NATS

Performance through Innovation

Swanwick Airspace Improvement Programme (L5250): Airspace Deployment 1

Airspace Change Proposal

Prepared by:

[redacted]

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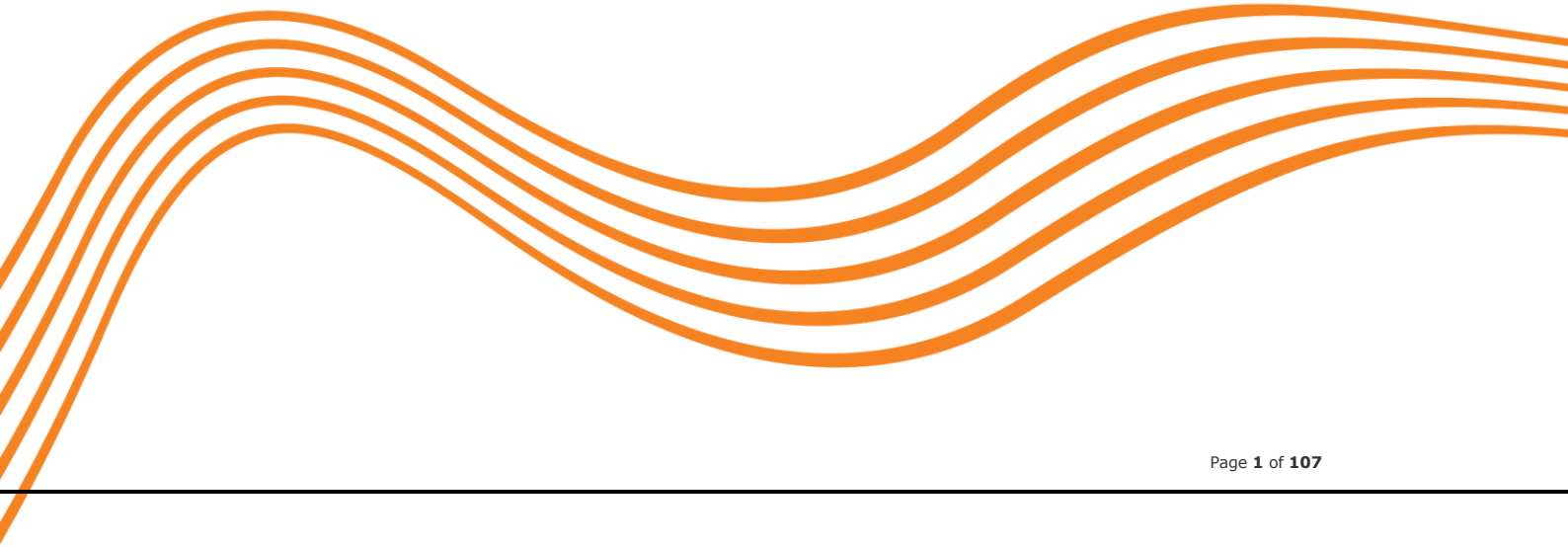

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Introduction

1.1 Overview

This is a proposal to introduce systemised RNAV-1 ATS routes and RNAV-1 STARs for Heathrow, Gatwick, Luton, Stansted, Northolt, Cambridge, Birmingham and East Midlands traffic that route via the Swanwick WOR sectors to the south-west of the London TMA. As such this proposal will refer to traffic to/from the south-west however it is accepted that some of this traffic may originate from the west and south.

In addition to these new ATS Routes and STARs the proposal also includes formalising a 'stack swap' for Gatwick arrivals from the east.

1.2 Justification

NATS is obligated under the terms of its licence to update the airspace infrastructure. Performance Based Navigation (PBN) offers significant operational and environmental benefits through systemisation of the ATM operation.

This proposal intends to capitalise on these benefits, delivering increased predictability and improved flight profiles for operators through the introduction of RNAV-1 designated ATS routes and STARs whilst maintaining access to RNAV-5 routes for those few aircraft which are not suitably equipped.

The aim is to segregate flows of traffic by establishing RNAV-1 ATS routes and STARs which are spaced according to CAA route spacing guidelines for RNAV-1 routes published in CAP1385. Precise details and justifications will be given in the relevant sections. These changes will utilise modern aircraft navigation capability to reduce controller workload, shorten routes and raise level caps.

Controlled airspace containment is in line with current guidance. Where in specific instances reduction in standard containment is sought, mitigations and justifications are given in the SAIP AD1 Route Spacing Assurance Document (RSAD).

1.3 Design Principles

- Provide a separated route structure using the RNAV-1 navigation standard
- Improve flight profiles (height and track length)
- Maintain access for non RNAV-1 equipped aircraft
- No changes to routes or tracks at or below 7000ft
- No increase in the volume of Controlled Airspace (CAS)
- No impact on GA operations
- No adverse impact on military operations

1.4 Benefits

- Reduce CO2 (contribute to the RP2 fuel saving target)
- Introduce systemisation
- Reduce controller workload
- Provide known radio failure procedures for stack swapping
- Improve flight profiles (both lateral and vertical)

2 Current Airspace Description & Operations

2.1 Description of the Airspace

2.1.1 STARs

Gatwick

Current Gatwick STARs into WILLO from the south-west are illustrated in the STAR Chart at Figure 1. They are shown in Figure 2, overlaid on a density plot of aircraft tracks (sample: 01/06/16 to 14/06/16).

Figure 3 illustrates the Gatwick TIMBA1C (stack-swap) STAR which commences at the Goodwood DVOR (GWC).

Gatwick inbound aircraft stack-swapping to WILLO from the east currently have no formalised route and instead are handled tactically as and when required. There is therefore no current chart to illustrate the route. This proposal intends to formalise this tactical operation by introducing a stack-swap STAR from the east which will provide greater predictability in the event of a radio failure during a swap between the two Holds.

Heathrow & Northolt

Figure 4 reproduces the Heathrow OCK STAR chart for inbound aircraft from the south-west, whilst Figure 5 shows a density plot for these arrivals over the same date period as for Figure 2.

Luton, Stansted & Cambridge

This change will introduce a new RNAV-1 STAR into the LOREL hold for Luton, Stansted and Cambridge airports, from the south-west.

Figure 6 reproduces the current LOREL STAR chart for inbound aircraft from the south-west, whilst Figure 7 illustrates a track plot for Luton, Stansted and Cambridge arrivals from the south-west for a week in June 2016. The current STARs will remain to be used by RNAV-5 equipped aircraft.

2.1.2 ATS Routes

This ACP will only detail the current routes in use where they are directly affected by a proposed change. There are too many possible combinations of routes to consider them all for every aspect of the proposal. Where appropriate the application of CAP1385 is explained.

