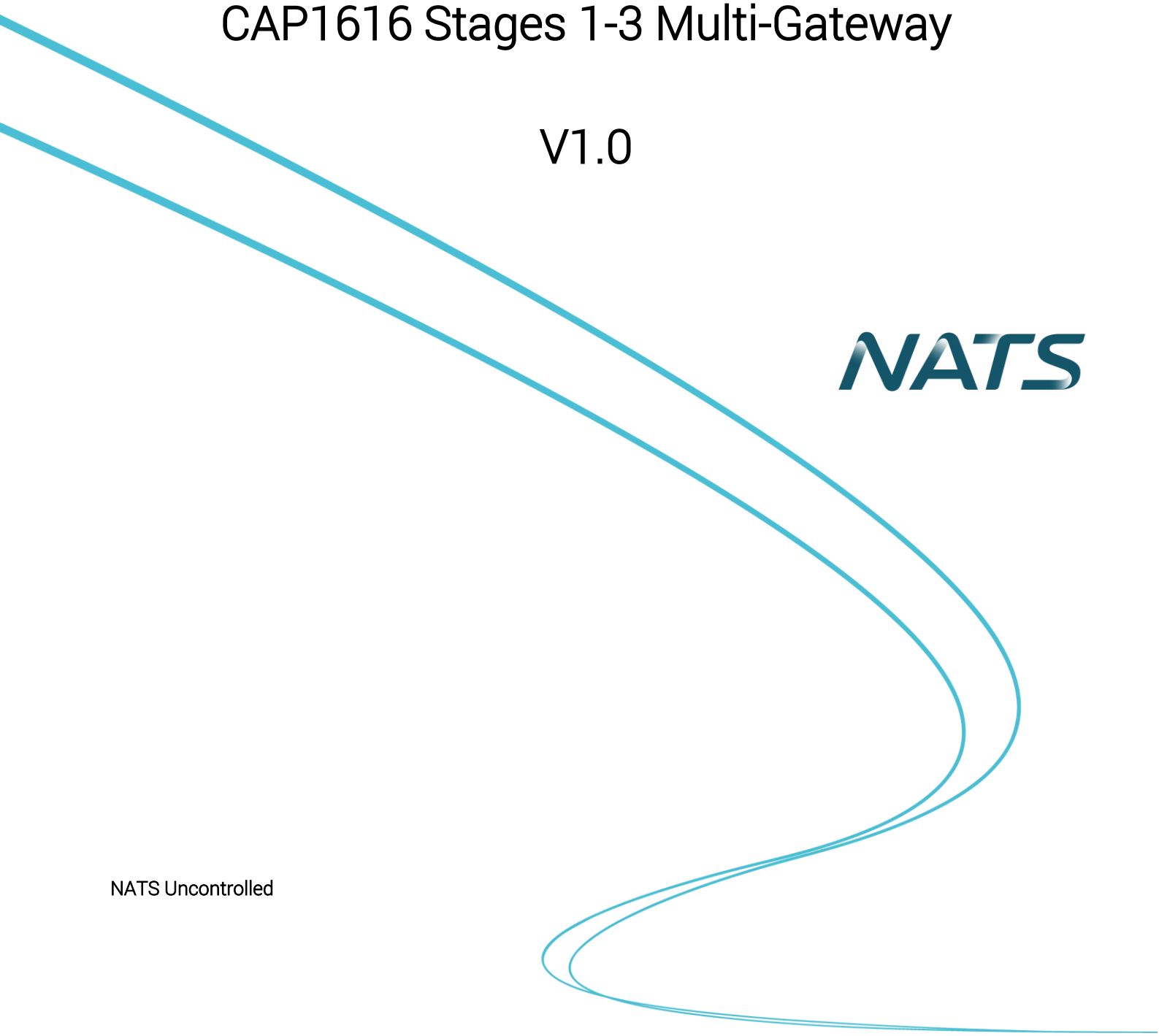
DVOR Rationalisation
Removal of Enroute Dependencies
BIG batch

DVOR BIG Holds, STARs and ATS Routes Documentation: CAP1616 Stages 1-3 Multi-Gateway

V1.0



NATS Uncontrolled

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Contents

1. Introduction

This document continues the CAP1616 process started with the Statement of Need (DAP1916 ref 2018) submitted in October 2018; which was revised to V2 DAP1916-2505 in January 2019. Following the Assessment Meeting, a final V3 DAP1916-2770 was uploaded in April 2019 (Ref 5). The intent of this document is to summarise and satisfy the requirements of CAP1616 Stages 1-3. The CAA reference is ACP-2018-59, the link to the CAA progress page is here.

