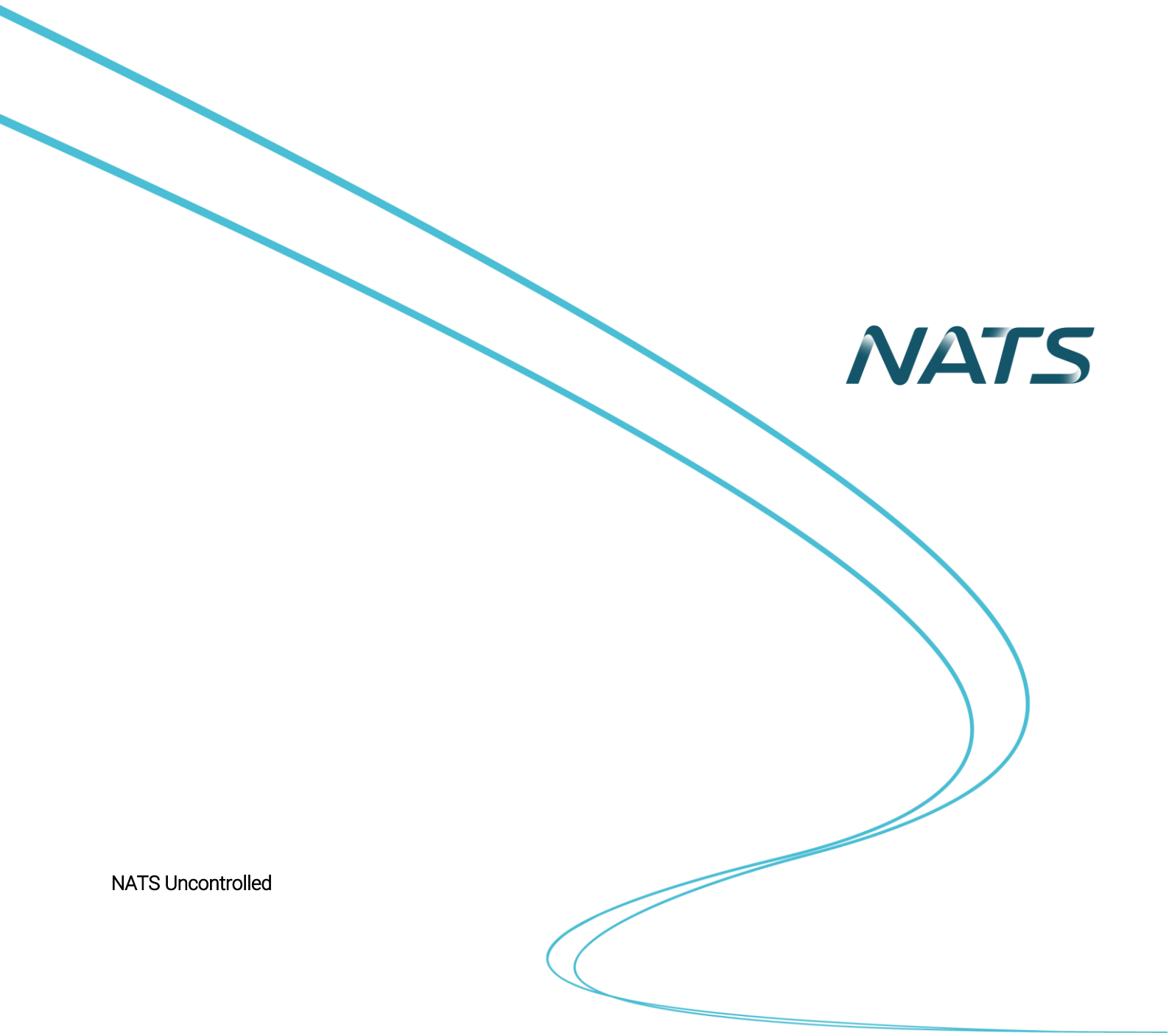
DVOR Rationalisation
Removal of En Route Dependencies
SAM and OCK batch

DVOR SAM-OCK STARs
CAP1616 Stages 1-4 Multi-Gateway

Executive Summary



NATS Uncontrolled

DVOR Rationalisation Removal of En Route Dependencies – SAM & OCK

NATS operates 46 DVORs around the UK which are going through the first batch of rationalisation; due to them operating beyond their design life and no longer being needed due to RNAV5 mandated ATS routes. Within the UK, there are several en-route 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 en-route IFP definitions require updating so that they no longer refer to the navaids scheduled to be removed.