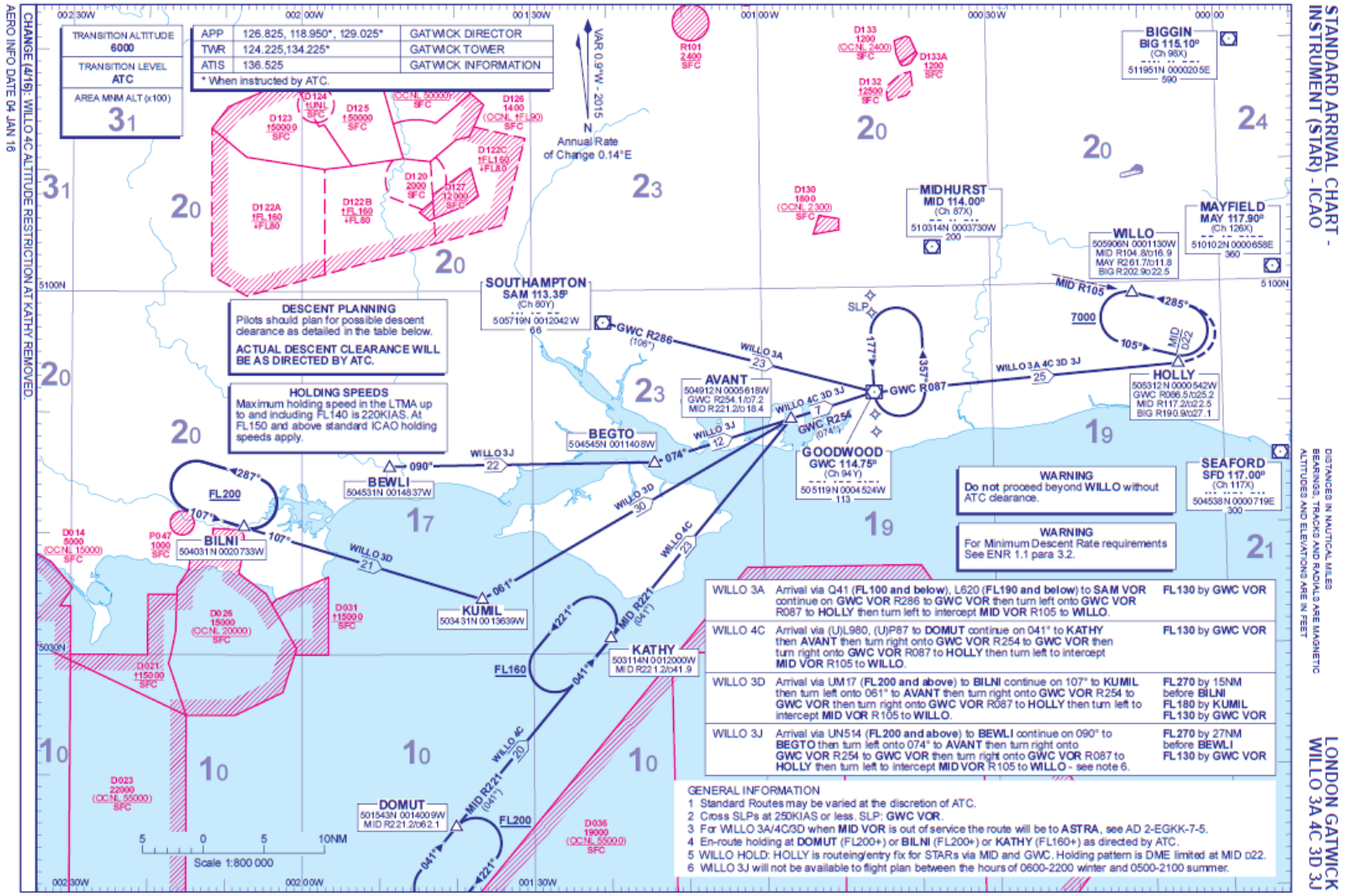

Figure 1: Gatwick WILLO STARS from the south-west (UK AIP)