Please read this document in conjunction with the redacted version of the BIG Slide Pack (Ref 1) already supplied, as references are made to slide numbers in that document. This is the primary reference material for illustrations of STAR amendments in this multi-gateway document.

Proposed Change to Scope of Work

Since submitting the Statement of Need (SoN) for this proposal, the CAA have requested that we do not collocate new 5LNCs (WEALD) with existing 3LNCs (BIG), if the navaids are still functioning. This proposal will therefore amend the Biggin Hill VOR/ DME (BIG) as Biggin DME (BIG) in the enroute environment.

2. Summary of this Proposal

This ACP is primarily limited to removing the dependency of enroute instrument flight procedures and ATS routes, in the UK AIP from the Biggin Hill (BIG) DVOR. Hence this proposal is focussed on Standard Terminal Arrival Routes (STARs), and their associated holds which refer to BIG as a conventional navaid in the enroute environment where NATS is the primary air navigation services provider (ANSP). This proposal contains the relevant changes to remove the dependency on BIG from these procedures; alongside some administrative changes for other ATS routes on STAR charts, not impacted by the BIG DVOR removal. These administrative changes are also included as we are taking the opportunity to reassess the ATS routes not directly involved in one of these STARs, but still routing through BIG in an effort to improve the overall network in a logical manner.

This document will identify

- existing conventional STAR connectivity relevant to BIG;
- Design Principles on how that connectivity would be replaced by RNAV procedures;
- option concepts for those replacements;
- an evaluation of those option concepts against the Design Principles;
- and, a full list of the specific changes.

The location of BIG VOR/ DME would remain the same however it would be renamed as BIG DME, to reflect the removal of the DVOR dependency. Also included are administrative changes to the names of some STARs that are being renamed in line with ICAO/CAA guidance. Airport-based procedures such as Standard Instrument Departures (SIDs) and instrument approaches are not relevant to the enroute scope of this proposal, hence they are excluded. Airport operators are developing separately their own equivalent procedures presuming DVOR rationalisation.

There would be no change in fuel/ CO_2/ greenhouse gas emissions due to this proposal because there would be no change to flightpaths: lateral or vertical tracks. Fuel uplift changes are unlikely to occur.

CAA's PBN STAR Replication Policy (V2) was published in Mar 2018 and was used as the 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 with the intention of retaining the existing route and track over the ground (para 5.4). Para 5.5 of the same policy makes assumptions that replication ensures procedures follows the same path over the ground as the existing conventional procedure, as closely as possible. This means that there would be no change to pilot or controller behaviour (apart from technical designation changes), and no change to lateral or vertical traffic dispersion.

The redacted version of the assessment meeting slide pack (Ref 1) should be read alongside this document.

3. Stage 1 Define

Step 1A Assess requirement

3.1 The statement of need was submitted on 10th October 2018 and subsequently revised to v2 on 25th January 2019.

3.2 The Assessment Meeting was held on 25th March 2019. This was attended by several representatives at NATS and the CAA; as listed in the Assessment Meeting minutes (Ref 4).

3.3 The technicalities of the proposed changes were described in some detail. A presentation was given by NATS to CAA, fully interactive with questions asked and answered.

3.4 Information subsequently supplied by NATS to SARG, and uploaded to the portal in April 2019, included:

- The BIG Assessment Meeting presentation slide pack redacted for publication (Ref 1);
- The Assessment Meeting Minutes redacted for publication (Ref 4);
- Updated V3 of the DAP1916, Statement of Need (Ref 5);
- Rationale for updated V3 Statement of Need (Ref 6).

3.5 This proposal is primarily about the removal of the enroute dependencies from the BIG DVOR, and the option concepts as to how this may be achieved.

3.6 The enroute flight procedures under consideration are Standard Terminal Arrival Routes (STARs), enroute holding patterns and terminal holding patterns where the BIG VOR is material to their definition.

3.7 Also included are the relevant ATS route changes for these procedures and some administrative changes for other routes on STAR charts.

3.8 CAA agreed that this proposal falls under the airspace change process with a provisional level of 2C, subject to the outcome of the Define Gateway.

