of the IFPs related to this project, to be solved by this airspace change proposal.

5. Statement of Need

The text from the Statement of Need V3 (DAP1916 ref 2770) (Ref 1) submitted in April 2019 for this proposal summarises the individual changes in support of the enroute dependency on the BIG DVOR, due for removal in 2019. This has been included in Appendix Section 15.2 below.

6. Proposed Airspace Description

6.1 Objectives/ requirements for Proposed Design

The primary objective for this proposed airspace design is to remove any enroute IFP dependencies from the BIG DVOR. This will be achieved by replacing the current connectivity using RNAV5 procedures. Where procedures already have an RNAV5 specification, we are proposing to simply re-designate them in line with ICAO policy and remove any references to BIG. The enroute flight procedures under consideration are all STARs, enroute holding patterns and terminal holding patterns where BIG is material to their definition.

These changes are in support of the NATS DVOR Rationalisation Programme which aims to reduce dependence on ground infrastructure without reducing enroute services.

The CAA's PBN STAR Replication Policy for Conventional STAR Replacement (Ref 6) has been used as a basis for this proposal. It defines PBN STAR Replication as a PBN redesign of an existing conventional STAR from the commencement of the STAR in the ATS enroute network to the termination point without introducing any change to existing track patterns over the ground. RNAV5 is mandated for enroute IFPs and does not require consultation under the CAA's replication policy. It would also allow a simple RNAV5 to RNAV1 conversion; however, this is out of the scope of this project.

This proposal has been used as an opportunity to review the relevance of the existing procedures and their details. As such, methods such as introducing truncations where an existing ATS route already formed the initial section of a STAR have been explored and considered, in line with the STAR replication policy mentioned above. This proposal also contains a number of administrative changes to other ATS Routes on STAR charts, which are not impacted by the BIG DVOR removal. These changes are included as we are also taking the opportunity to reassess and rationalise the ATS route network. NATS are including these administrative changes as the ATS Routes are geographically adjacent to the IFPs impacted by the BIG DVOR removal; existing on the same operational charts, which will be updated.

6.2 Proposed New Airspace/ Route Definition and Usage

There is no predicted change to current connectivity or flight behaviour as a consequence of this airspace change proposal; the proposed changes are only technical changes. This means that there would be no change to pilot or controller behaviour (apart from designation changes), and no change to lateral or vertical traffic dispersion, nor to impact adjacent IFPs. The proposed changes will also not alter route usage or traffic mix within the associated airspace.

A full summary of all the proposed changes and associated impacts can be found in Appendix Sections 15.3 to 15.6 below. This document details the impact assessment which was completed for all of the IFPs where the BIG DVOR is material to the procedure, or they feature on the same chart as the BIG DVOR. These are summarised below:

- Gatwick ASTRA Hold; ASTRA STARs; and WILLO STARs (5 individual IFPs, only 2 of which have a dependency on BIG)
- Heathrow BIG STARs; TIGER Hold; WEALD Hold; and WEALD STARs (8 individual IFPs, only 4 of which have a dependency on BIG)
- London City GODLU STARs (4 individual IFPs, none of which have a dependency on BIG)

This document includes a full list of all IFPs: their current connectivity, the proposed connectivity and the impact of the proposed change for each IFP. Some of the proposed changes are re-designations of STARs (already RNAV5) in line with ICAO policy. Charts and technical notes on all 21 of the above individual IFPs can be found in the assessment meeting slide pack (Ref 2). The impact assessment can also be found in the Stages 1-3 multi-gateway document (Ref 3).

The proposed changes will not change the connectivity of the procedures from today, due to RNAV5 replication; with or without appropriate truncation. Where truncations are being proposed, appropriate starting points for the STAR have been identified to ensure that there is no impact to connectivity. This means no change to route usage or traffic patterns over the ground. Sections 15.3 – 15.6 below summarise the impact assessment of all STARs, Holds and ATS Routes which are part of this proposal.

The location of BIG VOR/ DME would stay the same however, the description would be amended as BIG DME to denote the removal of the VOR reference. This change will not introduce any changes to traffic patterns. As mentioned above, in Section 4, this proposal also contains a number of administrative changes which are included in order to rationalise the overall ATS network in a logical manner.

The relevant airspace structures, and related AIP sections, which are associated with the STAR, Hold and administrative changes, are listed in Table 2 below.

Airspace Structure	Comment	AIP Section
Lower and Upper ATS routes	RNAV routes incorrectly and inconsistently listed under the lower and upper ATS routes sections ATS route administrative changes	ENR 3.1 & 3.2
Area Navigation (RNAV) routes	All affected RNAV routes amended by this ACP to be included in this section, alongside ATS route administrative changes	ENR 3.3
Holding	TIGER Hold description removed	ENR 3.6
Enroute charts	Charts amended to reflect changes to ATS Routes	ENR 5 and 6
Aerodrome AIP changes	Individual airport charts, coding tables and text updated to reflect ATS Route, STAR and Hold changes	AD 2.EGAA-14, AD 2.EGAC-12, AD 2.EGBB-7-2, AD 2.EGNX-7-1, AD 2.EGLC-6-1, AD 2.EGLC-7-2, AD 2.EGLC-7-6, AD 2.EGLC-7-8, AD 2.EGLC-7-12, AD 2.EGKK-6-1, AD 2.EGKK-6-2, AD 2.EGKK-6-3, AD 2.EGKK-6-4, AD 2.EGKK-6-18, AD 2.EGKK-6-21, AD 2.EGKK-7-2, AD 2.EGKK-7-3, AD 2.EGKK-7-7, AD 2.EGKK-7-9, AD 2.EGKK-7-11, AD 2.EGKK-7-12, AD 2.EGLL-27, AD 2.EGLL-7-2, AD 2.EGLL-7-3, AD 2.EGLL-7-8, AD 2.EGLL-7-12, AD 2.EGLL-7-13, AD 2.EGLL-7-14, AD 2.EGNT-7-1, AD 2.EGWU-13, AD 2.EGTO-6

Table 2: Current Relevant Airspace Structures associated with Administrative Changes

The summary of the proposed changes is that changing the procedures will not alter the traffic patterns or route usage, due to the truncation replication of STARs and the associated appropriate revision or addition of ATS routes.

The following technical documents provide further information on the proposed designs:

- A document summarising the draft AIP changes lists the changes, alongside the AIP pages where these changes need to occur (Ref 4).

- A technical definition document which contains the AeroData data in excel format (Ref 7).

7. Impacts and Consultation

7.1 Net impacts summary for proposed route

Category	Impact	Evidence
Safety/Complexity	No impact on safety or complexity	See Section 4.4 and Section 10
Capacity/Delay	No impact on capacity/ usage or delay	See Sections 4.2 and 4.3
Fuel Efficiency/CO_2	No impact, there will be no change to lateral or vertical tracks, nor to impact adjacent IFPs	See Section 7.6
Noise – Leq/ SEL	No impact, this is a Level 2C[3] change	See Section 7.7
Tranquillity, visual intrusion (AONBs & National Parks)	No impact, this is a Level 2C change	See Section 7.7
Local Air Quality	No impact, this is a Level 2C change	See Section 7.7
Other Airspace Users	No impact, no changes to volume or classification of CAS	See Sections 7.3 to 7.5

7.2 Units affected by the proposal

The following airports have been engaged throughout the project:

- Belfast City
- Belfast International
- Biggin Hill
- Birmingham
- East Midlands
- London City
- London Gatwick
- London Heathrow
- Newcastle
- Northolt
- Rochester

The airports have been fully briefed on the proposed changes and the justification behind why the enroute DVOR dependencies are being removed. The proposed changes have all been designed to be invisible from an airport' perspective, asides from the AIP changes described below.