This airspace proposal is limited to en-route IFPs, in the UK AIP, using DVORs Ockham (OCK) and Southampton (SAM) as materially important navaids. It aims to reduce dependence on this ground infrastructure without reducing en-route service. The location of SAM would be renamed as a 5-letter name code 'SAMIZ'; and OCK would become 'OKKOM'.

This proposal also contains some administrative changes for other routes on STAR charts, not impacted by the SAM/ OCK DVOR removal. These administrative changes are also included as we are taking the opportunity to reassess the ATS routes routing through SAM/ OCK; in an effort to improve the overall network in a logical manner.

A CAA-led consultation with NATMAC was completed in 2009, whereby airlines were broadly supportive with the rationalisation project. NATS reduction in expenditure was highlighted as a favourable item. We have also engaged with all relevant airports which will need to administratively update their AIP sections, in order to refer to the new 5LNCs SAMIZ and OKKOM.

NATS developed the following five Design Principles, alongside an overriding safety principle, in order to describe potential methods of removing the en-route dependencies.

Design Principle	Description
DP1 Admin	Remove unnecessary references to DVORs which are not material to the procedure
DP2 Withdraw	Some STARs are rarely used, some do the same job, some have segments in common with other STARs
DP3 Replicate	PBN Replication – replace conventional STARs/Holds with RNAV STARs/Holds
DP4 Truncate	Draft STAR Truncation Policy. When applied logically to STARs with many common segments, can result in withdrawal of unnecessary duplicate STARs. The truncated conventional STAR is always RNAV-replicated
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

NATS developed the following four airspace design options in order to facilitate the removal of the SAM and OCK en-route dependencies, and enable additional administrative changes.

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.
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 SAM/ OCK DVORs.

We evaluated the four design options and concluded that Option 2 best met the Design Principles and was progressed.

The primary objective for this proposed airspace design is to remove any en-route IFP dependencies on the SAM and OCK DVORs. This will be achieved by replacing the current connectivity using RNAV5 procedures for applicable Heathrow, Gatwick, Stansted, Luton, Southampton and Bournemouth STARs. As mentioned above, we are also proposing a few administrative changes to some ATS Routes.

A full summary of all of the proposed changes and associated impacts can be found on Pages 4 - 11 below. This includes a full list of all IFPs: their current connectivity, the proposed connectivity and the impact of the proposed change for each IFP.
There is no predicted change to flight behaviour as a consequence of this airspace change proposal. This means that there would be no change to pilot or controller behaviour (apart from using designation changes), and no change to lateral or vertical traffic dispersion. The proposed changes will also not alter route usage within the associated airspace.

For full details of the progress of this airspace change proposal, please see the CAA's online portal.

The ACP was submitted to the CAA on Friday 11th January 2019.

If the proposal is approved by the CAA, implementation of the proposed design would be implemented on the 28th February 2019.

Summary of benefits and impacts

Category	Impact
Safety/Complexity	No impact on safety or complexity
Capacity/Delay	No impact on delay
Fuel Efficiency/CO_2	No impact, there will be no change to lateral or vertical tracks
Noise – Leq/SEL	No impact, this is a Level 2C change
Tranquillity, visual intrusion (AONBs & National Parks)	No impact, this is a Level 2C change
Local Air Quality	No impact, this is a Level 2C change
Other Airspace Users	No impact, no changes to volume or classification of CAS