3.9 This proposal is targeting an implementation date of AIRAC 10, 12th September 2019. This is one of the four major annual NAS builds which this proposal can be implemented in, because the proposed changes affect the NAS adaptation.

Step 1A complete

Step 1B Design Principles

3.10 The analogy of a toolbox was used to describe potential methods of removing the enroute dependencies from the DVORs, with each tool having a specific function, in combination with other tools as appropriate.

3.11 A CAA-led consultation occurred 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.

3.12 Revised STAR designations should be in line with standard ICAO method – named after the first waypoint of the procedure, not the final waypoint as per typical UK designations. The route indicator will be named after the destination airport; for example, 'H' would denote Heathrow.

3.13 The Design Principle (DP0), with overriding priority is that the airspace change must "Maintain or enhance the current level of safety."

3.14 The Design Principle (DP1) driving this change is that "*none of the proposed technical changes to definitions of STARs/holds would result in a change to actual flight behaviours – laterally, vertically or in dispersal*".

3.15 The other Design Principles for this proposal have been created as different approaches for the removal of the BIG enroute dependencies; these are summarised below:

Design Principle	Description
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 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 are further detailed below with generic examples for context:

3.16 Design Principle 0 (DP0) – Maintain or enhance safety

Any airspace changes must maintain or enhance the current level of safety for all parties concerned.

3.17 Design Principle 1 (DP1) - No change to flight behaviour

The proposed technical changes to the definitions of STARs/holds will not result in a change to actual flight behaviours – laterally, vertically or in dispersal.

3.18 Design Principle 2 (DP2) – Admin change

This Design Principle removes unnecessary references to DVORs. Some conventional AIP STAR plates may contain references to a DVOR which is not actually used in the IFP itself. Assess the impact of removing that reference.
Make an administrative change – no change to STAR version number.

Example: A STAR waypoint defined by a conventional navaid and associated radials/ distances, but the navaid is not used in the definition of the IFP itself. There is no actual dependency on the navaid – thus no impact on the IFP.

Method: Update applicable waypoint definitions to remove the navaid fix definitions.

Desired Outcome: Navaid dependency entirely removed from the STAR chart with minimal effort and no impact.

3.19 Design Principle 3 (DP3) - Withdrawal

Some STARs are rarely used, other STARs provide similar connectivity. Assess the impact of removing the rarely-used STARs from service.

Example: A STAR has very similar connectivity to another STAR

Method: Analyse the flight-plan usage of each STAR e.g. filed plans per week

Desired Outcome: Withdraw one STAR from service and use another instead. Retain connectivity for relevant ATS routes/ waypoints. Minimal effort, minimal impact

3.20 Design Principle 4 (DP4) - Replication

Replicate the current IFPs using CAA PBN STAR Replication Policy (Sep 2016) and Policy for RNAV Holding Attached to Arrival Procedures in UK Airspace (Feb 2016). Assess the impact of changing the navigation status.

Example: Most STARs can be replicated from conventional navigation to RNAV5 specification. Those few which cannot are detailed under Design Principle 5.

Method: Employ an Approved IFP Designer (APD) to analyse the existing conventional STAR/hold. The APD is instructed to use appropriate RNAV criteria to draw up replacements, following the same track over the ground and vertical definitions.

Desired Outcome: By definition, replication of IFPs under these policies means there would be no change to tracks over the ground, purely technical changes to the definitions of the IFPs. Contingency STARs/holds, based on conventional navigation alternate DVORs, would no longer be required, thus they can be withdrawn from service (Design Principle 3).

3.21 Design Principle 5 (DP5) - Truncation

Assess the impact of truncating specific STARs. Several STARs have common "heads" and/or route segments in common with ATS routes – unnecessary duplication. An ATS route may be extended/ implemented to match STAR route segments until a common "head" is reached, or to suitable intermediate waypoint shortening the IFP.

Example: A STAR shares a common segment with an ATS route

Method: Truncate the STAR at a waypoint ensuring no change to connectivity
Replicate the remainder using RNAV5 (Design Principle 4)
Re-designate the resulting IFP as per ICAO method (see para 3.12).

Desired Outcome: No change to connectivity.
Replication of remaining segments of IFP under STAR Replication Policy means there would be no change to tracks over the ground, purely technical changes to the definitions of the IFPs. (Design Principle 4)
Fewer, less complex IFPs. Less ongoing maintenance. Overall burden is reduced for NATS and IFP Regulator. Simplifies network structures, reduces FDP processing.