The proposed changes will alter nomenclature in the aerodrome AIP pages for the above airports, except for Biggin Hill. There will also be a few minor technical amendments such as a STAR truncation. Asides from these technical changes, there are no other impacts anticipated for airports or relevant activities; the scope of these changes is just for enroute procedures, not airports. Airports will complete their own airspace change proposals if they wish to remove dependencies from other airport-specific local procedures, such as SIDs and approaches.

[3] The CAA agreed that this proposal falls under the airspace change process as a Level 2C proposal. This is a proposal which reflects the current use of airspace concerned and does not alter traffic patterns below 7,000ft. The Government's Air Navigation Guidance states that below 7,000ft is the maximum height at which noise is a priority for consideration; therefore, noise analysis has not been completed for this proposal.

No unit or airport operator stakeholders were identified as being impacted by the proposed changes. The changes are purely technical changes which will not lead to any material change to the current operation.

However, in order to provide full transparency, NATS has positively engaged with all relevant airports which will need to administratively update their AIP sections, in order to refer to BIG DME. Appropriate airport representatives have been informed about these changes prior to submission of the ACP; as summarised in Section 15.7. Assuming approval of this approval, the affected airports will then be advised, and permission sought to amend their sections of the AIP.

If this proposal is approved, the CAA will also organise appropriate coordination with ICAO prior to implementation. Relevant Air Navigation Service Providers (ANSPs) in Belgium (Skeyes), France (DSNA) and Ireland (IAA) have also been informed; and will be formally notified when the proposal is approved.

7.3 Military impact and consultation

A CAA-led consultation was held with NATMAC in 2009, with a NATMAC Informative produced on 7th October 2010. Airlines were broadly supportive, with the NATS reduction in expenditure as a favourable item.
No military airspace user stakeholders were identified as being impacted by the proposed changes. The changes are purely technical changes which will not lead to any material change to the current operation.

7.4 General Aviation airspace users impact and consultation

No General Aviation/ VFR airspace user stakeholders identified as being impacted by the proposed changes.

7.5 Commercial air transport impact and consultation

There would only be technical changes for commercial air transport such as nomenclature and RNAV5 route replication. There would be no impact to connectivity or flight behaviour, as there would be no change to lateral or vertical tracks, nor to impact adjacent IFPs.

No commercial air transport/ IFR stakeholders were identified as being impacted by the proposed changes; other than the nomenclature changes mentioned.

7.6 CO_2 environmental analysis impact and consultation

There would be no change in fuel, CO_2 or greenhouse gases and emissions as a result of the proposed changes because there would no change to lateral or vertical tracks, or to impact adjacent IFPs. Fuel uplift changes are unlikely to occur. The actual fuel uplift is very difficult to quantify, however there is an established relationship between distance flown and the amount of fuel uplift. As this proposal will not impact the distance flown, we can deduce that the fuel uplift should not change. As mentioned above, there has not been a consultation as part of these proposed changes.

This aligns with the design principle (DP1) which is driving this change, of ensuring that none of the proposed technical changes to IFP definitions result in any change to actual flight behaviours.

7.7 Local environmental impacts and consultation

There would be no change in environmental impacts, such as noise or tranquillity, as a result of the proposed changes because there would be no change to lateral or vertical tracks, nor any impact to adjacent IFPs. As mentioned above, there has not been a consultation as part of these proposed changes.

This aligns with the design principle (DP1) which is driving this change, of ensuring that none of the proposed technical changes to IFP definitions result in any change to actual flight behaviours.

7.8 Economic impacts

There are no predicted economic changes, nor any costs or benefits which could be monetised, as a result of the proposed changes. The development of this airspace change proposal has not been informed by any economic constraints or opportunities.

8. Analysis of Options

8.1 Airspace Change Design Options

In order to remove the enroute IFP dependencies on the BIG DVOR, NATS developed four separate options on how best to adapt the UK airspace in support of this. These are known as Option 0 – do nothing, Option 1, Option 2 and Option 3. They are also summarised in the Stages 1-3 multi-gateway document (Ref 3).

The first considered option, of doing nothing, would retain all of the current STARs, Holds and ATS Routes unchanged from today's AIP definition. Options 1, 2 and 3 involve making changes to today's AIP definition. Option 1 would replicate each STAR, Hold and ATS Route with a BIG dependency, exactly as defined today. Option 2 would individually evaluate each STAR, Hold and ATS Route as used in practice and how the network may be improved by rationalising/ truncating/ replicating them in a considered manner. Finally, Option 3 would remove all existing STARs, Holds and ATS routes that refer to or use the BIG DVOR.

8.2 Design Options Assessment

8.2.1 Design Principles

Design principles have been created in order to assess the four options, described in Section 8.1 above. They have been constructed around the general objectives for this airspace change proposal, such as removing the enroute dependencies from the BIG DVOR and reviewing the relevance of existing procedures. For example, this ACP is proposing to withdraw a number of STARs after reviewing them and concluding that they are not needed once other STARs have been replicated to an RNAV5 specification.

The analogy of a toolbox was used to describe potential methods of removing the enroute dependencies from the BIG DVOR, with each tool having a particular function, in combination with other tools when appropriate. This analogy has been used to construct the design principles around.

The overriding design principle (DP0), with the highest priority, for this airspace change is that the proposed airspace change must "maintain or enhance the current level of safety".

All of the design principles for this proposal are:

Design Principle	Description
DP0 Safety	The airspace change must maintain or enhance the current level of safety
DP1 Flight behaviour	None of the proposed technical changes to the definition of STARs/ Holds would result in a change to actual flight behaviours – laterally, vertically or in dispersal.
DP2 Admin	Remove unnecessary references to the BIG DVOR which are not material to the procedure
DP3 Withdraw	Some STARs are rarely used, some do the same job, some have segments in common with other STARs (see DP5 Truncate)
DP4 Replicate	PBN Replication – replace conventional STARs/Holds with RNAV STARs/Holds
DP5 Truncate	Draft STAR Truncation Policy, awaiting formal publication by CAA ISP, used here as agreed with CAA. When applied logically to STARs with many common segments, can result in withdrawal of unnecessary duplicate STARs (DP3) When the final arrangement is decided, the truncated conventional STAR is always RNAV-replicated (DP4)

DP6 Technical amendment	Minor changes to a STAR/ Hold which currently cannot be flown as it is formally defined, for legacy reasons – these changes always reflect what would actually happen in practical terms.

The seven design principles summarised above have been detailed fully in the Stages 1-3 multi-gateway document (Ref 3), which includes a contextual example of each design principle being put into practice.

8.2.2 Options Assessment using the Design Principles

The four options outlined in Section 8.1 above were assessed against the following seven design principles:

- Design Principle 0: maintain or enhance the current level of safety
- Design Principle 1: no change to flight behaviours
- Design Principle 2: administrative change
- Design Principle 3: withdraw unnecessary STARs
- Design Principle 4: replicate using RNAV replication policies
- Design Principle 5: truncate original STAR then replicate the remainder
- Design Principle 6: technical amendment

Each of the four options was qualitatively assessed against each design principle in order to evaluate whether the principle had been met, partially met or not at all. The first Option 0, of doing nothing, did not meet any of the design principles except for DP0 and DP1: maintain/ enhance the current level of safety and introduce no changes to flight behaviours. Option 0 therefore does not achieve the removal of dependencies from the BIG DVOR nor improves the network in any way; and has therefore been rejected.