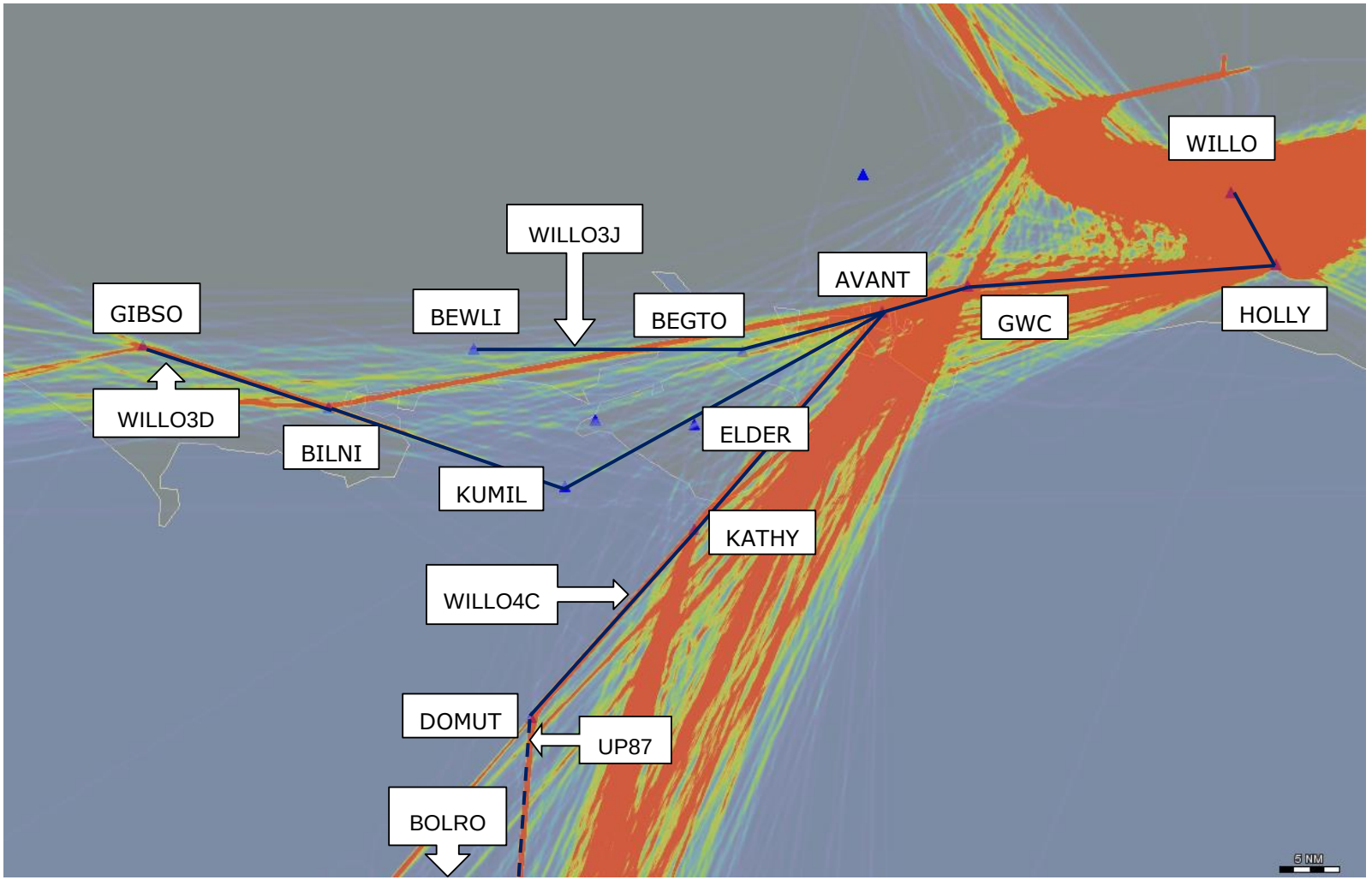

Figure 2: Gatwick WILLO STARS from the south-west (overlaid tracks – density plot)

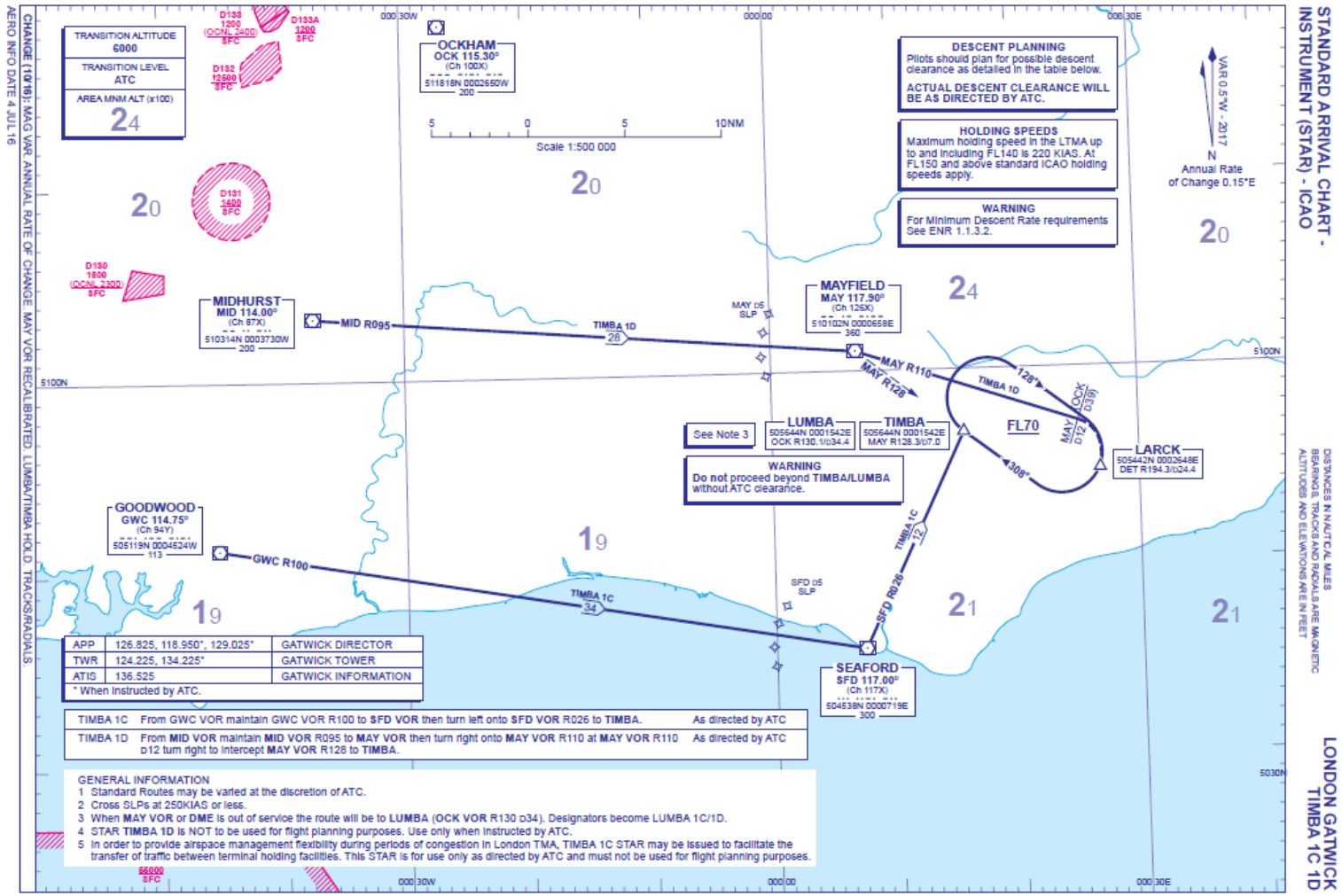

Figure 3: Gatwick TIMBA1C STAR from the west (UK AIP)

