

DVOR Rationalisation
Removal of Enroute Dependencies
DET LAM Deployment

DVOR DET LAM Holds and STARs CAP1616 Stage 2 Gateway

V1.0

NATS Uncontrolled

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1. Introduction

This document continues the CAP1616 process started with the Statement of Need (DAP1916) submitted in January 2020. The intent of this document is to summarise and satisfy the requirements of CAP1616 Stage 2. The CAA reference is ACP-2019-68, the link to the CAA progress page is [here](#).

This proposal is limited to removing the dependency of enroute instrument flight procedures in the UK AIP from the Detling (DET) and Lambourne (LAM) DVORs. Hence this proposal is focused on Standard Terminal Arrival Routes (STARs), and their associated holds which refer to DET or LAM 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 DET and LAM from these STARs and holds. Design Principles have been developed (Stage 1B) which are focused on best removing the enroute DVOR dependencies whilst ensuring the changes are safe and do not result in changes to flight behaviour. This document will identify:

- option concepts for replacing current connectivity relevant to DET and LAM with RNAV procedures;
- an evaluation of those option concepts against the Design Principles;
- a full list of the specific changes.

2. Stage 2 Develop and Assess

Step 2A Options Development

2.1 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 follow 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 traffic position.

2.2 Airspace change design options

The design options considered to remove the enroute dependencies from DET and LAM, were limited to the following:

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

Option 1 – Using the CAA policies, replicate all relevant STARs/holds using RNAV, exactly as defined in the AIP without considering any practicalities.

Option 2 – Examine the use of existing STARs and holds 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 and holds that refer to or use the DET or LAM DVOR.

On-going engagement throughout the DVOR project - with relevant airfields and Procedure teams at the London Area Control Centre at Swanwick - has determined that NATS would replicate conventional STARs and Holds as closely as possible using PBN design criteria (using the RNAV 5 specification). As these procedures are replications of current conventional procedures and there is no requirement for ensuring separation from other ATS Routes/STARs, RNAV5 is the preferred specification in order to ensure greatest accessibility to routes, rather than limiting to those aircraft with RNAV1 equipage.

In support of the eventual removal of the DET and LAM DVORs, this proposal will RNAV5 replicate 5 Holds (4 serving Heathrow and 1 for Luton/ Stansted) and 3 STARs (1 for Heathrow and 2 for Luton/ Stansted arrivals). These will all be replicated as closely as possible to the current conventional procedures using RNAV design criteria.

This proposal will remove 1 Hold (Heathrow) and 3 STARs (1 Heathrow and 2 Luton/ Stansted) which are conventional contingency procedures for when specific DVORs are out of service, and hence will no longer be required.

There are also 2 new Heathrow STARs as part of this proposal. BARM1 1G and 1H will both commence at BARM1 with different associated Descent Planning Levels at this waypoint, before leading on to different existing Heathrow STARs (TEBRA 1G and LOGAN 2H).

There are no new Holds resulting from this proposal. All of the above proposed changes are detailed fully in Annexes C - D.

Gatwick, Heathrow, Luton and Stansted Airports have been engaged with regarding this proposal and the changes to the aforementioned STARs and Holds. There were no objections received to current proposals.

2.3 Stakeholder Engagement

As part of Stage 2, CAP1616 requires change sponsors to develop a comprehensive list of Design Options, which are tested with the same group of stakeholders who were engaged with during Stage 1. However, as covered in the Stage 1B Design Principles document ^(Ref 4), the Design Principles for this submission were engaged upon with NATMAC in 2008; prior to the introduction of CAP1616 and the requirement to seek feedback on Design Principles.

Alongside the Design Principles, the Design Options have been developed to provide different methods in which the en-route dependencies can be removed from a DVOR, whilst ensuring no changes to flight behaviours. The Design Options have been used consistently across the numerous DVOR submissions as they achieve the same outcome; although they are always reviewed to ensure relevance. We therefore conclude that there is no need to re-consult with the NATMAC members, nor any additional stakeholders, as there will not be any impact upon them.

However, as part of this Airspace Change Proposal and as per previous submissions, NATS has been in contact with relevant airfields which use the STARs and associated Holds we plan to RNAV, specifically Gatwick, Heathrow, Luton and Stansted Airports. The aerodrome sections of the AIP for the affected airfields will need to be updated which this engagement has allowed us to inform them of. The proposed changes have been designed to be invisible from an airport's perspective so there are no other impacts anticipated. Annex G provides a summary of the engagement activity for these procedures. Unredacted engagement evidence is supplied to the CAA separately.