Option 1, concerning the replication of each STAR/ Hold, fully met three design principles: maintain/ enhance the current level of safety; introduce no changes to flight behaviours and replicate using RNAV replication policies. However, it only partially met DP2 of withdrawing unnecessary STARs; and did not meet any of the final three design principles. Although Option 1 removes the BIG DVOR dependency, it does not improve the network connectivity; does not account for current usage levels and it leaves route duplication in place. Therefore Option 1 has also been rejected.

Although Option 3 removes dependencies from the BIG DVOR, as a consequence of removing all IFPs and ATS Routes, it does not fully meet any of the seven design principles; offering no network improvements but significant disruption. Option 3 was therefore rejected.

Option 2 involves an individual evaluation of each STAR, Hold and ATS Route. As this option focussed on a flexible approach for removing the DVOR dependencies, it was able to fully meet all of the proposed design principles.

The conclusion of this assessment was to reduce the number of design options to one, known as Option 2 which best meets all of the design principles. This option removes the DVOR dependencies whilst also improving the overall network connectivity, reducing duplication and taking into consideration the current usage levels. A full summary of the above options assessment can be found in Section 4 of the Stages 1-3 multi-gateway document (Ref 3).

9. Airspace Description Requirements

	The proposal should provide a full description of the proposed change including the following:	Description for this proposal
a	The type of route or structure; for example, airway, UAR, Conditional Route, Advisory Route, CTR, SIDs/ STARs, holding patterns etc.	STARs, enroute/ terminal holding patterns and ATS Routes - see Section 6.
b	The hours of operation of the airspace and any seasonal variations	H24
c	Interaction with domestic and international enroute structures, TMAs or CTAs with an explanation of how connectivity is to be achieved. Connectivity to aerodromes not connected to CAS should be covered	This proposal would not have any impact on current connectivity - see Section 6.2 and Appendix Sections 15.3 to 15.6. Section 15.4 describes how the truncated BIG 1E STAR will have the same connectivity.
d	Airspace buffer requirements (if any). Where applicable describe how the CAA policy statement on 'Special Use Airspace – Safety Buffer Policy for Airspace Design Purposes' has been applied.	N/A – this proposal does not change any existing/ introduce new buffers.
e	Supporting information on traffic data including statistics and forecasts for the various categories of aircraft movements (passenger, freight, test and training, aero club, other) and terminal passenger numbers	This proposal would have no impact on airspace usage - see Sections 4.2 and 6.2.
f	Analysis of the impact of the traffic mix on complexity and workload of operations	This proposal would have no impact on the traffic mix - see Sections 4.2 and 6.2.
g	Evidence of relevant draft Letters of Agreement, including any arising out of consultation and/or airspace management requirements	N/A – this proposal does not change any existing/ introduce new LoAs; cross-border elements are not impacted.
h	Evidence that the airspace design is compliant with ICAO Standards and Recommended Practices (SARPs) and any other UK policy or filed differences, and UK policy on the Flexible Use of Airspace (or evidence of mitigation where it is not)	STAR Replication policy and PANS-OPS compliance – see design reports (Ref 5 and Ref 8).
i	The proposed airspace classification with justification for that classification	No change to existing airspace classification.
j	Demonstration of commitment to provide airspace users equitable access to the airspace as per the classification and where necessary indicate resources to be applied or a commitment to provide them in line with forecast traffic growth. 'Management by exclusion' would not be acceptable	N/A - this proposal does not change any existing/ introduce new airspace user access.
k	Details of and justification for any delegation of ATS	No change to the delegation of ATS.

10. Safety Assessment

10.1 There is an overriding safety design principle for the proposed changes which states that safety should be at least maintained, or improved, as an impact of the changes.

10.2 The safety of the IFP changes has been assured by NATS Design who have worked alongside the CAA SARG IFP Regulator.

10.3 Prior to implementation, NATS will also undertake a formal Hazard Analysis in order to prove that the proposed changes are safe to be implemented into the operational environment. However in light of the NIGIT 1H issue (being addressed September 2019), we have now withdrawn the proposed KIDLI 1G STAR to prevent repetition of similar issues.

10.4 The Option 2 concept would take full account of existing usage and connectivity needs. It would ensure that all IFPs are designed by an APD, as regulated by CAA SARG.

10.5 There would be a qualitative improvement in safety because each remaining IFP would use improved navigation specifications and be defined in an official manner. Today's conventional IFPs are known to be flown using FMS overlays, which are not state-regulated in the same way.

10.6 This submission is proposing to re-designate ATS Route M140 as L18 which should create less confusion around route M140 and UM140 having no coincident points; which can be argued as to provide a qualitative improvement in safety.

10.7 Where STARs have been truncated as part of this proposal, we have ensured that appropriate/ safe connectivity is still provided; by identifying common route segments which can be used. These will also be assessed as part of the safety hazard analysis, mentioned above in 10.3.

10.8 Where IFPs have been withdrawn as part of this proposal, we have ensured that appropriate/ safe connectivity is still provided and that there are no impacts. We have used historical flight data to assess usage (summarised in Sections 15.3 and 15.4 below).

10.9 Therefore, there would be a positive impact on safety whilst also improving the overall network connectivity. This is dependent on the satisfactory completion of the hazard analysis.

11. Operational Impact

	An analysis of the impact of the change on all airspace users, airfields and traffic levels must be provided, and include an outline concept of operations describing how operations within the new airspace will be managed. Specifically, consideration should be given to:	Evidence of compliance/ proposed mitigation
a	Impact on IFR general air traffic and operational air traffic or on VFR General Aviation (GA) traffic flow in or through the area	No impact to air traffic (technical change only) – see Sections 7.4 - 7.5.
b	Impact on VFR operations (including VFR routes where applicable);	No impact on VFR operations. See Section 7.4.
c	Consequential effects on procedures and capacity, i.e. on SIDs, STARs, and/or holding patterns. Details of existing or planned routes and holds	No impact on procedures or capacity (technical change only) - see Section 6.2.

d	Impact on aerodromes and other specific activities within or adjacent to the proposed airspace	No impact on aerodromes or other relevant activities – see Section 7.2.
e	Any flight planning restrictions and/or route requirements	No impact – technical changes only.

12. Supporting Infrastructure/ Resources

	General requirements	Evidence of compliance/ proposed mitigation
a	Evidence to support RNAV and conventional navigation as appropriate with details of planned availability and contingency procedures	N/A – current RNAV5 coverage is demonstrably adequate
b	Evidence to support primary and secondary surveillance radar (SSR) with details of planned availability and contingency procedures	Traffic uses the same regions as today in a similar manner from a surveillance point of view. Demonstrably adequate for the region.
c	Evidence of communications infrastructure including R/T coverage, with availability and contingency procedures	Traffic uses the same regions as today in a similar manner from a comms infrastructure point of view. Demonstrably adequate for the region.
d	The effects of failure of equipment, procedures and/or personnel with respect to the overall management of the airspace must be considered	Existing contingency procedures, based on the conventional navigation DVOR BIG, would no longer be required and will be withdrawn. RNAV replication removes the dependency from the BIG DVOR. Other existing contingency procedures and management protocol will continue to apply as today.
e	Effective responses to the failure modes that will enable the functions associated with airspace to be carried out including details of navigation aid coverage, unit personnel levels, separation standards and the design of the airspace in respect of existing international standards or guidance material	As above (12d).
f	A clear statement on SSR code assignment requirements	No change to SSR code allocation.

g	Evidence of sufficient numbers of suitably qualified staff required to provide air traffic services following the implementation of a change	No training or additional qualifications required.