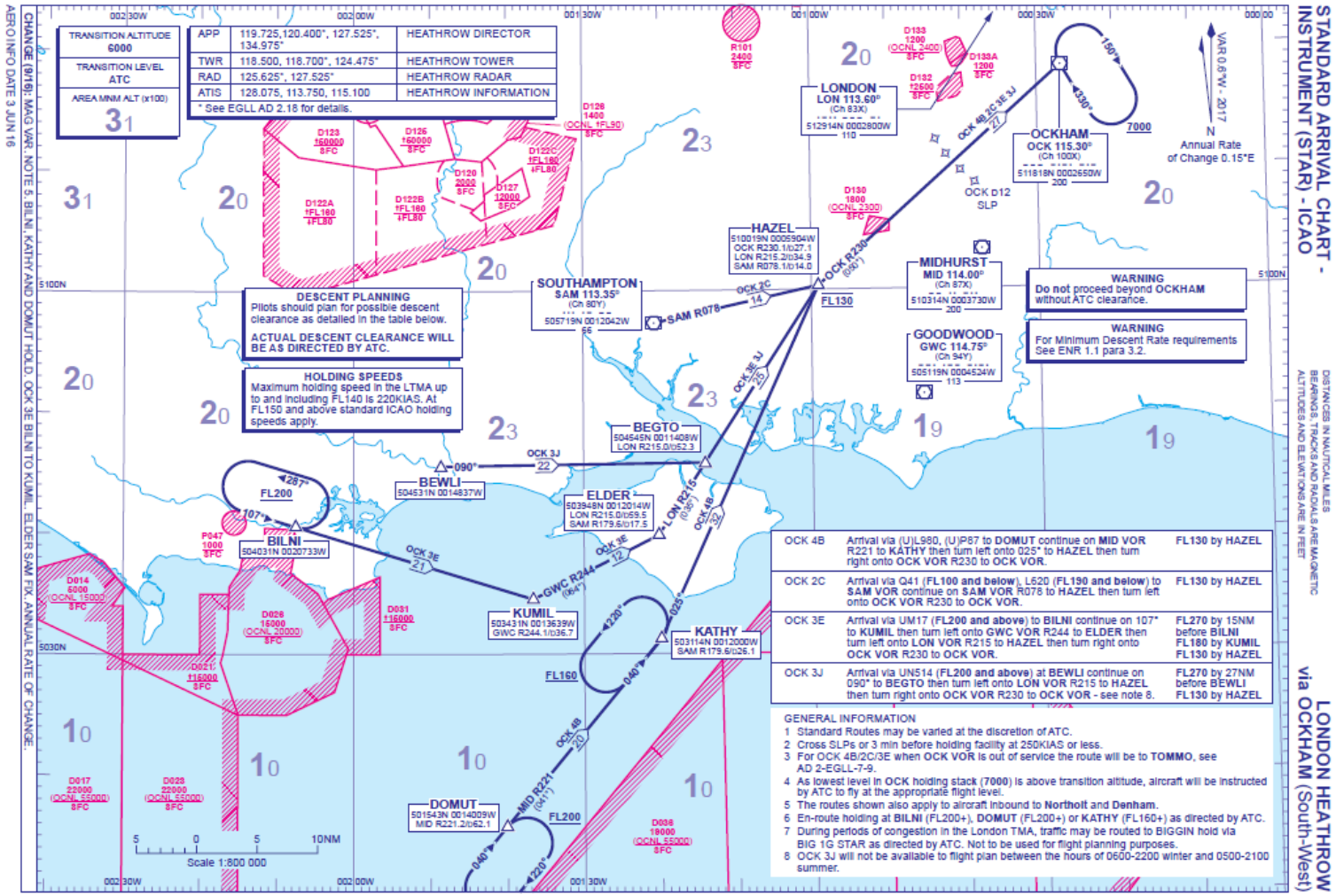

Figure 4: Heathrow OCK STARs from the south-west (UK AIP)

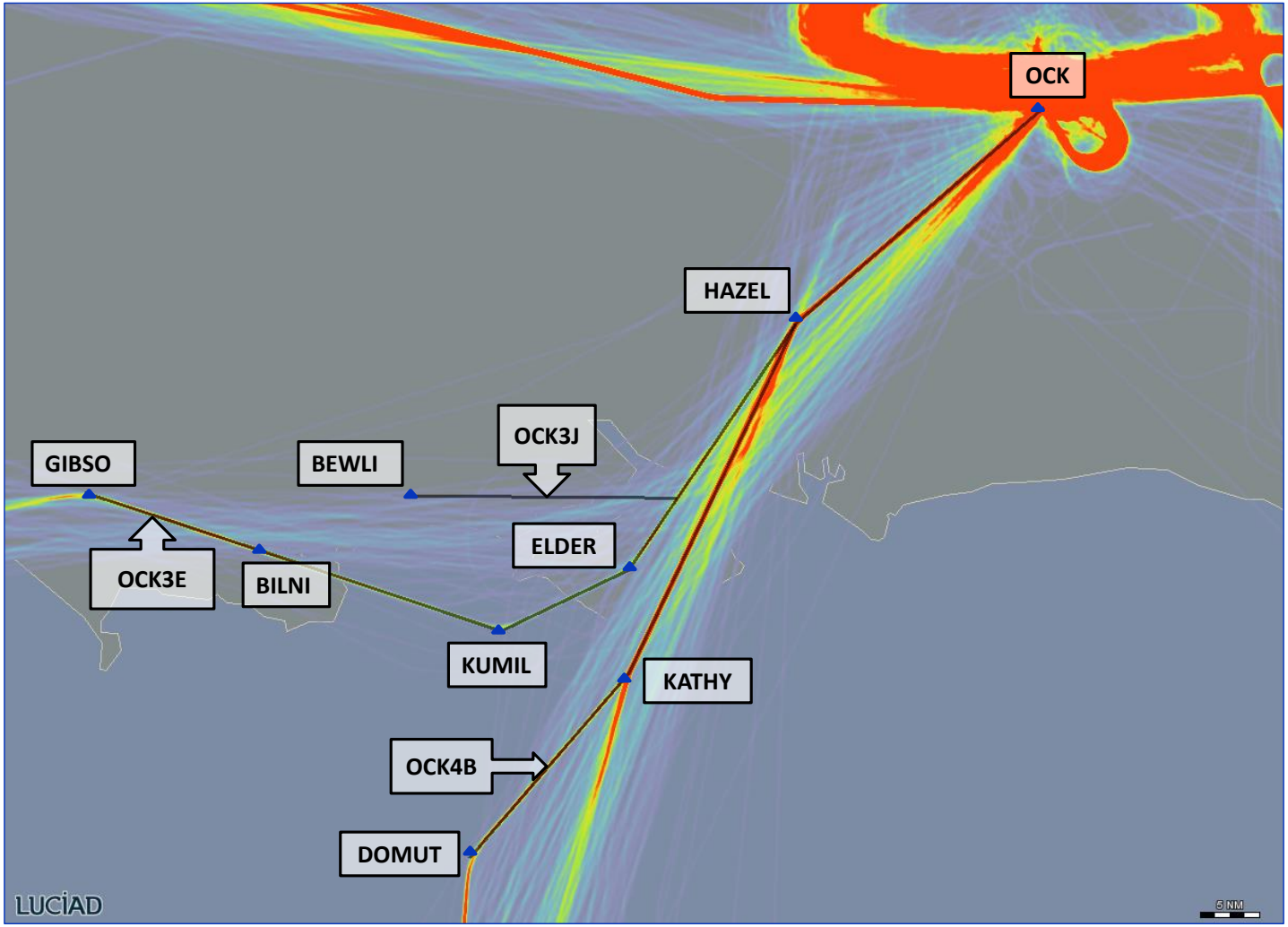

Figure 5: Heathrow OCK STARs from the south-west (overlaid tracks – density plots)