Impact Assessment – Heathrow OCK / TOMMO STARs

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
OCK 4B	L980 DOMUT-KATHY-HAZEL-OCK	4 Trunc 3 Rep	Trunc KATHY	L980-**KATHY 1H**:KATHY-HAZEL-OCK(INTED/ OKKOM)	L980 is common to STAR leg, no impact to connectivity. No predicted change to flight behaviour.
OCK 2C	L620 SAM-HAZEL-OCK	4 Trunc 3 Rep	Trunc HAZEL	L620-**HAZEL 1H**:HAZEL-OCK(INTED/ OKKOM)	L620 is common to STAR leg, no impact to connectivity. No predicted change to flight behaviour.
OCK 3E	DCT BILNI-KUMIL-ELDER-BEGTO-HAZEL-OCK	Originally 3 Replicate Now 2 Withdraw	Not required	Same (OCK now INTED/ OKKOM) **BILNI 1H**	Originally this was to be replicated with a name change (OCK now INTED/ OKKOM); with no impact to connectivity or predicted change to flight behaviour. This will now be withdrawn, following on from feedback from the Ops room, due to lack of usage since AD1 09/11/17.
OCK 1D	N/A HON-WOD-OCK	5 Tech Amend	Replace route (not used due to inadequate connectivity) with tactical route used today	**TOBID 1X**: TOBID-WOD-OCK (OKKOM)	This stack-swap STAR is not flight plannable. Currently there is inadequate connectivity because the vast majority of EGLL arrivals from NW route NUGRA-TOBID via the BNN 1B STAR which ***does not*** have HON on its FPL. If a stack-swap to OCK is needed in practice, controllers would tactically instruct aircraft to route TOBID-WOD-OCK, manually correcting the existing inadequate connectivity. Making this technical amendment would cause no impact to connectivity because, if used today, this FPL connection must already be manually corrected to route via TOBID. This amendment reflects current practice, reducing the manual aspect of a tactical reroute. No predicted change to flight behaviour. 'X' identifier used in order to conform with a protocol adopted in SAIP AD4 to use letters 'X, Y, Z, Q'; to demonstrate an extraordinary STAR i.e. stack-swap or contingency.

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
OCK 1A	KENET-OCK	Originally 3 Replicate Now 2 Withdraw	Not required	KENET DCT NIGIT then see next row	Originally this was going to be replicated, as per Assessment Meeting. Since then, Swanwick ops room has stated this STAR is not required. Traffic filing OCK 1A gets tactically rerouted once airborne via BEDEK OCK 2F (see next row). In 2017 it was 87% filed by BAW flights returning to Heathrow from their Cardiff maintenance base, with 8% being military arrivals from Brize Norton (5% others). These flightplans are filed because connectivity onto ATS route P2 BEDEK OCK 2F is not available directly from those departure aerodromes even though that is where they would prefer, so once airborne the tactical reroute can be applied. No impact to connectivity. No predicted change to flight behaviour.
OCK 2F	BEDEK-NIGIT-OCK	4 Trunc 3 Rep	Trunc NIGIT	P2-NIGIT 1H:NIGIT-OKKOM)	ATS route P2 is coincident with a segment of the STAR leg, no impact to connectivity. Arrivals currently flightplanning via OCK 1A (row above) are tactically rerouted onto this STAR when airborne. No predicted change to flight behaviour.
OCK 1G	BIG-DORKI-OCK	3 Replicate	Same	Same (OCK now OKKOM) BIG 1Z	Same (OCK now OKKOM), no impact to connectivity. No predicted change to flight behaviour. 'Z' identifier used in order to conform to the protocol adopted in SAIP AD4 to use letters 'X, Y, Z, Q'; to demonstrate an extraordinary STAR i.e. stack-swap or contingency.
OCK 1H	LAM-DORKI-OCK	3 Replicate	Same	Same (OCK now OKKOM) LAM 1Y	Same (OCK now OKKOM), no impact to connectivity. No predicted change to flight behaviour. 'Y' identifier used in order to conform to the protocol adopted in SAIP AD4 to use letters 'X, Y, Z, Q'; to demonstrate an extraordinary STAR i.e. stack-swap or contingency.
BIG 1G	OCK-DORKI-HILLY-BIG	3 Replicate	Same	Same (OCK now OKKOM) OKKOM 1Z	Same (OCK now OKKOM), no impact to connectivity. No predicted change to flight behaviour. 'Z' identifier designator used in order conform to the

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
					protocol adopted in SAIP AD4 to use letters 'X, Y, Z, Q'; to demonstrate an extraordinary STAR i.e. stack-swap or contingency.
WEALD 1G	OCK-DORKI-HILLY-WEALD	2 Withdraw	Not required	Not required (WEALD 1G only)	RNAV replication removes dependency from all VORs, so procedures for VOR u/s are no longer relevant
All TOMMOs	Equivalent to OCK arrivals	2 Withdraw	Not required	Not required (all TOMMOs)	
OTMET 1H	N17 OTMET – SOKDU – NEDUL – BEGTO – HAZEL – LL201 - OCK	1 Admin	Rename to OTMET 2H	Same – OTMET 2H	No impact to connectivity, or change to flight behaviour. Up-numbered to reflect renaming of OCK to OKKOM.