13. Airspace and Infrastructure

	General requirements	Evidence of compliance/ proposed mitigation
a	The airspace structure must be of sufficient dimensions with regard to expected aircraft navigation performance and manoeuvrability to fully contain horizontal and vertical flight activity in both radar and non-radar environments	As today - no proposed changes to the airspace structure (technical changes only). See Section 6.2.
b	Where an additional airspace structure is required for radar control purposes, the dimensions shall be such that radar control manoeuvres can be contained within the structure, allowing a safety buffer. This safety buffer shall be in accordance with agreed parameters as set down in CAA policy statement 'Safety Buffer Policy for Airspace Design Purposes Segregated Airspace'. Describe how the safety buffer is applied, show how the safety buffer is portrayed to the relevant parties, and provide the required agreements between the relevant ANSPs/ airspace users detailing procedures on how the airspace will be used. This may be in the form of Letters of Agreement with the appropriate level of diagrammatic explanatory detail.	As today - no proposed changes to the airspace structure (technical changes only).
c	The Air Traffic Management system must be adequate to ensure that prescribed separation can be maintained between aircraft within the airspace structure and safe management of interfaces with other airspace structures	As today - no proposed changes to the existing airspace structure (technical changes only).
d	Air traffic control procedures are to ensure required separation between traffic inside a new airspace structure and traffic within existing adjacent or other new airspace structures	As today – no proposed changes to the existing ATC procedures.
e	Within the constraints of safety and efficiency, the airspace classification should permit access to as many classes of user as practicable	As today - no proposed changes to existing airspace classifications.
f	There must be assurance, as far as practicable, against unauthorised incursions. This is usually done through the classification and promulgation	As today– no proposed changes to airspace classification or volume.
g	Pilots shall be notified of any failure of navigational facilities and of any suitable alternative facilities available and the method of identifying failure and notification should be specified	Existing contingency procedures would continue to apply.
h	The notification of the implementation of new airspace structures or withdrawal of redundant airspace structures shall be adequate to allow interested parties sufficient time to comply with user requirements. This is normally done through the AIRAC cycle	This will be promulgated via the AIRAC cycle.
i	There must be sufficient R/T coverage to support the Air Traffic Management system within the totality of proposed controlled airspace	No change from today's Controlled Airspace. R/T coverage demonstrably adequate as per current day.

j	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered	No proposed new structures.
k	Should there be any other aviation activity (low flying, gliding, parachuting, microlight site, etc.) in the vicinity of the new airspace structure and no suitable operating agreements or air traffic control procedures can be devised, the change sponsor shall act to resolve any conflicting interests	No proposed new airspace structures.

	ATS route requirements	Evidence of compliance/ proposed mitigation
a	There must be sufficient accurate navigational guidance based on in-line VOR/DME or NDB or by approved RNAV derived sources, to contain the aircraft within the route to the published RNP value in accordance with ICAO/ Eurocontrolstandards	RNAV5 navaid coverage is demonstrably adequate. DME/ DME coverage is adequate and demonstrated in the coverage plots in Reference 5.
b	Where ATS routes adjoin terminal airspace there shall be suitable link routes as necessary for the ATM task	As today – there are no new link routes required as part of this proposal.
c	All new routes should be designed to accommodate P-RNAV navigational requirements	Confirmed - RNAV5 will be used.

	Terminal airspace requirements	Evidence of compliance/ proposed mitigation
a	The airspace structure shall be of sufficient dimensions to contain appropriate procedures, holding patterns and their associated protected areas	As today - no proposed changes to the airspace structure.
b	There shall be effective integration of departure and arrival routes associated with the airspace structure and linking to designated runways and published instrument approach procedures (IAPs)	As today - no proposed changes to the airspace structure.
c	Where possible, there shall be suitable linking routes between the proposed terminal airspace and existing enroute airspace structure	As today - the revised STARs will end in the same locations as they do currently.
d	The airspace structure shall be designed to ensure that adequate and appropriate terrain clearance can be readily applied within and adjacent to the proposed airspace	As today - no change to the airspace structure.
e	Suitable arrangements for the control of all classes of aircraft (including transits) operating within or adjacent to the airspace in question, in all meteorological conditions and under all flight rules, shall be in place or will be put into effect by the change sponsor upon implementation of the change in question (if these do not already exist)	As today - no change to the airspace structure.

f	The change sponsor shall ensure that sufficient visual reference points are established within or adjacent to the subject airspace to facilitate the effective integration of VFR arrivals, departures and transits of the airspace with IFR traffic	As today - no change to visual reference points.
g	There shall be suitable availability of radar control facilities	As today - no change to radar control facilities.
h	The change sponsor shall, upon implementation of any airspace change, devise the means of gathering (if these do not already exist) and of maintaining statistics on the number of aircraft transiting the airspace in question. Similarly, the change sponsor shall maintain records on the numbers of aircraft refused permission to transit the airspace in question, and the reasons why. The change sponsor should note that such records would enable ATS managers to plan staffing requirements necessary to effectively manage the airspace under their control	As today - there are no proposed changes to the airspace structure.
i	All new procedures should, wherever possible, incorporate Continuous Descent Approach (CDA) profiles after aircraft leave the holding facility associated with that procedure	As today – no new procedures.

	Off-route airspace requirements	Evidence of compliance/ proposed mitigation
	There are no proposed changes to off-route airspace structures	

14. Environmental Assessment

	Theme	Content	Evidence of compliance/ proposed mitigation
a	WebTAG analysis	Output and conclusions of the analysis (if not already provided elsewhere in the proposal)	N/A – no change in CO_2 or greenhouse gas emissions. See Section 7.6.
b	Assessment of noise impacts (Level 1/M1 proposals only)	Consideration of noise impacts, and where appropriate the related qualitative and/or quantitative analysis If the change sponsor expects that there will be no noise impacts, the rationale must be explained	N/A – this is a Level 2C change.
c	Assessment of CO_2 emissions	Consideration of the impacts on CO_2 emissions, and where appropriate the related qualitative and/or quantitative analysis If the change sponsor expects that there will be no impact on CO2 emissions impacts, the rationale must be explained	N/A – no change in CO_2 or greenhouse gas emissions. See Section 7.6.
d	Assessment of local air quality (Level 1/M1 proposals only)	Consideration of the impacts on local air quality, and where appropriate the related qualitative and/or quantitative analysis If the change sponsor expects that there will be no impact on local air quality, the rationale must be explained	N/A – this is a Level 2C change
e	Assessment of impacts upon tranquillity (Level 1/M1 proposals only)	Consideration of any impact upon tranquillity, notably on Areas of Outstanding Natural Beauty or National Parks, and where appropriate the related qualitative and/or quantitative analysis If the change sponsor expects that there will be no tranquillity impacts, the rationale must be explained	N/A – this is a Level 2C change.
f	Operational diagrams	Any operational diagrams that have been used in the consultation to illustrate and aid understanding of environmental impacts must be provided	See the Assessment meeting slide pack (Ref 2) No change to environmental impacts, as covered in Section 7.6.
g	Traffic forecasts	10-year traffic forecasts, from the anticipated date of implementation, must be provided (if not already provided elsewhere in the proposal)	No changes to capacity or usage - see Section 4.3.
h	Summary of environmental impacts and conclusions	A summary of all of the environmental impacts detailed above plus the change sponsor's conclusions on those impacts	No environmental impact - see Section 7.6.