3.22 Design Principle 6 (DP6) - Technical Amendment

This corrects an existing IFP technical issue which is worked around in practice; or corrects an existing flight-plan disconnection which is also worked around in practice. Assess the impact of correcting an existing error to match the actual workaround.

Example: A stack-swap STAR cannot be selected by most traffic as it starts at a particular waypoint which the majority of flights bypass entirely.
Should a stack-swap situation occur, cockpit and ATC workload would increase as the disconnected stack-swap STAR would need to be manually issued and input via the more appropriate connection waypoint.

Method Amend the rarely-used, non-flight-plannable STAR to use a more appropriate waypoint.
Instruct an APD to draw up the revised STAR and designate the resulting IFP as per ICAO method (see para 3.12).

Desired Outcome: Improvement to connectivity – updated the IFP to what it should always have been and align it with what would happen in practice.
A potential reduction in cockpit/ATC workload under busy stack-swap situations.
No impact on actual flight behaviours.

Step 1B complete

4. Stage 2 Develop and Assess

Step 2A Options development

4.1 Airspace change design options:

The design options considered to remove the enroute dependencies from BIG, were limited to the following:

Option 0 – Do nothing. Retain all the STARs, holds and ATS routes unchanged from today's AIP definition.

Option 1 – Using the CAA policies, replicate STARs/holds using RNAV, exactly as defined in the AIP without considering any practicalities. The ATS routes are already RNAV5 and would not be affected in this option.

Option 2 – Examine the use of existing STARS, holds and ATS Routes from a practical point of view, re-evaluate how they are used and how the network may be improved by rationalising/truncating/replicating them in a considered manner.

Option 3 – Remove all existing STARs, holds and ATS routes that refer to or use the BIG DVOR.

4.2 Option 0 – Do nothing

Retain all the STARs, holds and ATS routes unchanged from today's AIP definition.

Option 0			REJECT
Description of option			
This is the current scenario. No change to existing AIP definitions of STARs, holds or ATS routes.			
Design Principle 0: Maintain or enhance the current level of safety			MET
Summary of qualitative assessment No change; the level of safety is maintained.			
Design Principle 1: No change to flight behaviours			MET
Summary of qualitative assessment No change to lateral/vertical track patterns.			
Design Principle 2: Administrative change	NOT MET		
Summary of qualitative assessment No administrative changes would take place under this design option; including changes which would logically improve the ATS route network. Does not remove any enroute flight dependency from the BIG DVOR.			
Design Principle 3: Withdraw unnecessary STARs	NOT MET		
Summary of qualitative assessment No withdrawals would take place under this design option. Does not remove any enroute flight dependency from the BIG DVOR.			
Design Principle 4: Replicate using RNAV Replication policies	NOT MET		
Summary of qualitative assessment No replication would take place under this design option. Does not remove any enroute flight dependency from the BIG DVOR.			
Design Principle 5: Truncate original STAR then replicate the remainder	NOT MET		
Summary of qualitative assessment No truncations would take place under this design option. Does not remove any enroute flight dependency from the BIG DVOR.			
Design Principle 6: Technical amendment	NOT MET		
Summary of qualitative assessment No technical amendments would take place under this design option. Does not remove any enroute flight dependency from the BIG DVOR.			

4.3 Option 1 – Replicate each STAR/Hold exactly as defined

Option 1			REJECT
Description of option			
All IFPs would be replicated exactly as defined in the current AIP. No account would be taken of actual usage, route segment duplication, or other factors. The ATS routes are already RNAV5 and would not be impacted in this option.			
Design Principle 0: Maintain or enhance the current level of safety			MET
Summary of qualitative assessment IFPs replicated as RNAV5 procedures. The level of safety is maintained or slightly improved due to increased precision.			
Design Principle 1: No change to flight behaviours			MET
Summary of qualitative assessment No practical change to connectivity, no change to lateral/vertical track patterns.			
Design Principle 2: Administrative change	NOT MET		
Summary of qualitative assessment No administrative changes would take place under this design option; including changes which would logically improve the ATS route network.			
Design Principle 3: Withdraw unnecessary STARs		PARTIAL	
Summary of qualitative assessment Would remove the need for contingency conventional-navigation STARs/holds based on other navaids; such IFPs could be withdrawn.			
Design Principle 4: Replicate using RNAV Replication policies			MET
Summary of qualitative assessment This option would purely replace like for like, including route segment duplications etc. Therefore, this Design Principle would be satisfied.			
Design Principle 5: Truncate original STAR then replicate the remainder	NOT MET		
Summary of qualitative assessment No truncations would take place under this design option.			
Design Principle 6: Technical amendment	NOT MET		
Summary of qualitative assessment No technical amendments would take place under this design option.			