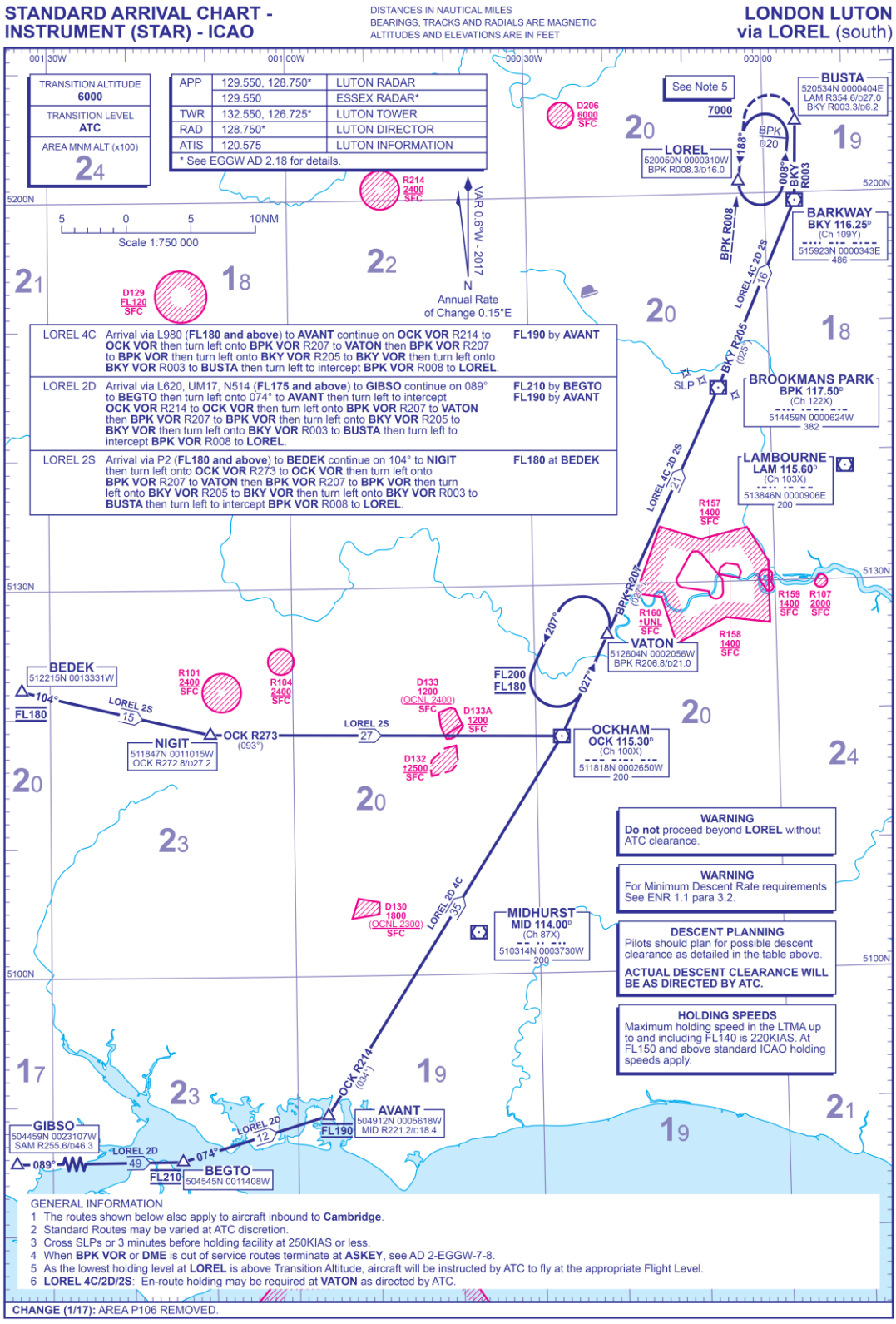

Figure 6: Luton LOREL STARs from the south-west (UK AIP)

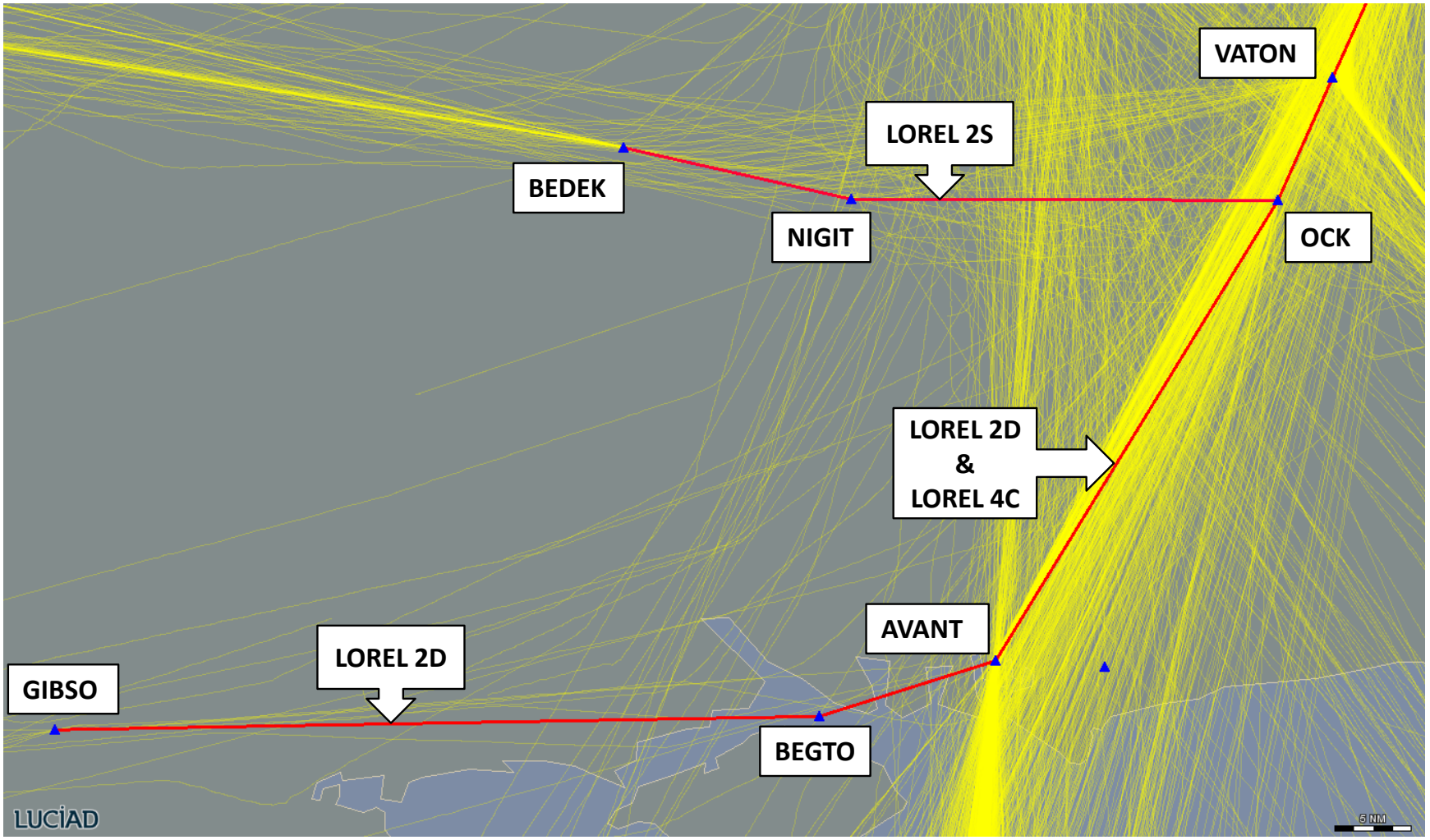

Figure 7: LOREL STARs from the south-west (overlaid on tracks for Stansted, Luton & Cambridge)

2.2 Air Traffic Operations

2.2.1 Inbound traffic

Traffic from the South-West

The majority of Gatwick arrivals from the south-west use the WILLO 4B STAR (see Figure 2). They flight plan either via CDR (U)P87 from BOLRO or (U)L980 from ORTAC on the FIR boundary to DOMUT where the STAR begins. From the density plots shown in Figure 2 it is clear that majority of these arrivals are vectored or given tactical directs from BOLRO/ORTAC towards KATHY, AVANT or GWC with very few being left to route via DOMUT.