15. Appendices

15.1 References

Ref No	Name	Hyperlink
1	Statement of Need for BIG DVOR, DAP1916 #2770	Link
2	BIG DVOR CAP1616 Stage 1 Assessment Meeting Slide Pack V1.1	Link
3	BIG DVOR CAP1616 Stages 1-3 Multi-Gateway V1.1	Link
4	AIP changes in support of DVOR rationalisation for BIG (Final V06082019)	Supplied alongside ACP
5	PDG BIG DVOR Design Report V3.2	Supplied alongside ACP
6	SARG Policy: Policy for the replication of conventional SIDS, STARS and Holds using PBN	Link
7	BIG DVOR AeroData Technical Definition Document (Final V8.1)	Supplied alongside ACP
8	PDG AVANT 1C DVOR Design Report V1.0 This report was submitted to the CAA separately to the main BIG DVOR Design Report (Ref 5), following specific queries relating to this procedure.	Supplied alongside ACP

15.2 Statement of Need V3 for BIG ACP (DAP1916 ref 2770)

In order to facilitate the eventual removal of the Biggin (BIG) VOR/ DME it is proposed to remove the enroute dependency from this facility. The location of BIG VOR/ DME will remain the same and be re-named as "BIG DME".

Any STARs that use this facility and not changed by previous DVOR Removals (SAM, OCK & GWC), will be made RNAV 5. Any STARs into or out of BIG that were RNAV'd by the previous changes will be amended with the new name and up-numbered accordingly. All WEALD STARs and the WEALD Hold will be removed as it will no longer be required. The under-utilised WILLO 1F STAR from KENET will be dis-established.

NATS will also take the opportunity to remove the U designator prefix from the routes that pass through this facility as well as all those that pass abeam it and end at DVR; specifically, these are UL6, UL10, UL15, UL607, UL613, UM140, UQ70, UT421, UY311 and UY312. M140 between MID and DVR will be re-designated as L18.

15.3 Impact Assessment – Gatwick Holds and STARs

See the redacted Stage 1 Assessment Meeting Presentation [Ref 2] for charts and technical notes. Slides 15, 16 and 19 show the current IFPs; and Slides 34, 35 and 38 show the proposed changes. The AIP change document [Ref 4] and PDG final design report [Ref 5] contain further technical details.

Current IFP	Current route connectivity/ STAR	Design Principle	How	Proposed route Connectivity/ STAR	Impact of proposed change on connectivity/ flight behaviour
WILLO 2H STAR	P2: *BEDEK - NIGIT - MID - HOLLY - WILLO*	4 Replicate	RNAV5 replication	Same - replicate as BEDEK 1G	Same, no impact to connectivity. No predicted change to flight behaviour. 'G' Identifier used in order to adhere to the CAA request of naming the Route Indicator after the destination airport (G - Gatwick).
ASTRA Hold	N/A	3 Withdraw	Not required	Not required	This Hold is not required due to the replication of the WILLO Hold, completed as part of SAIP AD1. The WILLO Hold provides the required connectivity. No predicted change to flight behaviour.
ASTRA 1F STAR	Q63: *KENET - WOD - ASTRA*	3 Withdraw	Not required	Not required	Under-utilised ASTRA 1F STAR to be withdrawn (used 32 times in 2018), in association with the withdrawal of WILLO 1F (covered below).
ASTRA 2H STAR	UL607, P2: *BEDEK - NIGIT - ASTRA*	3 Withdraw	Not required	Not required	There will be no need for this STAR once the WILLO 2H STAR is RNAV'd.
WILLO 1F STAR	Q63: *KENET – MID - HOLLY - WILLO*	3 Withdraw	Not required	Not required	Under-utilised WILLO 1F STAR to be withdrawn (used 60 times in 2018; compared to WILLO 3B which was used 16,488 times and provides the same connectivity). WILLO is currently defined by a reference to BIG.

15.4 Impact Assessment – Heathrow Holds and STARs

See the redacted Stage 1 Assessment Meeting Presentation [Ref 2] for charts and technical notes. Slides 9, 10, 11, 14 and 17 show the current IFPs; and Slides 31, 33 and 36 show the proposed changes. The AIP change document [Ref 4] and PDG draft design report [Ref 5] contain further technical details.

Current IFP	Current route connectivity/ STAR	Design Principle	How	Proposed route Connectivity/ STAR	Impact of proposed change on connectivity/ flight behaviour
BIG 1E stack-swap STAR	This is a stack-swap STAR (servicing EGLL form the east), so it's not flight-plannable	5 Truncate 4 Replicate	Truncate at TANET and replicate (RNAV5)	*TANET - DET - BIG* Replicate as TANET 1Z	TANET is an appropriate starting point on the current STAR which ATC can continue to direct aircraft to, therefore introducing no impact to connectivity. Traffic which Stack Swaps from BIG to LAM usually routes via L610 and doesn't reach ERING before it is routed to BIG. We could have truncated BIG 1E at DET, but with DET potentially changing its name, this would require further work. We therefore identified TANET as an appropriate point. As Stack Swap STARs are not flight plannable, there is no need for them to connect to the network as they are handled tactically. Flights will continue to be vectored by ATC on a tactical basis as today; however, TANET 1Z signifies the full STAR for pilots to reference. Swanwick Operations fully support the proposal to truncate this STAR and will respond by publishing the necessary OPNOT (Operational Notice)/ SI (Support Information). No predicted change to flight behaviour. This STAR will be 'as directed by ATC' and not flight plannable. 'Z' Identifier used in order to adhere to CAA request to name the Route Identifier as 'X, Y, Z, Q'; to demonstrate an extraordinary STAR i.e. stack-swap or contingency. This stack-swap STAR is only for tactical use by ATC and not flight-plannable.
BIG 3D stack-	This is a stack-swap STAR (LAM	4 Replicate	RNAV5 replication	Same - replicate as LAM 1X	Same, no impact to connectivity. No predicted change to flight behaviour.

Current IFP	Current route connectivity/ STAR	Design Principle	How	Proposed route Connectivity/ STAR	Impact of proposed change on connectivity/ flight behaviour
swap STAR	Hold to BIG Hold), so it's not flight plannable				This STAR will be 'as directed by ATC' and not flight plannable. 'X' Identifier used in order to adhere to CAA request to name the Route Indicator as 'X, Y, Z, Q'; to demonstrate an extraordinary STAR i.e. stack-swap or contingency.
BIG 4B STAR	T420: *ALESO - ROTNO - ETVAX - TIGER - BIG*	4 Replicate	RNAV5 replication	Same - replicate as ALESO 1H Remove reference to BIG VOR	Same, no impact to connectivity. No predicted change to flight behaviour. 'H' Identifier used in order to adhere to the CAA request of naming the Route Indicator after the destination airport (H – Heathrow).
TIGER Hold	*ALESO - ROTNO - ETVAX - TIGER*	6 Technical Amendment 4 Replication	The inbound track will be amended to coincide with the true track between waypoints ETVAX and TIGER, on the currently published BIG 4B STAR. The rest of the Hold will be replicated (RNAV5).	*ALESO - ROTNO - ETVAX - TIGER*	Same, no impact to connectivity. No predicted change to flight behaviour.
WEALD 4B STAR	T420: *ALESO - ROTNO - ETVAX - TIGER - WEALD*	3 Withdraw	Not Required	Not Required	Withdrawn, redundant once the BIG STARs are RNAV'd. This STAR was never used in 2018.
WEALD 3D STAR	*LAM - WEALD*	3 Withdraw	Not Required	Not Required	Withdrawn, redundant once the BIG STARs are RNAV'd. This STAR was never used in 2018.
WEALD 1E STAR	L980, L608, P7: *LOGAN - KOPUL - TANET - DET - WEALD*	3 Withdraw	Not Required	Not Required	Withdrawn, redundant once the BIG STARs are RNAV'd. This STAR was never used in 2018. The TANET 1Z RNAV STAR (covered above) can be used via the same connectivity as the WEALD 1E STAR (shown in the current route connectivity).