4.4 Option 2 – Evaluate each STAR, hold and ATS route as used in practice, replicate as appropriate

Option 2			ACCEPT and PROGRESS
Description of option			
Examine the use of existing IFPs and ATS routes from a practical point of view, re-evaluate how they are used and how the network may be improved by rationalising/truncating/replicating them in a considered manner.			
Design Principle 0: Maintain or enhance the current level of safety			MET
Summary of qualitative assessment IFPs replicated as RNAV5 procedures. The level of safety is maintained or slightly improved due to increased precision. Procedures can be simplified depending on actual usage today.			
Design Principle 1: No change to flight behaviours			MET
Summary of qualitative assessment No practical change to connectivity, no change to lateral/vertical track patterns.			
Design Principle 2: Administrative change			MET
Summary of qualitative assessment Evaluate current IFPs and ATS routes and identify where this Design Principle applies. Rename STAR designations in line with the current ICAO policy. For example, this option allows the London City GODLU 1A STAR to be renamed as BEDEK 1C; with BEDEK as the starting waypoint and the 'C' designator to denote the destination airport. Rename ATS routes to remove the U- prefix as appropriate and to improve the naming within the network in a logical manner. For example, this enables the U designator to be removed from ATS Route UT421, which is identical to T421.			
Design Principle 3: Withdraw unnecessary STARs			MET
Summary of qualitative assessment Evaluate current IFPs and identify where this Design Principle applies. Analysis of flightplanning history would reveal actual usage, compare with STARs performing similar function and connectivity. For example, this allows the Heathrow WEALD 3D STAR to be withdrawn as it will otherwise become redundant once the BIG STARs are RNAV'd.			
Design Principle 4: Replicate using RNAV Replication policies			MET
Summary of qualitative assessment Evaluate current IFPs and identify where this Design Principle applies. Several IFPs would satisfy this Design Principle. For example, this allows the Heathrow STAR BIG 4B to be RNAV5 replicated and renamed as ALESO 1H.			
Design Principle 5: Truncate original STAR then replicate the remainder			MET
Summary of qualitative assessment Evaluate current IFPs and identify where this Design Principle applies. Several IFPs would satisfy this Design Principle. For example, this option enables the London City STAR GODLU 1J to be truncated at AVANT, which is common to the STAR leg.			
Design Principle 6: Technical amendment			MET
Summary of qualitative assessment Evaluate current IFPs and ATS routes and identify where this Design Principle applies. Several IFPs would satisfy this Design Principle. For example, this option allows the inbound track of the Gatwick DELBO Hold to be amended in order to coincide with the true track.			

4.5 Option 3 – Remove all existing IFPs with a BIG dependency

Option 3			REJECT
Description of option			
Remove all existing IFPs and ATS routes for which the BIG DVOR is materially important.			
Design Principle 0: Maintain or enhance the current level of safety	NOT MET		
Summary of qualitative assessment The removal of these procedures would create a gap in the network. This would require all aircraft currently using the existing IFPs to be channelled into other, potentially busy flows/ sectors, which could greatly increase controller workload in those areas.			
Design Principle 1: No change to flight behaviours	NOT MET		
Summary of qualitative assessment Aircraft would not be able to use the current procedures, causing a change in flight behaviours to work around this.			
Design Principle 2: Administrative change	NOT MET		
Summary of qualitative assessment No administrative changes would take place under this design option; including changes which would logically improve the ATS route network.			
Design Principle 3: Withdraw unnecessary STARs		PARTIAL	
Summary of qualitative assessment The unnecessary STARs would be removed in this option alongside necessary ones.			
Design Principle 4: Replicate using RNAV Replication policies	NOT MET		
Summary of qualitative assessment No replication would take place under this design option.			
Design Principle 5: Truncate original STAR then replicate the remainder	NOT MET		
Summary of qualitative assessment No truncations would take place under this design option.			
Design Principle 6: Technical amendment	NOT MET		
Summary of qualitative assessment No technical amendments would take place under this design option.			