Note: BOLRO lies on the FIR boundary and is approximately 12nm South of DOMUT. It is indicated but not shown on the preceding maps.

Similarly, Heathrow arrivals (see Figure 5) on the OCK 4B arrival also flight plan via (U)L980 and (U)P87 and are likewise vectored or sent direct from the area of BOLRO/DOMUT generally towards KATHY or HAZEL. Gatwick and Heathrow arrivals share the same flight planned route as far north as KATHY.

The positioning of Gatwick and Heathrow arrivals requires careful monitoring and timely ATC instructions to ensure aircraft are positioned appropriately against each other and against the surrounding danger areas and neighbouring sectors. This type of intervention typically results in high RT loading as multiple heading changes and stepped descents are required.

Luton, Stansted and Cambridge arrivals (as illustrated in Figure 7) predominantly route via DIKRO and flight plan (U)N863 to AVANT where the LOREL4C STAR starts. (U)N863 from DIKRO to AVANT is also used by inbounds to Birmingham and East Midlands. The simultaneous arrival of these aircraft requires controllers to tactically intervene and split aircraft onto parallel headings. As Luton, Stansted and Cambridge arrivals share the same route as Birmingham and East Midlands arrivals a penalising level cap of FL340 is required to ensure that Luton, Stansted and Cambridge arrivals are generally positioned underneath Birmingham and East Midlands arrivals. Birmingham and East Midlands arrivals are level capped at FL360.

The result of the tactical intervention by ATC in this area results in a swathe of arrivals for Heathrow, Gatwick, Luton, Stansted, Birmingham and East Midlands which spreads east from DOMUT. ATC position the traffic this way with the aim of separating the Heathrow and Gatwick arrival flows to tactically reduce track mileage and complexity.

The intention of this proposal is to replicate this tactical behaviour. By utilising the proposed RNAV-1 route structure aircraft will self-position and the requirement for controllers to intervene will be significantly reduced. This will reduce pilot and controller workload, result in fewer stepped descents, enable level caps to be raised and reduce flight planned track mileage.

Traffic from the West

Figure 2 and Figure 5 illustrate that few arrivals using the WILLO 3D for Gatwick or the OCK 3E for Heathrow from the west are left on the entirety of the published STARs with most being vectored or routed direct from GIBSO/BILNI towards BEGTO/AVANT. This is a result of controller intervention for two reasons. GIBSO is a conflict point where westbound LTMA departures via (U)L620 meet eastbound LTMA arrivals. In order to de-conflict these flows ATC intervention is required to position the eastbound arrivals south of GIBSO and the westbound departures north of GIBSO. Secondly, the flight-planned route for the Heathrow and Gatwick inbounds is excessively long. The route length does not assist in resolving conflictions between aircraft. If there are no conflictions then aircraft are sent direct to GWC.

The number of Luton, Stansted and Cambridge arrivals from the west via GIBSO is minimal as the majority of this traffic routes via BEDEK (see Figure 7).

The Gatwick stack swap STAR from the west (TIMBA 1C, Figure 3) is always managed on a tactical basis, generally sending aircraft direct to SFD and then into the TIMBA hold or direct to TIMBA. Stack-swaps are only occasionally used (estimated use at once or twice per day) with aircraft being no lower than FL120 and more usually FL140 and FL150, until they are sent direct to SFD/TIMBA. The TIMBA 1C from GWC is never flown in its entirety but serves as a radio failure, fall back procedure (i.e. in the event of R/T fail it is expected the aircraft will fly the published procedure).

Traffic from the East

Gatwick traffic stack-swapping from the east (TIMBA Hold) into the WILLO Hold is currently handled on a tactical basis only and has no published procedure associated with it. Aircraft are routed direct to the hold as soon as possible after being given an initial heading towards the south-west.

In the event of Radio Failure during this period of flight the exact track flown and/or the intentions of the flight crew are not known and significantly less predictable than if a formal published procedure was being followed thereby increasing controller workload when, by definition, it is already busy enough to require stack swapping to occur.

2.2.2 Outbound Traffic (South-West)

The most common departure route to the south-west for London TMA outbounds is via the Southampton DVOR (SAM). At SAM the routes split. Aircraft operators either flight plan via (U)L620 to GIBSO or (U)N621 to the south (via KAPEX) to exit the London FIR at LELNA or LORKU. Stansted, Birmingham and East Midlands departures are able to flight plan UN63 (KAPEX-LORKU) for a slightly shorter flight planned route. See Figure 8.