Current IFP	Current route connectivity/ STAR	Design Principle	How	Proposed route Connectivity/ STAR	Impact of proposed change on connectivity/ flight behaviour
WEALD Hold	N/A	3 Withdraw	Not required	Not required	To be withdrawn, as it will no longer be required once the WEALD STARs are withdrawn.

15.5 Impact Assessment – London City STARs

See the redacted Stage 1 Assessment Meeting Presentation [Ref 2] for charts and technical notes. Slides 12, 13, 18, 19 and 20 show the current IFPs; and Slides 34, 39, 40 and 41 show the proposed changes. The AIP change document [Ref 4] and PDG draft design reports [Ref 5 and Ref 8] contain further technical details.

Current IFP	Current route connectivity/STAR	Design Principle	How	Proposed route Connectivity/STAR	Impact of proposed change on connectivity/ flight behaviour
GODLU 1A STAR	P2: *BEDEK - BIG - UMTUM - GODLU*	2 Admin	Same (already RNAV5)	Same - rename as BEDEK 1C Remove reference to BIG VOR	Same, no impact to connectivity. No predicted change to flight behaviour. 'C' Identifier used in order to adhere to the CAA request of naming the Route Indicator after the destination airport (C – London City).
GODLU 1C STAR	L9: *KONAN - GODLU*	2 Admin	Same (already RNAV5)	Same - rename as KONAN 1C	Same, no impact to connectivity. No predicted change to flight behaviour. 'C' Identifier used in order to adhere to the CAA request of naming the Route Indicator after the destination airport (C – London City).
GODLU 1D STAR	L613: *SOVAT - ERKEX - OKVAP – GODLU*	2 Admin	Same (already RNAV5)	Same - rename as SOVAT 1C	Same, no impact to connectivity. No predicted change to flight behaviour. 'C' Identifier used in order to adhere to the CAA request of naming the Route Indicator after the destination airport (C – London City).
GODLU 1F STAR	M189: *NEVIL - OSPOL - NETVU - SOXUX - OKVAP - GODLU*	2 Admin	Same (already RNAV5)	Same - rename as NEVIL 1C	Same, no impact to connectivity. No predicted change to flight behaviour. 'C' Identifier used in order to adhere to the CAA request of naming the Route Indicator after the destination airport (C – London City).
GODLU 1J STAR	L89: *GIBSO - BEGTO - AVANT - BIG - UMTUM - GODLU*	5 Truncate 2 Admin	Truncate AVANT (already RNAV5)	*AVANT - BIG - UMTUM - GODLU* Rename as AVANT 1C Remove reference to BIG VOR	As per the recently approved SAM/ OCK ACP (ACP-2017-62), L89 will be established GIBSO – BEGTO – AVANT; thus, enabling this truncation. AVANT is therefore an appropriate existing point on the STAR leg. No impact to connectivity. No predicted change to flight behaviour. 'C' Identifier used in order to adhere to the CAA request of naming the Route Indicator after the destination airport (C – London City). Please note that the referenced route L89 is a future route, effective AIRAC 06/2019 (23/05/19). This procedure is contained within a separate design report [Ref 8].

15.6 Impact Assessment – ATS Route Re-designations

See the redacted Stage 1 Assessment Meeting Presentation [Ref 2] for charts and technical notes. Slides 23 - 28 show the current ATS routes; and Slides 43 summarises the proposed changes. The AIP change document [Ref 4] and PDG draft design report [Ref 5] contain further technical details.

Current Route Name	Current Route	Proposed Route Name	Proposed Route	Notes	Impact of proposed change on connectivity/ flight behaviour
UL6	*DET - DVR*	Same - L6	Same as the combination of the current routes	U designator removed	Same, no impact to connectivity. No predicted change to flight behaviour. This will include the same directional specifications along the route (no change from today).
L6	Same as UL6				
UL10	*KELLY - CASEL - PENIL - WAL - HON - DTY - WOBUN - BUZAD - BPK - LAM - ITVIP - DVR - RINTI*	Same - L10	Same as the combination of the current routes	U designator removed	Same, no impact to connectivity. No predicted change to flight behaviour. This will include the same directional specifications along the route (no change from today).
L10	*BEL - DUFFY - RINGA - SLYDA - IOM – KELLY;* then same as UL10				
UL15	*SOSIM - GIGTO - MALUD - EPOXI - AMPIT - RISLA - KEPAD - HON - PIXUP - FINMA - BETPO - BIG - SANDY - MOTOX*	Same - L15	Same as the combination of the current routes	U designator removed *SANDY – MOTOX* added to the route to allow U designator to be removed	Same, no impact to connectivity. No predicted change to flight behaviour. No change to route levels, as today.
L15	*DUFFY - PEPOD - VAKPO - MAKUS - SOSIM - GIGTO - MALUD - EPOXI - AMPIT - RISLA - KEPAD - HON - PIXUP - FINMA - BETPO - BIG*				

Current Route Name	Current Route	Proposed Route Name	Proposed Route	Notes	Impact of proposed change on connectivity/ flight behaviour
L18	*LANON - BADSI - ABLIN - IRKUM - LIPGO*	Same - M140 re-designated as L18 (between MID and VABIK) L18 partitioned with a route break	*VABIK - DVR - WIZAD – MAY - MID - VAPID - NIGIT - INLAK - GAVGO - DIKAS - MEDOG - LANON - BADSI - ABLIN - IRKUM - LIPGO*	*IRKUM* added to upper route portion. U designator removed from UL18. Dual designation between UL9 and UL18 removed (action placed on the UK by Eurocontrol) Current M140 is not designed to connect with UM140 at MID. M140 routes traffic from L620, and traffic via MID to DVR. No traffic would ever route eastbound (UL18) to turn onto M140 (L18) to DVR; it would have turned onto UL9 further west. NATS content with both VABIK and VAPID being on the same elongated L18. (UM140 will have U designator removed, covered below)	Same, no impact to connectivity. No predicted change to flight behaviour. This should create less confusion around routes M140 and UM140 having no coincident points.
M140	*VABIK - DVR - WIZAD – MAY - MID*				
UL18	*LIPGO - BADSI - LANON - MEDOG - DIKAS - GAVGO - INLAK - NIGIT - VAPID - MID*				
UL607	*EVRIN – NEKAP – ABDUK – NUMPO – INLAK – KONAN*	L607	Same as current UL607 route	U designator removed	Same, no impact to connectivity. No predicted change to flight behaviour.
UL613	*SOVAT - SANDY - STOAT - MOGLI - BETAX - MAMUL - HALIF - ABKAT - TALLA - FINDO - VADNO - PIPEM - SOXON – BAMRA*	Same – L613	Same as the combination of the current routes	U designator removed	Same, no impact to connectivity. No predicted change to flight behaviour. L613 will have the same base levels as the current route and will go up to FL460 (currently FL245).
L613	*SOVAT - SANDY*				