Previous DVOR removal proposals have all contained three Design Options: in summary, to do nothing; to replicate all procedures; and lastly, to examine all procedures and improve where appropriate (rationalise/ truncate/ replicate). These Design Options were accepted by the CAA. NATS was later requested to add an additional option to all future submissions, whereby all procedures with a dependency are removed; thus, removing the DVOR dependency. The CAA acknowledged that this Design Option would never meet the Design Principles however; it should be included for completeness.

The Design Options have therefore been developed so they can be applied to each of the individual DVOR submissions and have evolved following guidance from the CAA. As mentioned above, appropriate engagement has previously been completed with NATMAC members; and airports will be fully briefed when their AIP pages require updating.

3. Step 2A Options Development: Design Principle Evaluation

This section evaluates the performance of all 4 Design Options with respect to each Design Principle. The Design Principles developed during Stage 1 are included in Annex A for reference.

The below assessment criteria have been used to determine whether each Design Option has met; partially met; or not meet each of the Design Principles.

Design Principle	Description	Assessment Criteria		
		Does not meet	Partially meets	Met
DP0 Safety	Airspace change must maintain or enhance the current level of safety	Unlikely to pass a safety case due to major safety issues from proposed changes	Issues identified that would require a robust safety case e.g. workload, IFP (flyability), new hazards	No significant safety issues identified
DP1 Flight behaviour	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	Proposed change(s) would result in a change to flight behaviour	N/A – either met or not met	None of the proposed changes would result in a change to flight behaviour
DP2 Admin	Remove unnecessary references to the DET/ LAM DVOR which are not material to the procedure	Procedures are not individually evaluated for potential application of this DP; therefore, no admin changes are made	Procedures are individually evaluated for potential application of this DP, but no appropriate admin changes are made	Procedures are individually evaluated for potential application of this DP, and appropriate admin changes are made
DP3 Withdraw	Some STARs are rarely used, some do the same job, some have segments in common with other STARs	Procedures are not individually evaluated for potential application of this DP; therefore, none are withdrawn	Procedures are individually evaluated for potential application of this DP, but no appropriate withdrawals are made	Procedures are individually evaluated for potential application of this DP, and withdrawals are made, with justification provided
DP4 Replicate	PBN Replication – replace conventional STARs/ Holds with RNAV STARs/ Holds	STARs/ Holds are not replicated with RNAV versions	N/A – either met or not met	Conventional procedures are replaced with RNAV versions
DP5 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	Procedures are not individually evaluated for potential application of this DP; therefore, no technical changes are made	Procedures are individually evaluated for potential application of this DP, but no appropriate technical changes are made	Procedures are individually evaluated for potential application of this DP, and minor changes are made, with justification provided

3.1 Option 0 – Do nothing. Retain all the STARs and Holds unchanged from today’s AIP definition.

See the submitted Stage 1 Assessment Meeting slide_pack ^(Ref 1) for the detail of the 12 procedures which reference the DET or LAM DVOR on their charts and which would remain as is for this option. The table below presents an evaluation of this option against the Design Principles

Option 0	REJECT		
<i>Description of option</i>			
This is the current scenario. No change to existing AIP definitions of STARs or Holds.			
<i>Design Principle 0: Maintain or enhance the current level of safety</i>			MET
<i>Summary of qualitative assessment</i> No change from today; the level of safety is maintained.			
<i>Design Principle 1: No change to flight behaviours</i>			MET
<i>Summary of qualitative assessment</i> No change to lateral/vertical track patterns.			
<i>Design Principle 2: Administrative change</i>		NOT MET	
<i>Summary of qualitative assessment</i> Procedures are not individually evaluated for potential application of this DP; therefore, no administrative changes would take place under this Design Option. Does not remove any enroute flight dependency from the DET or LAM DVOR.			
<i>Design Principle 3: Withdraw unnecessary STARs</i>		NOT MET	
<i>Summary of qualitative assessment</i> Procedures are not individually evaluated for potential application of this DP; therefore, no withdrawals would take place under this Design Option. Does not remove any enroute flight dependency from the DET or LAM DVOR.			
<i>Design Principle 4: Replicate using RNAV Replication policies</i>		NOT MET	
<i>Summary of qualitative assessment</i> No RNAV replication would take place under this Design Option. Does not remove any enroute flight dependency from the DET or LAM DVOR.			
<i>Design Principle 5: Technical amendment</i>		NOT MET	
<i>Summary of qualitative assessment</i> Procedures are not individually evaluated for potential application of this DP; therefore, no technical amendments would take place under this Design Option. Does not remove any enroute flight dependencies from the DET or LAM DVOR.			