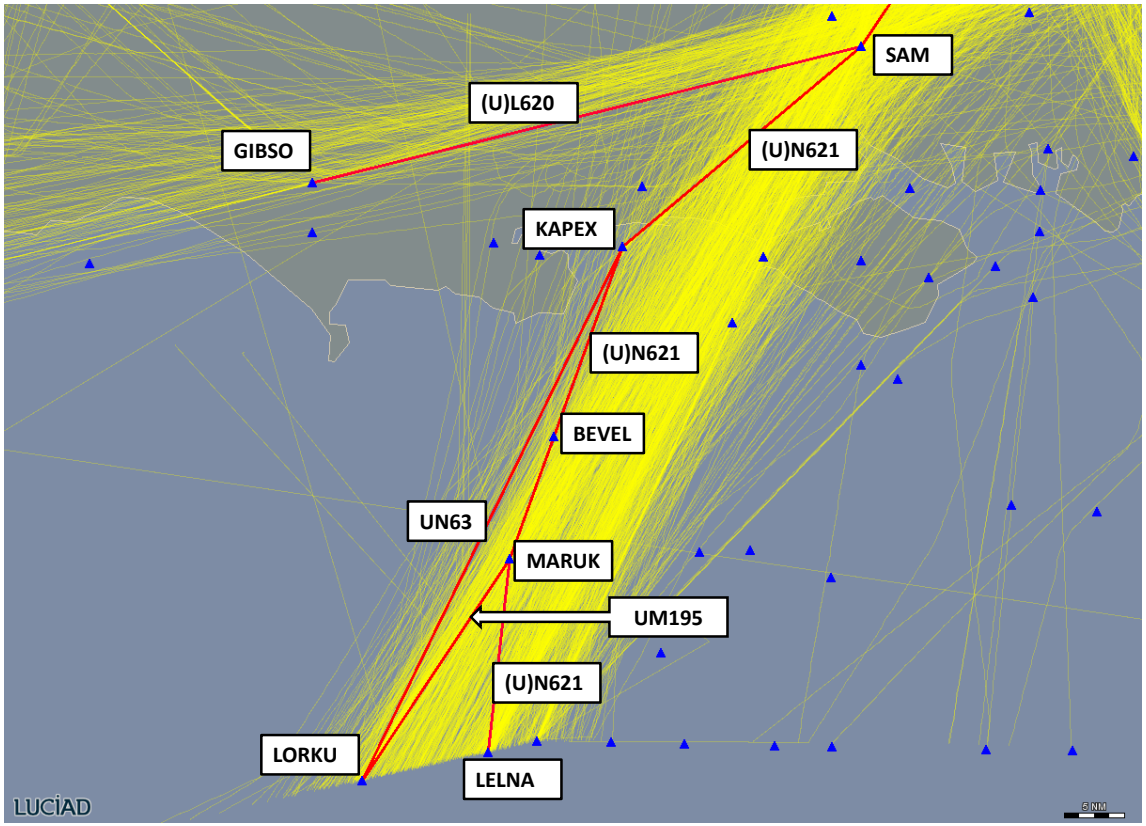

Figure 8: LTMA Outbound Routes to southwest via GIBSO & KAPEX (two days of LTMA outbound tracks)

2.3 Traffic Figures

Table 1 details the total traffic figures for the OCK, WILLO and LOREL arrivals and departures via GIBSO and KAPEX to/from the south-west. It is broken down by STAR and by departure route.

There are no figures for the stack-swap traffic into WILLO from the east as this is not a formalised route. Whilst the stack-swap STAR from the south-west into TIMBA does exist it cannot be flight planned and is rarely issued to pilots. The stack-swap is nearly always handled tactically, so no figures are given.

Traffic Flow	Movements (July 2015 -June 2016)
OCK 3J Arrivals	24
OCK 3E Arrivals	3,679
OCK 4B Arrivals	15,333
WILLO 3J Arrivals	341
WILLO 3D Arrivals	8,309
WILLO 4C Arrivals	36,711
LOREL 2D Arrivals	724
LOREL 4C Arrivals	25211
LTMA Deps. SAM - GIBSO	11227
All Deps. SAM - KAPEX	46443
LTMA Deps. SAM – KAPEX – LELNA	26133
SS/NX/BB Deps. SAM – KAPEX – LORKU	8902

Table 1: Total Traffic Movements over a 12 Month Period

2.4 Operational Efficiency, Complexity, Delays & Choke Points

The current route structure does not effectively separate the key traffic flows, relying instead on tactical ATC positioning to do so. Similarly the stack-swap process relies almost entirely on tactical vectoring and ad hoc coordination between controllers.

The sectors concerned do not currently cause significant delay, however if traffic levels continue to increase in the future, and the increase in traffic to Iberian destinations continues then this may become a delay hotspot.

2.5 Environmental Considerations

2.5.1 Fuel Burn/CO2

Figure 2, Figure 5 and Figure 7 demonstrate that tactical positioning is regularly used to provide more direct routes. Very few aircraft fly the full flight planned route, bypassing DOMUT and AVANT from the south and BILNI and KUMIL from the west.

The flight planned route in each case is therefore longer than the route regularly flown, resulting in unnecessary additional fuel uplift. This proposal will reduce the flight planned mileage and will more closely match the actual flight profiles flown today. Therefore, the fuel uplift requirement and subsequent fuel burn and CO_2 output will reduce.

Table 2 gives a comparative track length analysis in nautical miles for the most utilised OCK, WILLO and LOREL STARs, averaging end to end flight distance for the aircraft on each STAR and comparing them to the new proposed STARs (detailed in the next section of this document). It illustrates a significant improvement when taken across the large numbers of flights filing the routes and STARs in question.

Traffic Flow	Current Average Track Miles Per Flight (NM)	AD1 Average Track Miles Per Flight (NM)	AD1 Average Track Saving per Flight (NM)
OCK 3E	4236.3	4231.3	5.1
OCK 4B	1196.7	1195.4	1.4
WILLO 3D	3149.9	3147.4	>2
WILLO 4C	939.0	931.8	>5
LOREL 4C	885.7	884.9	0.7

Table 2: Average Track Mileage comparison for the most utilised OCK, WILLO & LOREL STARs

2.5.2 Noise

The STARs in this proposal descend traffic into the WILLO, OCK and LOREL holds at the minimum usable stack flight level; which is always the equivalent of 7000ft amsl or higher.

As such the proposed changes to the STARs will affect traffic flows above 7000ft and these therefore should not fall under the DfT height based priorities for consideration of local noise.

Similarly the proposed holds operate at FL70 and above as the lowest useable level, which will always be above 7000ft (the lowest usable level becoming FL80 on low pressure days) and therefore always above the DfT level for noise considerations.

The stack swap STARs are no lower than 7000ft at the holds but the transfer of traffic between the stacks occurs at a height no lower than FL120 for operational reasons and more usually FL140 and FL150. See Section 3.2.3.

2.6 Safety

There are no specific, extant safety issues to be addressed in this area. Formalising the WILLO stack swap procedure from the east will give increased certainty to the radio failure procedure for aircraft engaged in a stack-swap.

3 Proposed Airspace Description

3.1 Holds

New holds in this context are RNAV holds created to replicate and exist alongside conventional holds.

3.1.1 New and Revised Holds

3.1.1.1 New Holds

Airfield	Holding Fix	Navigation Specification
EGKK	WILLO	RNAV
EGLL/WU	OCK	RNAV
EGGW/SS/SC	LOREL	RNAV
En-route	KATHY	RNAV
En-route	BILNI	RNAV
En-route	DOMUT	RNAV
En-route	VATON	RNAV

3.2 STARs

STAR changes are listed below as 'new', 'revised' or 'withdrawn' and encompass the following airports: Heathrow, Northolt, Gatwick, Luton, Stansted and Cambridge.

The new STARs have been designed to meet the RNAV-1 design criteria. NATS is currently impact assessing the designation of these STARs in line with ICAO/EASA criteria (i.e. their designation being based on the initial waypoint of the STAR). This is included as an option with the route letter proposed being unique to the destination airfield: H for Heathrow, G for Gatwick and L for LOREL (Luton, Stansted and Cambridge) arrivals.