Current Route Name	Current Route	Proposed Route Name	Proposed Route	Notes	Impact of proposed change on connectivity/ flight behaviour
UM140	*NORLA - MERLY - EXMOR – SAM - ROKKE - PENUX - DVR*	M140	Same as current UM140 route	U designator removed Current UM140 is not designed to connect with M140 at MID, which is to be re-designated as L18 (covered above).	Same, no impact to connectivity. No predicted change to flight behaviour.
UQ70	*COWLY - BENSU - BIG - DET - ITVIP - MOKBU – VABIK*	Same - Q70	Same as the combination of the current routes	U designator removed	Same, no impact to connectivity. No predicted change to flight behaviour.
Q70	Same as UQ70				
UT421	*KUNAV - NIVKO - BISRU - BIG*	Same - T421	Same as the combination of the current routes	U designator removed	Same, no impact to connectivity. No predicted change to flight behaviour.
T421	Same as UT421				
UY311	*ODVIK – DVR*	Same - Y311	Same as the combination of the current routes	U designator removed	Same, no impact to connectivity. No predicted change to flight behaviour.
Y311	Same as UY311				
UY312	*ADMAG – DVR*	Same - Y312	Same as the combination of the current routes	U designator removed	Same, no impact to connectivity. No predicted change to flight behaviour.
Y312	Same as UY312				

15.7 Airport Engagement Evidence

Belfast City (EGAC) and Belfast International Airports (EGAA)

From: [redacted]
Sent: 07 June 2019 13:41
To: [redacted]
Subject: RE: Removal of U from UL15

No objection

Regards

[redacted]
NATS
[redacted]
General Manager ATS
Belfast International & Belfast City Airports

Birmingham Airport (EGBB)

From: [redacted]
Sent: 07 June 2019 13:16
To: [redacted]
Subject: Removal of U designator from UL15

Hi [redacted]

Hope you're well

NATS plan to remove the U designator prefix from Ul15 which will require changes to some route info on your CHASE 2D STAR as follows:

AD 2.EGBB-7-2
Amend UL15 to L15 on CHASE 2D in all places

Please confirm you no have objection to this change which I shall make on your behalf.

Cheers
[redacted]

NATS
[redacted]
Swanwick Development ATCO

East Midlands Airport (EGNX)

From: [redacted]
Sent: 07 June 2019 13:21
To: [redacted]
Subject: Removal of U desigantofr prefix on UL15

Hi [redacted]

Hope you're well

NATS plan to remove the U designator prefix from Ul15 which will require changes to some route info on your ROKUP 2D STAR as follows:

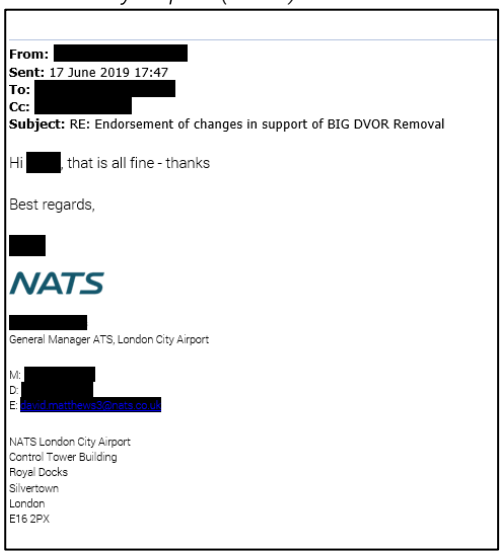
AD 2.EGNX-7-1
Amend UL15 to L15 on ROKUP 2D in all places

Please confirm you no have objection to this change which I shall make on your behalf.

Cheers
[redacted]

NATS
[redacted]
Swanwick Development ATCO

London City Airport (EGLC)



From: [redacted]
Sent: 17 June 2019 17:47
To: [redacted]
Cc: [redacted]
Subject: RE: Endorsement of changes in support of BIG DVOR Removal

Hi [redacted], that is all fine - thanks

Best regards,

[redacted]

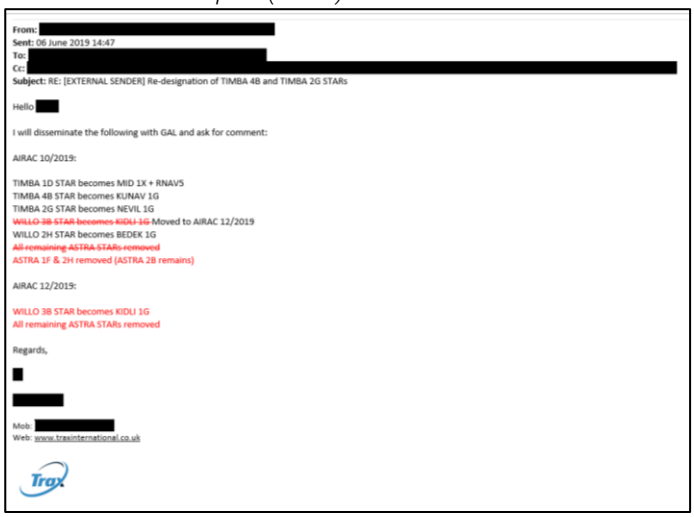
NATS

[redacted]
General Manager ATS, London City Airport

M: [redacted]
D: [redacted]
E: [redacted]

NATS London City Airport
Control Tower Building
Royal Docks
Silvertown
London
E16 2PX

London Gatwick Airport (EGKK)



From: [redacted]
Sent: 06 June 2019 14:47
To: [redacted]
Cc: [redacted]
Subject: RE: [EXTERNAL SENDER] Re-designation of TIMBA 4B and TIMBA 2G STARs

Hello [redacted]

I will disseminate the following with GAL and ask for comment:

AIRAC 10/2019:

TIMBA 1D STAR becomes MID 1X + RNAV5
TIMBA 4B STAR becomes KUNAV 1G
TIMBA 2G STAR becomes NEVIL 1G
~~WILLO 3B STAR becomes KIDLI 1G~~ Moved to AIRAC 12/2019
WILLO 2H STAR becomes BEDEK 1G
~~All remaining ASTRA STARs removed~~
~~ASTRA 1F & 2H removed (ASTRA 2B remains)~~

AIRAC 12/2019:

WILLO 3B STAR becomes KIDLI 1G
All remaining ASTRA STARs removed

Regards,

[redacted]

[redacted]

Mob: [redacted]
Web: www.traxinternational.co.uk

Trax

London Heathrow Airport (EGLL)

From: [redacted] mailto:Kathryn.Leahy@heathrow.com
Sent: 13 June 2019 22:45
To: [redacted]
Cc: [redacted] mark.burgess@heathrow.com
Subject: RE: TIME CRITICAL - FW: New STAR names

[redacted]

further to your email below. Heathrow has no objections to these proposals.

Please accept this email as our approval.