Step 2A complete

Step 2B Options appraisal

4.6 Using the Design Principles, we have evaluated the four concept options, as summarised above.

4.7 Option 0 Do Nothing – this does not achieve the removal of dependencies from BIG. Rejected.

4.8 Option 1 Replicate as defined – this achieves the removal of dependencies from BIG. However, it does not improve network connectivity; it leaves route segment duplication in place and it does not account for current usage levels. Rejected.

4.9 Option 2 Evaluate each STAR, hold and ATS route as used in practice – achieves the removal of dependencies from BIG. This improves overall network connectivity, reduces duplication, and accounts for current usage levels. Accepted and progressed.

4.10 Option 3 Remove all existing STARs, holds and ATS routes that refer to or use the BIG DVOR. This technically would remove the dependencies from BIG; however, it removes ATS routes, STARs and holds that are used and needed by aircraft today and going forward. Rejected

4.11 Conclusion: The Option 2 concept best meets all of the Design Principles. The shortlist comprises the Option 2 concept only. The other three option concepts are therefore not progressed. There would be no change in fuel/CO_2/greenhouse gas emissions due to this proposal because there would be no change to lateral or vertical tracks. Fuel uplift changes are unlikely to occur. There are no costs or benefits which could be reasonably monetised due to this enroute proposal.

4.12 Safety Assessment: The Option 2 concept would take full account of existing usage and connectivity needs. It would ensure all IFPs are designed by an APD, as regulated by CAA SARG. 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.
This submission is proposing to re-designate ATS Route M140 as L18 which should create less confusion around routes M140 and UM140 having no coincident points; which can be argued as to provide a qualitative improvement in safety.

4.13 Conclusion: There would be a positive impact on safety whilst also improving the overall network connectivity.

End of Step 2B

5. Stage 3 Consult

Steps 3A-3D

5.1 Consultation is mainly about explaining differences in impacts, and how that may affect a stakeholder.

5.2 The draft consultation strategy is "consultation is not required, by design". There would be no impact to people on the ground, nor to aviation stakeholders; beyond typical AIRAC updates with technical changes (AIRAC changes are a "day job" for an air operator). This project was organised to be a technical piece of work, and there would be no noticeable impacts, leading to no material change to the current operation.

5.3 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.

5.4 Draft consultation document: not required, all the practical impacts of Option 2 have been assessed and there are none, except for technical network improvements. Consultation would serve no practical purpose.

5.5 Full options appraisal: unchanged from the Stage 2 options appraisal.

5.6 NATS requests the CAA acknowledge that Stage 3 is either hereby satisfied, or not required due to the previous CAA consultation.

6. Summary

6.1 This document details the STARs and Holds where the BIG VOR is material to the instrument flight procedure. It describes the current connectivity; the method used to progress the change; and the proposed connectivity.

6.2 The ATS route re-designations proposed will not change flight behaviour but will improve the layout and nomenclature of the network in the area in a logical way.

6.3 Some minor administrative changes to other ATS Routes, Holds and STARS are included, in order to improve the consistency of charts within the AIP and to follow CAA/ICAO guidance on the naming of STARs.

6.4 The proposed connectivity remains entirely unchanged due to RNAV5 replication, with or without appropriate truncation/ATS route extension.

- routes are unchanged
- connectivity is unchanged
- hence flight behaviours and traffic patterns over the ground are unchanged.

6.5 Sections 8 to 11 below detail the following IFP and ATS Route changes we are proposing to make in support of removing the BIG DVOR enroute dependency and rationalisation of the network:

- Gatwick - 2 STARs to RNAV replicate; 1 Hold to RNAV replicate; and 4 STARs and 1 Hold being withdrawn
- Heathrow - 3 STARs to RNAV replicate; 1 Hold to RNAV replicate; 3 STARs and 1 Hold being withdrawn
- London City – 5 STARs being renamed
- ATS Routes – administrative changes to 21 ATS Routes (including dual-designated routes which will be rationalised)

7. Conclusion

7.1 We have assessed that there are no foreseen impacts of making the proposed changes described in the tables below (Sections 8 to 11), and conclude that making these technical changes to the procedures would not alter traffic patterns.