3.2 Option 1 - Using the CAA policies, replicate STARs/holds using RNAV, exactly as defined in the AIP without considering any practicalities.

This option would replace all dependant procedures identified in the Assessment Meeting slide_pack ^(Ref 1) as RNAV procedures. This table evaluates this option against the Design Principles:

Option 1	REJECT		
<i>Description of option</i>			
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.			
<i>Design Principle 0: Maintain or enhance the current level of safety</i>			MET
<i>Summary of qualitative assessment</i> IFPs replicated as RNAV5 procedures. The level of safety is maintained or slightly improved due to increased precision. No potential safety issues identified.			
<i>Design Principle 1: No change to flight behaviours</i>			MET
<i>Summary of qualitative assessment</i> No practical change to connectivity therefore, no change to lateral/vertical track patterns.			
<i>Design Principle 2: Administrative change</i>		NOT MET	
<i>Summary of qualitative assessment</i> Procedures are not individually evaluated for potential application of this DP; therefore, no administrative changes would take place under this Design Option; including changes which would logically improve the ATS route network.			
<i>Design Principle 3: Withdraw unnecessary STARs</i>			MET
<i>Summary of qualitative assessment</i> This Design Option would remove the need for contingency conventional-navigation STARs/holds based on other nav aids; therefore, such IFPs could be withdrawn.			
<i>Design Principle 4: Replicate using RNAV replication policies</i>			MET
<i>Summary of qualitative assessment</i> This Design Option would purely replicate procedures like for like, including route segment duplications etc. Therefore, this Design Principle would be satisfied.			
<i>Design Principle 5: Technical amendment</i>		NOT MET	
<i>Summary of qualitative assessment</i> Procedures are not individually evaluated for potential application of this DP; therefore, no technical amendments would take place under this Design Option.			

3.3 Option 2 - Examine the use of existing STARS and holds 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.

This option evaluates the usage of each procedure individually and creates opportunity bespoke to specific procedures. See Annexes C - D for the detailed change for each of the procedures under this option.

This table evaluates this option against the Design Principles:

Option 2	ACCEPT and PROGRESS		
<i>Description of option</i>			
Examine the use of existing IFPs 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.			
<i>Design Principle 0: Maintain or enhance the current level of safety</i>			MET
<i>Summary of qualitative assessment</i> 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. No potential safety issues identified.			
<i>Design Principle 1: No change to flight behaviours</i>			MET
<i>Summary of qualitative assessment</i> No practical change to connectivity, no change to lateral/vertical track patterns.			
<i>Design Principle 2: Administrative change</i>			MET
<i>Summary of qualitative assessment</i> 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 will up number the Heathrow LOGAN 1H STAR to LOGAN 2H, with LOGAN as the starting waypoint and the 'H' identifier to denote the destination airports.			
<i>Design Principle 3: Withdraw unnecessary STARS</i>			MET
<i>Summary of qualitative assessment</i> Evaluate current IFPs and identify where this Design Principle applies. Several IFPs would satisfy this Design Principle. For example, the Luton/ Stansted LOGAN 1Q STAR – which is used when the BKY DVOR is out of service - can be withdrawn once the equivalent LOGAN 1A STAR has been RNAV replicated under this proposal.			
<i>Design Principle 4: Replicate using RNAV Replication policies</i>			MET
<i>Summary of qualitative assessment</i> Evaluate current IFPs and identify where this Design Principle applies. Several IFPs would satisfy this Design Principle. For example, this allows the Luton/ Stansted LOGAN Hold to be RNAV5 replicated.			
<i>Design Principle 5: Technical amendment</i>			MET
<i>Summary of qualitative assessment</i> Evaluate current IFPs and ATS routes and identify where this Design Principle applies. For example, this proposal includes 2 new Heathrow STARS which include vital Descent Planning Level restrictions.			

3.4 Option 3 – Remove all existing STARs and holds that refer to or use the DET/ LAM DVOR.

This option removes each STAR and Hold with a DET or LAM dependency and replaces DET and LAM DVOR/DME with DET and LAM DME.