Impact Assessment – Gatwick WILLO STARs

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
WILLO 3A	L620 SAM – -GWC[1]-HOLLY – WILLO	4 Trunc 3 Rep	Trunc GWC	Y8-GWC 1G: GWC -HOLLY-WILLO	Y8 is common to STAR leg, no impact to connectivity. No predicted change to flight behaviour.
WILLO 4C	L980 DOMUT – KATHY – AVANT – GWC – HOLLY – WILLO	4 Trunc 3 Rep	Trunc ABSAV	L980-ABSAV 1G: ABSAV-AVANT-GWC-etc	L980 is common to STAR leg, no impact to connectivity. No predicted change to flight behaviour.
WILLO 3D	DCT BILNI – KUMIL – AVANT – GWC – HOLLY – WILLO	Originally 3 Replicate Now 2 Withdraw	Not required	Same BILNI 1G	Originally this was going to be replicated however Swanwick Ops room has stated that this STAR is not required. It has not been flown since November 2017. No impact to connectivity. No predicted change to flight behaviour.
ASTRA 3A 4C 3D	Contingency, equivalent to WILLO arrivals	2 Withdraw	Not required	Not required	RNAV replication removes dependency from all VORs, so procedures for VOR u/s are no longer relevant. These have been withdrawn during the timeframe of this project.

Impact Assessment – Gatwick SAM SIDs

Current IFP	Current route Connectivity/ SID	Design principle	How	Proposed route Connectivity/ STAR	Impact of proposed change on connectivity Impact of proposed change on flight behaviour
SAM 3P	Fly the DET VOR 260 radial before turning onto the SAM 068 VOR radial to SAM	1 Admin	Rename as SAMIZ 3P	Fly the DET VOR 260 radial before turning onto the SAM 068 VOR radial to SAMIZ	No impact to connectivity. No predicted change to flight behaviour.
SAM 3W	Fly the DET VOR 260 radial before turning onto the SAM 068 VOR radial to SAM	1 Admin	Rename as SAMIZ 3W	Fly the DET VOR 260 radial before turning onto the SAM 068 VOR radial to SAMIZ	No impact to connectivity. No predicted change to flight behaviour.

[1] If the GWC work package is implemented at the same time as SAM/ OCK, GWC will change to a 5LNC 'POZAR' e.g. GWC 1G will become POZAR 1G

Impact Assessment – Stansted and Luton LOREL STARs

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
LOREL 4C	L980 AVANT-OCK-VATON-BPK-BKY-BUSTA-LOREL	3 Replicate	Same (RNAV5)	Same (OCK now OKKOM) AVANT 1L	Same (OCK now OKKOM), no impact to connectivity. No predicted change to flight behaviour.
LOREL 2D	L620 GIBSO-BEGTO-AVANT-OCK-VATON-BPK-BKY-BUSTA-LOREL	2 Withdraw	No longer required	Add ATS route (draft designator L89) GIBSO-BEGTO-AVANT then use replicated LOREL 4C via AVANT (previous row)	No impact to connectivity – ATS route instead of STAR segment. No predicted change to flight behaviour.
LOREL 2S	P2 BEDEK-NIGIT-OCK-VATON- BPK-BKY-BUSTA-LOREL	3 Replicate	Same (RNAV5)	Same (OCK now OKKOM) BEDEK 1L	Same (OCK now OKKOM), no impact to connectivity. No predicted change to flight behaviour.
ASKEY 4C 2D 2S	N/A As per LOREL 4C 2D 2S	2 Withdraw	No longer required	No longer required	RNAV replication removes dependency from all VORs, so procedures for VOR u/s are no longer relevant