8. Annex A Impact assessment – Gatwick Hold and STARs

See the redacted Stage 1 Assessment Meeting Presentation (Ref 1) 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 3) and PDG draft design report (Ref 2) contain further technical details.

Current IFP	Current route connectivity/STAR	Design Principle	How	Proposed route Connectivity/STAR	Impact of proposed change on connectivity Impact of proposed change on flight behaviour
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. Same, no impact to connectivity. No predicted change to flight behaviour.
DELBO Hold	*HON - DELBO*	6 Technical Amendment 4 Replicate	The inbound track will be amended to coincide with the true track between HON VOR and DELBO. The rest of the Hold will be replicated (RNAV5).	*HON - DELBO*	Same, no impact to connectivity. No predicted change to flight behaviour.
ASTRA 1F STAR	Q63: *KENET – WOD NDB – SFD VOR – ASTRA*	3 Withdraw	Not Required	Not Required	Under-utilised ASTRA 1F STAR to be withdrawn, in association with the withdrawal of WILLO 1F.
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.
ASTRA 2B STAR	UL151, N859: *KIDLI – WOD NDB – SFD VOR - ASTRA*	3 Withdraw	Not Required	Not Required	There will be no need for this STAR once the WILLO 3B STAR is RNAV'd.
WILLO 1F STAR	Q63: *KENET – MID VOR/ DME – HOLLY - WILLO*	3 Withdraw	Not Required	Not Required	Under-utilised WILLO 1F STAR to be withdrawn. WILLO is currently defined by a reference to BIG.

WILLO 2H STAR	P2: *BEDEK – NIGIT – MID VOR/ DME – HOLLY - WILLO*	4 Replicate	RNAV5 replication	Same - replicate as BEDEK 1G	Same, no impact to connectivity. No predicted change to flight behaviour. 'G' designator used in order to adhere to the CAA request of naming the Route Indicator after the destination airport (G - Gatwick).
WILLO 3B STAR	L151, N859: *KIDLI – MID VOR/ DME – HOLLY - WILLO*	4 Replicate	RNAV5 replication	Same - replicate as KIDLI 1G	Same, no impact to connectivity. No predicted change to flight behaviour. 'G' designator used in order to adhere to the CAA request of naming the Route Indicator after the destination airport (G - Gatwick).

9. Annex B Impact assessment – Heathrow Hold and STARs

See the redacted Stage 1 Assessment Meeting Presentation [Ref 1] 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 3] and PDG draft design report [Ref 2] contain further technical details.

Current IFP	Current route connectivity/STAR	Design Principle	How	Proposed route Connectivity/STAR	Impact of proposed change on connectivity Impact of proposed change on flight behaviour
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 Hold	N/A	3 Withdraw	Not required	Not required	To be withdrawn to avoid confusion when the current BIG Hold, which is currently used; is converted to the WEALD Hold in the future. Same, no impact to connectivity.

Current IFP	Current route connectivity/STAR	Design Principle	How	Proposed route Connectivity/STAR	Impact of proposed change on connectivity Impact of proposed change on flight behaviour
					No predicted change to flight behaviour.
BIG 1E stack-swap STAR	This is a stack-swap STAR, so it's not flight-plannable	5 Truncate 4 Replicate	Truncate TANET and replicate (RNAV5)	*TANET – DET – BIG* Replicate as TANET 1Z	TANET is common to the STAR leg, no impact to connectivity. No predicted change to flight behaviour. 'Z' designator 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. This stack-swap STAR is only for tactical use by ATC and not flight-plannable.
BIG 3D stack-swap STAR	This is a stack-swap STAR, so it's not flight plannable	4 Replicate	RNAV5 replication	Same - replicate as LAM 1X	Same, no impact to connectivity. No predicted change to flight behaviour. 'X' designator 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 VOR/ DME*	4 Replicate	RNAV5 replication	Same - replicate as ALESO 1H	Same, no impact to connectivity. No predicted change to flight behaviour. 'H' designator used in order to adhere to the CAA request of naming the Route Indicator after the destination airport (H – Heathrow).
WEALD 4B STAR	UT420: *ALESO – ROTNO – ETVAX – TIGER - WEALD*	3 Withdraw	Not Required	Not Required	Withdrawn, redundant once the BIG STARs are RNAV'd.
WEALD 3D STAR	*LAM VOR/ DME - WEALD*	3 Withdraw	Not Required	Not Required	Withdrawn, redundant once the BIG STARs are RNAV'd.
WEALD 1E STAR	L980, L608, P7: *LOGAN – KOPUL – TANET – DET VOR/ DME - WEALD*	3 Withdraw	Not Required	Not Required	Withdrawn, redundant once the BIG STARs are RNAV'd.