This table evaluates this option against the Design Principles:

Option 3	REJECT		
<i>Description of option</i>			
Remove all existing IFPs for which the DET or LAM DVOR is materially important.			
<i>Design Principle 0: Maintain or enhance the current level of safety</i>	NOT MET		
<i>Summary of qualitative assessment</i> 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. This could create significant safety issues from such substantial changes.			
<i>Design Principle 1: No change to flight behaviours</i>	NOT MET		
<i>Summary of qualitative assessment</i> Aircraft would not be able to use the current procedures, causing a significant change in flight behaviours to work around this.			
<i>Design Principle 2: Administrative change</i>	NOT MET		
<i>Summary of qualitative assessment</i> Procedures are not individually evaluated for potential application of this DP; therefore, no administrative changes would take place under this Design Option; including changes which would logically improve the ATS route network.			
<i>Design Principle 3: Withdraw unnecessary STARs</i>		PARTIAL	
<i>Summary of qualitative assessment</i> This Design Option would remove all STARs; both necessary and unnecessary.			
<i>Design Principle 4: Replicate using RNAV Replication policies</i>	NOT MET		
<i>Summary of qualitative assessment</i> Procedures are not individually evaluated for potential application of this DP; therefore, no replication would take place under this Design Option.			
<i>Design Principle 5: Technical amendment</i>	NOT MET		
<i>Summary of qualitative assessment</i> Procedures are not individually evaluated for potential application of this DP; therefore, no technical amendments would take place under this Design Option.			

3.5 Summary – Options Development

Using the six Design Principles, we have evaluated the four concept Design Options, as summarised above.

3.6 *Option 0: Do Nothing – Retain all the STARS and holds unchanged from today's AIP definition.* This does not achieve the removal of dependencies from the DET and LAM DVORs. **Rejected.**

3.7 *Option 1: Using the CAA policies, replicate STARS/holds using RNAV, exactly as defined in the AIP without considering any practicalities – this achieves the removal of dependencies from DET and LAM. However, it does not improve network connectivity; it leaves route segment duplication in place and it does not account for current usage levels.* **Rejected.**

3.8 *Option 2: Examine the use of existing STARS and holds 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.* This achieves the removal of dependencies from DET and LAM, alongside improving the description of network procedures and reducing duplication. **Accepted and progressed.**

3.9 *Option 3: Remove all existing STAR and holds that refer to or use the DET and LAM DVORs.* This would technically remove the dependencies from DET and LAM; however, it removes STARS and holds that are used and needed by aircraft today and going forward. **Rejected**

Conclusion: The Design 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.

Step 2A complete

Step 2B Options Appraisal

3.10 The baseline (do nothing) option does not achieve the removal of dependencies from DET and LAM. The ratings for the baseline option against each of the Design Principles shows that whilst it maintains safety levels and creates no change to flight behaviours, it does not meet the remaining 4 Design Principles.

3.11 Following the Design Principle evaluation, we conclude that the following Design Option 2 could be used to remove the dependencies from the DET and LAM DVORs in accordance with the Design Principles:

Examine the use of existing STARS and holds 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.

2.15 There would be no change in fuel/ CO₂/ 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.

3.16 **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.

4. DET and LAM Option 2 Cost/Benefit Analysis

The CAP1616 Appendix E cost/benefit analysis is given below.

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health and quality of life	N/A	As there are no proposed changes to lateral or vertical tracks there will be no impact on noise or quality of life.
Communities	Air quality	N/A	No changes below 1,000ft
Wider society	Greenhouse gas impact	Monetise and quantify	No proposed changes to lateral or vertical tracks so no impact
Wider society	Capacity/ resilience	Qualitative	No changes
General Aviation	Access	N/A	No changes
General Aviation/ commercial airlines	Economic impact from increased effective capacity	Quantify	No changes
General Aviation/ commercial airlines	Fuel burn	Monetise	No proposed changes to lateral or vertical tracks so no impact.
Commercial airlines	Training cost	N/A	N/A – there is not expected to be any airline training cost.
Commercial airlines	Other costs	N/A	Updates to FMS and flight planning systems will completed via the routine AIRAC updates. There are no other known costs which would be imposed on commercial aviation.
Airport/ Air navigation service provider	Infrastructure costs/benefit	Qualitative and quantitative	The cost of implementation of the change, adaptation of systems is estimated to be £65,000. Removal of the en-route dependency enables decommissioning of the DVOR (once airfields have removed their dependencies i.e. SIDs). This will yield an annual cost saving of circa £10,000 per DVOR (£20,000 for both DET and LAM).
Airport/ Air navigation service provider	Operational costs	N/A	N/A – this proposal would not lead to changes in operational costs.
Airport/ Air navigation service provider	Deployment costs	Qualitative and quantitative	N/A – this change would be introduced via briefings and bulletins for staff, with no additional training or simulation training/costs required.