Impact Assessment – Southampton and Bournemouth SAM / NEDUL STARs

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
SAM 2A	N859 NEDEX-KIDLI-CPT-PEPIS-SAM	2 Withdraw	No longer required	Via ATS routes and 5th row below, or ATS routes & 3rd row below	Rarely used. Options continue to be available for connectivity assurance – no impact. No predicted change to flight behaviour.
SAM 1C	Q41 WCO-PEPIS-SAM	4 Trunc 3 Rep	Trunc COWLY	Q41-COWLY 1S-PEPIS-SAMIZ (was SAM)	Q41 realigned SILVA-COWLY on 9 Nov 2017, now common to STAR leg. Removes a FPL DCT from ATS routes to WCO which used to be "orphaned", no impact to connectivity. No predicted change to flight behaviour.
SAM 1F	Q63 KENET-CPT-PEPIS-SAM	4 Trunc 3 Rep	Trunc CPT	Q63-CPT 1S-PEPIS-SAMIZ (was SAM)	Q63 is common to STAR leg, no impact to connectivity[2]. No predicted change to flight behaviour.
SAM 2D	N20, M8 ELDAX – NOTGI – EVEXU – GIVUN – RUDMO – MIVLA - SAMIZ	1 Admin	Rename to ELDAX 1S	Same – ELDAX 1S	No impact to connectivity, or change to flight behaviour. 'S' designator used in order to adhere to CAA request to name the Route Indicator after the destination airport (S – Southampton).
UMBUR 1S	M40 UMBUR – OCK – PEPIS - SAM	1 Admin	Rename to UMBUR 2S	Same – UMBUR 2S	No impact to connectivity, or change to flight behaviour. 'S' designator used in order to adhere to CAA request to name the Route Indicator after the destination airport (S – Southampton). Up-numbered to reflect renaming of SAM and OCK.
SAM 1G	*L8 HON-BAMBO-EVSEM-RISIN-NUBRI-PEPIS-SAM*	*2 Withdraw*	*No longer required*	*L8 extended HON-NANUM-BUGUP*	*No impact to connectivity – ATS route instead of STAR segment. No predicted change to flight behaviour.*
SAM 1E	*L151 PEPUL-MOVEN-BAMBO-EVSEM-RISIN-NUBRI-PEPIS-SAM*	*5 Tech Amend*	*Trunc BAMBO BAMBO renamed "BUGUP" Remove EVSEM Redraw PANS-*	*L151-Y322-BUGUP1S-RISIN-NUBRI-PEPIS-SAM (SAM now* SAMIZ, *BAMBO now BUGUP)*	*For legacy reasons lost in time, this B-RNAV STAR is not flyable in its current state due close proximity of waypts EVSEM and RISIN combined with 'flyover' definitions instead of 'flyby'. Removing waypt EVSEM from that segment of the STAR, combined with converting all waypts to 'flyby' definitions, corrects the STAR into what it should always*

[2] This portion of the ATS route has been redesignated from L9 to Q63 as part of the ACP known as SAIP AD4, no connectivity impact. The AIS data reflects these wider proposed changes.

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
			OPS to RNAV5		*have been and as it would be flown today.* *No connectivity impact, or change to flight behaviour.*
Original framework briefing had SAM 1E withdrawn and SAM 1G truncated/replicated, this has since been reversed but with precisely the same result (including the ATS route connectivity where L8 would be extended HON NANUM BUGUP).					
NEDUL 1A	Q41/Y110 THRED-NEDUL	3 Replicate	Same (RNAV5)	Same THRED1S	No impact to connectivity, or change to flight behaviour.

Impact Assessment – ATS Route Re-designations

Current Route Name	Current Route	Proposed Route Name	Proposed Route	Notes	Impact of proposed change on connectivity Impact of proposed change on flight behaviour
L8	HON – STAFA …	Same	L8 BUGUP – NANUM - HON – STAFA	Extended L8 – provides connectivity to respective EGHI/ HH STARs	This will replace connectivity for the former SAM 1G STAR
N/A	N/A	L89	GIBSO – BEGTO – AVANT	New ATS route – provides connectivity to respective EGLC/ MC STARs	This will replace current DCTs to AVANT from GIBSO
N/A	N/A	Y322	PEPUL – - BUGUP	New ATS route – provides connectivity to respective EGHH/ HI STARs	This will replace connectivity for the former SAM 1E and SAM 2A STARs