10. Annex C Impact assessment – London City STARs

See the redacted Stage 1 Assessment Meeting Presentation [Ref 1] 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 3] and PDG draft design report [Ref 2] contain further technical details.

Current IFP	Current route connectivity/STAR	Design Principle	How	Proposed route Connectivity/STAR	Impact of proposed change on connectivity Impact of proposed change on flight behaviour
GODLU 1A STAR	P2: *BEDEK – BIG VOR/ DME – UMTUM - GODLU*	2 Admin	Same (already RNAV5)	Same - rename as BEDEK 1C	Same, no impact to connectivity. No predicted change to flight behaviour. 'C' designator 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' designator 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' designator 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' designator 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 VOR/ DME – UMTUM - GODLU*	5 Truncate 2 Admin	Truncate AVANT (already RNAV5)	*AVANT – BIG – UMTUM – GODLU* Rename as AVANT 1C	AVANT is common to the STAR leg, no impact to connectivity. No predicted change to flight behaviour. 'C' designator used in order to adhere to the CAA request of naming the Route Indicator after the destination airport (C – London City).

11. Annex D Impact assessment – ATS Route Re-designations

See the redacted Stage 1 Assessment Meeting Presentation [Ref 1] 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 3] and PDG draft design report [Ref 2] contain further technical details.

Current Route Name	Current Route	Proposed Route Name	Proposed Route	Notes	Impact of proposed change on connectivity Impact of proposed change on flight behaviour
UL6	*DET– DVR*	Same - L6	Same as current route(s)	U designator removed	Same, no impact to connectivity. No predicted change to flight behaviour.
L6	Same as UL6				
UL10	*KELLY – CASEL – PENIL – WAL – HON – DTY – WOBUN – BUZAD – BPK – LAM – ITVIP – RINTI*	Same - L10	Same as current route(s)	U designator removed	Same, no impact to connectivity. No predicted change to flight behaviour.
L10	Same as UL10				
UL15	*SOSIM – GIGTO – MALUD – EPOXI – AMPIT – RISLA – KEPAD – HON – PIXUP – FINMA – BETPO – BIG – SANDY – MOTOX*	Same - L15	Same as current L15 route	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.
L15	*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 Impact of proposed change on 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 – 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*				
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 current UL613 route	U designator removed	Same, no impact to connectivity. No predicted change to flight behaviour.
L613	*SOVAT - SANDY*				

Current Route Name	Current Route	Proposed Route Name	Proposed Route	Notes	Impact of proposed change on connectivity Impact of proposed change on flight behaviour
UM140	*NORLA – MERLY – EXMOR – SAM– ROKKE – PENUX – DVR DME*	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 current route(s)	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 current route(s)	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 current route(s)	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 current route(s)	U designator removed	Same, no impact to connectivity. No predicted change to flight behaviour.
Y312	Same as UY312				

12. Annex E List of references

Reference	Title and description
1 For publication	*L4017-BIG-DVOR-CAP1616-Stage 1 Assessment Meeting V1.1 (Redacted)* Slide pack presented at the Stage 1 assessment meeting; annotated and redacted for publication. This is the primary reference material for illustrations of IFP and ATS Route amendments in this multi-gateway document. Link to document on portal.
2 Not for publication	*DVOR Rationalisation Biggin Hill Draft PDG Report* This PDF summarises the draft IFP data pack which will be supplied to CAA IFP Regulator for ICAO PANS-OPS compliance analysis. This is part of a technical piece of work in the context of IFP Regulation. It contains NATS IPR and is not expected to be published on the CAA's portal.
3 Not for publication	A document summarising the relevant AIP changes, alongside the AIP pages where these changes need to occur.
4 For publication	BIG DVOR Assessment Meeting minutes (redacted) Link to document on portal.
5 For publication	DAP1916 BIG DVOR Statement of Need V3 (2770) Link to document on portal.
6 For publication	Rationale for updated Statement of Need V3. Link to document on portal.

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