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

End of Step 2B

5. Summary

5.1 This document details the STARs and Holds where the DET or LAM DVOR is material to the instrument flight procedure. It describes the current connectivity; the method used to progress the change; and the proposed connectivity.

5.2 Some minor administrative changes to 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.

5.3 This proposal also includes 2 new Heathrow STARs which include important Descent Planning Level restrictions at the start of each STAR.

5.4 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.

5.5 Annexes C - D below details the IFP changes we are proposing to make in support of removing the DET and LAM DVOR enroute dependencies and rationalisation of the network, as summarised in Table 1 below:

Ref	Airport	Type	Procedure	DET/ LAM VOR	Proposed Changes
1	Heathrow	Hold	LAM	Dependent on LAM	RNAV5 replication
2	Heathrow	Hold	SABER	Dependent on LAM	RNAV5 replication
3	Heathrow	Hold	BRASO	Dependent on LAM	RNAV5 replication
4	Heathrow	Hold	LOGAN	Dependent on LAM	RNAV5 replication
5	Heathrow	STAR	LOGAN 1H	Dependent on LAM	RNAV5 replication
6	Heathrow	Hold	TAWNY	Non-dependent	Withdrawn
7	Heathrow	STAR	LOGAN 1Z	Non-dependent	Withdrawn
8	Luton/ Stansted	STAR	DET 1A	Dependent on DET	RNAV5 replication
9	Luton/ Stansted	STAR	DET 1Q	Dependent on DET	Withdrawn
10	Luton/ Stansted	Hold	LOGAN	Non-dependent	RNAV5 replication
11	Luton/ Stansted	STAR	LOGAN 1A	Non-dependent	RNAV5 replication
12	Luton/ Stansted	STAR	LOGAN 1Q	Non-dependent	Withdrawn
13	Heathrow	New STAR	BARMI 1G	N/A	New RNAV5 STAR
14	Heathrow	New STAR	BARMI 1H	N/A	New RNAV5 STAR

Table 1: Summary of proposed changes

6. Conclusion

6.1 We have assessed that there are no foreseen impacts of making the proposed changes described in the tables below (Annexes C - D) and conclude that making these technical changes to the procedures would not alter traffic patterns.

7. Annex A: Design Principles

7.1 Design Principles for DET and LAM DVORs (as per Stage 1B – Ref 4)

Design Principle	Description
<i>DP0 Safety</i>	Airspace change must maintain or enhance the current level of safety
<i>DP1 No change to flight behaviour</i>	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
<i>DP2 Admin</i>	Remove unnecessary references to the DET/ LAM DVOR which are not material to the procedure
<i>DP3 Withdraw</i>	Some STARS are rarely used, some do the same job, some have segments in common with other STARS
<i>DP4 Replicate</i>	PBN Replication – replace conventional STARS/Holds with RNAV STARS/Holds
<i>DP5 Technical amendment</i>	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.

8. Annex B: Design Option 2: Procedure Detail

This section demonstrates the proposed changes for Design Option 2

Option 2: Examine the use of existing STARS and holds 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.

- 1) **LAM Hold**– this procedure is dependent on LAM VOR
- 2) **SABER Hold**– this procedure is dependent on LAM VOR
- 3) **BRASO Hold**– this procedure is dependent on LAM VOR
- 4) **LOGAN Hold** – this procedure is dependent on LAM VOR

WARNING For Minimum Descent Rate requirements See ENR 1.1 para 3.2.
WARNING Do not proceed beyond LAMBOURNE without ATC clearance.
DESCENT PLANNING Pilots should plan for possible descent clearance as detailed in the table below.

- 5) **LOGAN 1H** – this procedure is dependent on LAM VOR

This STAR currently has varying Descent Planning Levels so will be extended back to ensure these are captured on the RNAV version. An additional RNAV STAR will be created to enable this.

It has a route connectivity via L608, L980 & P7 of: LOGAN – LAM VOR

WARNING For Minimum Descent Rate requirements See ENR 1.1 para 3.2.
WARNING Do not proceed beyond LAMBOURNE without ATC clearance.
DESCENT PLANNING Pilots should plan for possible descent clearance as detailed in the table below.

- 6) **TAWNY Hold** – this is not dependent on LAM DVOR.
It is a contingency Hold for when LAM is out of service.
- 7) **LOGAN 1Z** – this is not dependent on LAM VOR.
It is a contingency STAR when LAM is OOS.
It has a route connectivity via: L608, L980 & P7 of: LOGAN – TAWNY

000000	HEATHROW DIRECTOR
* 127.525°	HEATHROW TOWER
* 124.475°	HEATHROW RADAR
5°	HEATHROW INFORMATION
L 115.100	HEATHROW INFORMATION
etc.	