Regards,

[redacted]

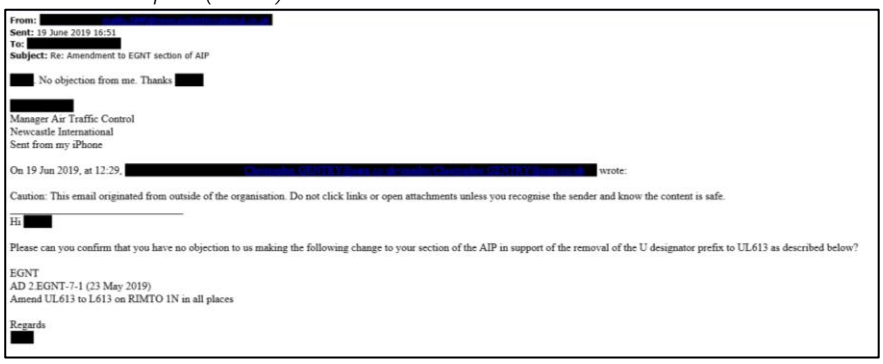
Kathryn Leahy
Director of Operations

Heathrow

Heathrow Airport
The Compass Centre, Nelson Road
Hounslow, Middlesex, TW6 2GW

m: +[redacted]
w: heathrow.com t: twitter.com/heathrowairport
a: heathrow.com/apps

Newcastle Airport (EGNT)



From: [redacted]
Sent: 19 June 2019 16:51
To: [redacted]
Subject: Re: Amendment to EGNT section of AIP

[redacted] No objection from me. Thanks [redacted]

[redacted]
Manager Air Traffic Control
Newcastle International
Sent from my iPhone

On 19 Jun 2019, at 12:29, [redacted] wrote:

Caution: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

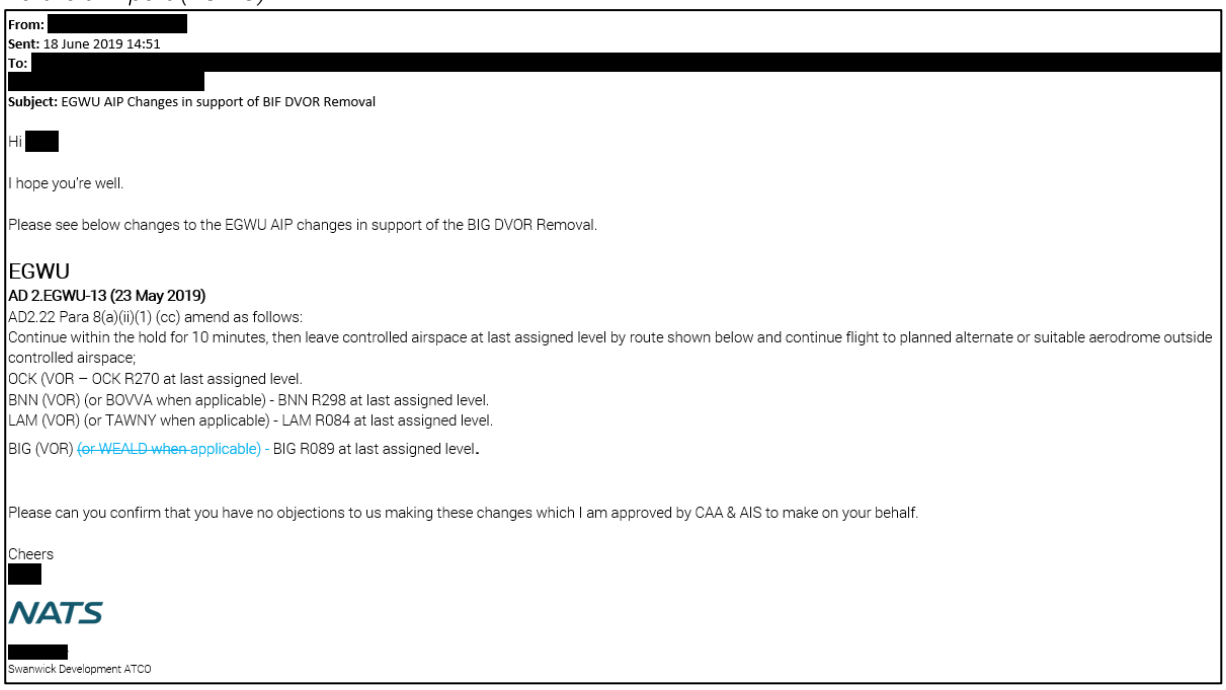
Hi [redacted]

Please can you confirm that you have no objection to us making the following change to your section of the AIP in support of the removal of the U designator prefix to UL613 as described below?

EGNT
AD 2.EGNT-7-1 (23 May 2019)
Amend UL613 to L613 on RIMTO 1N in all places

Regards
[redacted]

Northolt Airport (EGWU)



From: [redacted]
Sent: 18 June 2019 14:51
To: [redacted]
Subject: EGWU AIP Changes in support of BIF DVOR Removal

Hi [redacted]

I hope you're well.

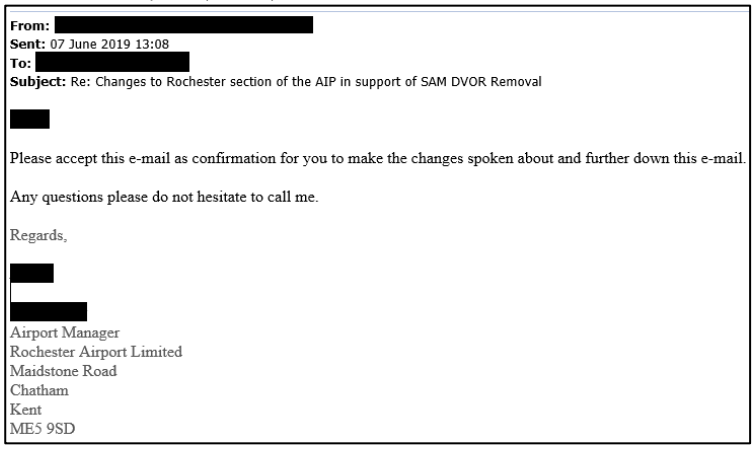
Please see below changes to the EGWU AIP changes in support of the BIG DVOR Removal.

EGWU
AD 2.EGWU-13 (23 May 2019)
AD2.22 Para 8(a)(ii)(1) (cc) amend as follows:
Continue within the hold for 10 minutes, then leave controlled airspace at last assigned level by route shown below and continue flight to planned alternate or suitable aerodrome outside controlled airspace;
OCK (VOR – OCK R270 at last assigned level.
BNN (VOR) (or BOVVA when applicable) - BNN R298 at last assigned level.
LAM (VOR) (or TAWNY when applicable) - LAM R084 at last assigned level.
BIG (VOR) ~~(or WEALD when~~ applicable) - BIG R089 at last assigned level.

Please can you confirm that you have no objections to us making these changes which I am approved by CAA & AIS to make on your behalf.

Cheers
[redacted]
NATS
[redacted]
Swanwick Development ATCO

Rochester Airport (EGTO)



From: [redacted]
Sent: 07 June 2019 13:08
To: [redacted]
Subject: Re: Changes to Rochester section of the AIP in support of SAM DVOR Removal

[redacted]

Please accept this e-mail as confirmation for you to make the changes spoken about and further down this e-mail.

Any questions please do not hesitate to call me.

Regards,

[redacted]
[redacted]
Airport Manager
Rochester Airport Limited
Maidstone Road
Chatham
Kent
ME5 9SD

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