WARNING For Minimum Descent Rate requirements See ENR 1.1 para 3.2.
WARNING Do not proceed beyond LAMBOURNE without ATC clearance.
DESCENT PLANNING Pilots should plan for possible descent clearance as detailed in the table below.

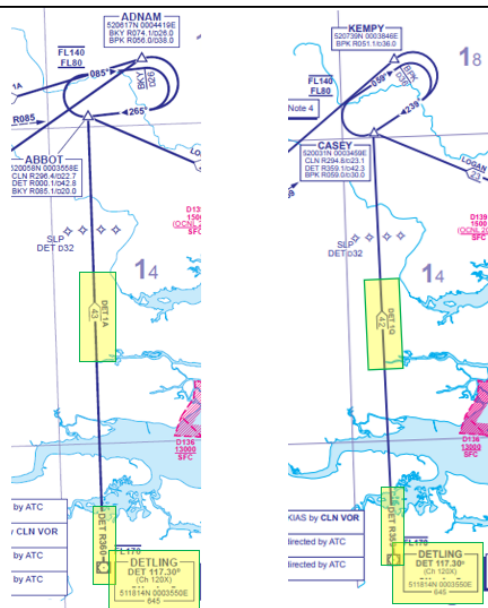
8) DET 1A – this procedure is dependent on DET VOR

It has a route connectivity via L10, L613, N57 of:
DET VOR – ABBOT

9) DET 1Q STAR – this procedure is dependent on DET VOR.

It is a contingency procedure for when BKY is OOS

It has a route connectivity via L10, L613, N57 of:
DET VOR - CASEY



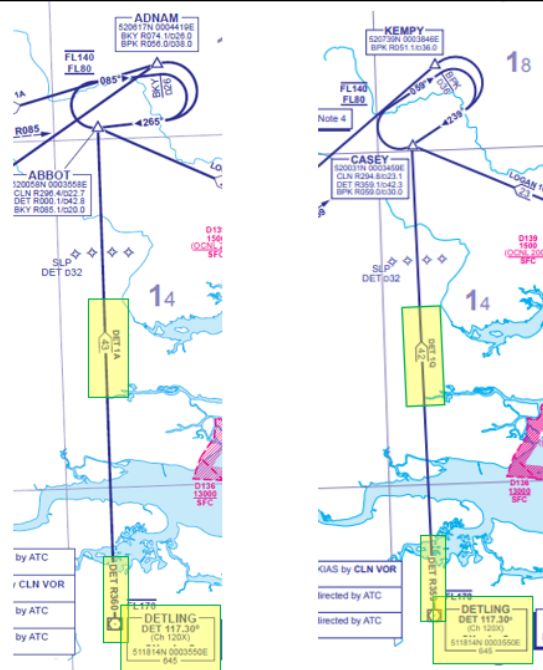
8) DET 1A – this procedure is dependent on DET VOR

It has a route connectivity via L10, L613, N57 of:
DET VOR – ABBOT

9) DET 1Q STAR – this procedure is dependent on DET VOR.

It is a contingency procedure for when BKY is OOS

It has a route connectivity via L10, L613, N57 of:
DET VOR - CASEY



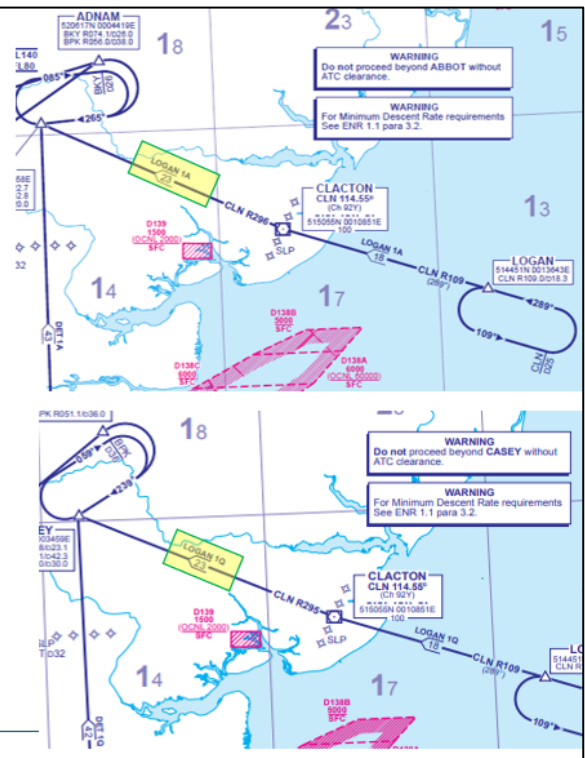
10) LOGAN Hold – this procedure for GW/SS is not dependent on DET or LAM

11) LOGAN 1A – this procedure is not dependent on DET VOR

It has a route connectivity via L608, L980 of:
LOGAN – CLN VOR – ABBOT

12) LOGAN 1Q – this procedure is not dependent on DET VOR.

It is a contingency procedure for when BPK is OOS.
It has a route connectivity via L608 & L980 of:
LOGAN – CLN VOR – CASEY



9. Annex C: Impact Assessment - Gatwick STARs and Holds

For charts and technical notes see the Assessment Meeting slide pack ^(Ref 1) for the current IFPs.

Current IFP	Current route connectivity/STAR	Design Principle	How	Proposed route Connectivity/STAR	Impact of proposed change on connectivity and flight behaviour
N/A	N/A	5 Technical Amendment	New RNAV5 STAR with FL260 Descent Planning Level at BARM1	<p><i>BARM1 - SONOG - ODROB - TEBRA</i> (then as per TEBRA 1G)</p> <p>Named BARM1 1G</p>	<p>This new STAR extends the TEBRA 1G back to BARM1, along route Y4. This ensures that the FL260 level restriction at BARM1 is captured. This is crucial for sector sequencing and reducing complexity, despite not currently being part of a coded procedure.</p> <p>The Descent Planning Level could not be added to TEBRA 1G as it starts at TEBRA therefore, this STAR has been established to ensure that the level restriction is appropriately planned for and fuelled for.</p> <p>The new STAR reflects the exact same routeing already flown today when joining the TEBRA 1G RNAV5 STAR via route P7/ Y4.</p> <p>The BARM1 1G STAR will be in addition to the current TEBRA 1G STAR; the former for traffic from the north-east and the latter for traffic from the east.</p>

10. Annex D: Impact Assessment - Heathrow STARs and Holds

For charts and technical notes see the Assessment Meeting slide pack ^(Ref 1) for the current IFPs.

Current IFP	Current route connectivity/STAR	Design Principle	How	Proposed route Connectivity/STAR	Impact of proposed change on connectivity and flight behaviour
LAM Hold	N/A	4 Replicate	RNAV5 Replication	Not required	This RNAV5 Hold is based on the currently published conventional LAM Hold. Same, no impact to connectivity. No predicted change to flight behaviour.
SABER Hold	N/A	4 Replicate	RNAV5 Replication	Not required	This RNAV5 Hold is based on the currently published conventional SABER Hold. Same, no impact to connectivity. No predicted change to flight behaviour.
BRASO Hold	N/A	4 Replicate	RNAV5 Replication	Not required	This RNAV5 Hold is based on the currently published conventional BRASO Hold. Same, no impact to connectivity. No predicted change to flight behaviour.
LOGAN Hold	N/A	4 Replicate	RNAV5 Replication	Not required	This RNAV5 Hold is based on the currently published conventional LOGAN Hold. Same, no impact to connectivity. No predicted change to flight behaviour.
LOGAN 1H STAR	L608, L980, P7: <i>LOGAN - TRIPO - SABER- BRASO - LAM DVOR</i>	2 Admin 4 Replicate	RNAV5 Replication	L608, L980: <i>LOGAN - SABER - BRASO - WESUL - LAM DVOR</i> Up-number to LOGAN 2H	The routeing is the same except for the removal of waypoint TRIPO which - Swanwick Procedures have confirmed - there is no requirement for. Existing waypoint WESUL – situated between BRASO and LAM - has been added to replace the existing Speed Limit Point at LAM. Route P7 has been removed from this STAR as the new BARM1 1H STAR has been established for traffic from P7.

Current IFP	Current route connectivity/STAR	Design Principle	How	Proposed route Connectivity/STAR	Impact of proposed change on connectivity and flight behaviour
					No impact to connectivity and no predicted change to flight behaviour.
TAWNY Hold	N/A	3 Withdraw	Not required	Not required	This Hold is a contingency procedure for when the LAM DVOR is out of service. This Hold will therefore not be needed once the LAM Hold has been RNAV replicated and the en-route dependencies have been removed from LAM.
LOGAN 1Z STAR	L608, L980, P7: <i>LOGAN - TAWNY</i>	3 Withdraw	Not required	N/A	This STAR is a contingency procedure for when the LAM DVOR is out of service. This STAR is currently no published anywhere and will not be needed once the en-route procedure dependencies have been removed from LAM.
N/A	N/A	5 Technical Amendment	New RNAV5 STAR with FL300 Descent Planning Level at BARM I	<i>BARM I - SONOG - LOGAN</i> (then as per LOGAN 2H) Named BARM I 1H	<p>This new STAR extends the LOGAN 2H back to BARM I, along route P7. This ensures that the FL300 level restriction at BARM I is captured. This is crucial for sector sequencing and reducing complexity, despite not currently being part of a coded procedure.</p> <p>The Descent Planning Level could not be added to LOGAN 2H as it starts at LOGAN therefore, this STAR has been established to ensure that the level restriction is appropriately planned for and fuelled for.</p> <p>This new STAR reflects the exact same routing already flown today when joining the LOGAN 2H RNAV5 STAR via route P7.</p>

11. Annex E: Impact Assessment – Luton/ Stansted STARs and Holds

For charts and technical notes see the Assessment Meeting slide pack ^(Ref 1) for the current IFPs.

Current IFP	Current route connectivity/STAR	Design Principle	How	Proposed route Connectivity/STAR	Impact of proposed change on connectivity and flight behaviour
DET 1A STAR	L10, L613, N57: <i>DET DME/ DVOR - ABBOT</i>	2 Admin 4 Replicate	RNAV5 Replication	L10, L613, N57: <i>DET DME – LOFFO – ABBOT</i> Up-number to DET 2A	The routing is unchanged except that new waypoint LOFFO has been included to replace the existing Speed Limit Point at DET. Same, no impact to connectivity. No predicted change to flight behaviour.
DET 1Q STAR	L10, L613, N57: <i>DET DME/ DVOR - CASEY</i>	3 Withdraw	Not required	N/A	This STAR is a contingency procedure for when BKY is out of service. There will be no need for this STAR once the DET 1A STAR is RNAV5 replicated.
LOGAN Hold	N/A	4 Replicate	RNAV5 Replication	Not required	This RNAV5 Hold is based on the currently published conventional LOGAN Hold. Same, no impact to connectivity. No predicted change to flight behaviour.
LOGAN 1A STAR	L608, L980: <i>LOGAN - CLN DVOR - ABBOT</i>	2 Admin 4 Replicate	RNAV5 Replication	L608, L980: <i>LOGAN - CLN DVOR - ABBOT</i> Up-number to LOGAN 2A	Same, no impact to connectivity. No predicted change to flight behaviour.
LOGAN 1Q STAR	L608, L980: <i>LOGAN – CLN DVOR - CASEY</i>	3 Withdraw	Not required	N/A	This STAR is a contingency procedure for when BKY is out of service. There will be no need for this STAR once the LOGAN 1A STAR is RNAV5 replicated.

11. Annex F: List of references

Reference	Title and description
1 For publication	<i>DET LAM DVOR CAP1616 Stage 1 Assessment Meeting Slide pack</i> Slide pack presented at the Stage 1 assessment meeting. 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 For publication	<i>DET LAM DVOR Assessment Meeting minutes (redacted)</i> Link to document on portal
3 For publication	<i>DAP1916 DET LAM DVOR Statement of Need (#3341)</i> Link to document on portal
4 For publication	<i>DET LAM DVOR 1B Design Principles v1.0</i> Link to document on portal
5 For publication	<i>DET LAM DVOR Removal Engagement Evidence (redacted)</i> Link to document on portal

12. Annex G: Engagement Evidence

This section summarises the engagement activities we conducted, which influenced the design decisions / considerations.

Stakeholder	Type of engagement	Date	Notes
Gatwick Airport ATC	Email	27/04/2020	Email outlining proposed changes to STARs/Holds as part of DVOR Rationalisation; seeking feedback
Heathrow Airport ATC	Email	23/04/2020	Email outlining proposed changes to STARs/Holds as part of DVOR Rationalisation; seeking feedback
Luton Airport ATC	Email	23/04/2020	Email outlining proposed changes to STARs/Holds as part of DVOR Rationalisation; seeking feedback
Stansted Airport ATC	Email	23/04/2020	Email outlining proposed changes to STARs/Holds as part of DVOR Rationalisation; seeking feedback

Table 1: Engagement with Airports for DET LAM proposed changes

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