An alternative designator utilising the clearance limit (in brackets) is also provided should the proposed designator convention not be considered appropriate by either NATS or the CAA, or a decision for which to use does not fit within the timescales for this deployment.

Revised STARs are those which require changes to the expected descent planning level to match the rise in level restrictions introduced by the new RNAV-1 STARs.

Some night time only STARs have been withdrawn if they are replaced by a more appropriate new H24 STAR which is shorter or very similar length.

3.2.1 New, Revised and Withdrawn STARs

3.2.1.1 Gatwick

New STARs

New STARs	Function
AMDUT 1G (WILLO 1M)	Stack Swap
ARNUN 1G (WILLO 1N)	Stack Swap
VASUX 1G (WILLO 1Z)	Flight plannable STAR See SAIP AD1 RSAD for details pertinent to the design of this STAR and its spacing in relation to D037, CAS boundaries and the ROXOG 1H (OCK 1Z) STAR
OTMET 1G (WILLO 1Y)	Flight plannable STAR
TELTU 1G (TIMBA 1E)	Stack Swap

Revised STARs

Revised STARs		
Current Designation	**New Designation**	**Change**
WILLO 4C	n/a	Route connectivity from (U)L980 only.
WILLO 3D	n/a	Expect FL180 level by KUMIL replaced with FL210 level by KUMIL. Route connectivity from (U)L620 only.
ASTRA 4C	n/a	Route connectivity from (U)L980 only.
ASTRA 4D	n/a	Expect FL180 level by KUMIL replaced with FL210 level by KUMIL. Route connectivity from (U)L620 only.

Withdrawn STARs

Withdrawn STAR	Alternative
WILLO 3J	OTMET 1G (WILLO 1Y)
ASTRA 3J	OTMET 1G (WILLO 1Y)

3.2.1.2 Heathrow/Northolt

New STARs

New STARs	Function
ROXOG 1H (OCK 1Z)	Flight plannable STAR See SAIP AD1 RSAD for details pertinent to the design of this STAR and its spacing in relation to ATS route Z171 and ATS route (U)P87.
OTMET 1H (OCK 1Y)	Flight plannable STAR

Revised STARs

Revised STARs		
Current Designation	**Proposed New Designation**	**Change**
OCK 4B	n/a	Route connectivity from (U)L980 only
OCK 3E	n/a	Expect FL180 level by KUMIL replaced with FL210 level by KUMIL. Route connectivity from (U)L620 only
TOMMO 4B	n/a	Route connectivity from (U)L980 only
TOMMO 3E	n/a	Expect FL180 level by KUMIL replaced with FL210 level by KUMIL. Route connectivity from (U)L620 only

Withdrawn STAR

Withdrawn STARs	Alternative
OCK 3J	OTMET 1H (OCK 1Y)
TOMMO 3J	OTMET 1H (OCK 1Y)

3.2.1.3 Luton/Stansted/Cambridge

New STARs

New Star Designation	Function
TELTU 1L (LOREL 1Z)	Flight plannable STAR See SAIP AD1 RSAD for details pertinent to the design of this STAR and its spacing in relation to ATS route (U)M184

Withdrawn STARs

Withdrawn STARs	Alternative
LOREL 2M	LOREL 2L
ASKEY 2M	ASKEY 2L
LOREL 2N	LOREL 1B
ASKEY 2N	ASKEY 1B
LOREL 2P	LOREL 1B
ASKEY 2P	ASKEY 1B

3.2.2 Proposed STAR Designs – Flight Plannable STARs

3.2.2.1 Design and Illustrations

The proposed designs for the non-stack swap RNAV-1 STARs into WILLO, OCK and LOREL from the south-west are shown in Figure 9 through to Figure 14. These STARs are offered as an alternative to the existing conventional STARs which will remain in place until RNAV STARs are drawn up to replace all conventional STARs, or when existing conventional STARs are deemed as being no longer required.

Figure 9 and Figure 11 show the proposed WILLO and OCK STARs overlaid on current aircraft tracks (as density plots), whilst Figure 13 illustrates the proposed LOREL STAR overlaid onto current aircraft track plots.

For the OCK, WILLO and LOREL STARs the lowest usable level for the hold at which each STAR terminates is FL70. Each new OCK and LOREL STAR merges onto the same route as the existing STARs where aircraft are approximately at FL140. The new WILLO STARs converge with the existing WILLO STARs at HOLLY. Aircraft are not at or below 7000ft until after reaching HOLLY. Therefore, we have assessed these proposed STARs as fulfilling the DfT criteria of 'no change at or below 7000 feet' and therefore outside of the scope for noticeable noise change analysis along the route.

3.2.2.2 STAR Use and Justification

Gatwick:

It can be seen from Figure 9 that the proposed OTMET 1G (WILLO 1Y) and VASUX 1G (WILLO 1Z) STAR designs place the new routes within the lateral boundaries of the current spread of inbound tracks Figure 10 illustrates that the majority of aircraft are entering the hold today at FL120 and above (the area in which the majority are reaching FL120 is circled in black). It is not anticipated that the proposed change will alter this.

This STAR offers a small but not insignificant reduction (see Table 2) not only in flight planned route but potentially in actual route flown as whilst many aircraft are given tactical direct routings many still fly the planned route to AVANT and/or GWC (see Figure 10). They are now more likely to fly the new route.

The level restriction for Gatwick arrivals routeing via NEDUL or KUMIL has been raised from FL180 to FL210. This is a significant benefit over the existing level restriction.

Heathrow:

It can be seen from Figure 11 that the proposed ROXOG 1H (OCK 1Z) and OTMET 1H (OCK 1Y) STAR designs place the routes within the boundaries of the current inbound tracks, whilst Figure 12 illustrates that based on today's traffic the majority of aircraft are FL140 at or abeam HAZEL.

These STARs also offer a small but not insignificant reduction (see Table 2) not only in flight planned route but potentially in actual route flown as whilst many aircraft are given tactical direct routings many still fly the planned route via GIBSO and KUMIL from the west and via DOMUT and KATHY from the south (see Figure 12).

The level restriction for Heathrow arrivals routeing via NEDUL or KUMIL has been raised from FL180 to FL210. This is a significant benefit over the existing level restrictions.

Luton, Stansted and Cambridge:

Again, it can be seen from Figure 13 that the proposed TELTU 1L STAR design is placed within the boundaries of the current inbound tracks, whilst Figure 14 illustrates that based on today's traffic the aircraft are FL140 a little before BPK, well after the current and proposed routes connect at the common point VATON.

This STAR also offers a marginal reduction in mileage (see Table 2) not only in flight planned route but potentially in actual route flown as whilst many aircraft are given tactical direct routings many still fly the planned route via AVANT from the south (Figure 13).

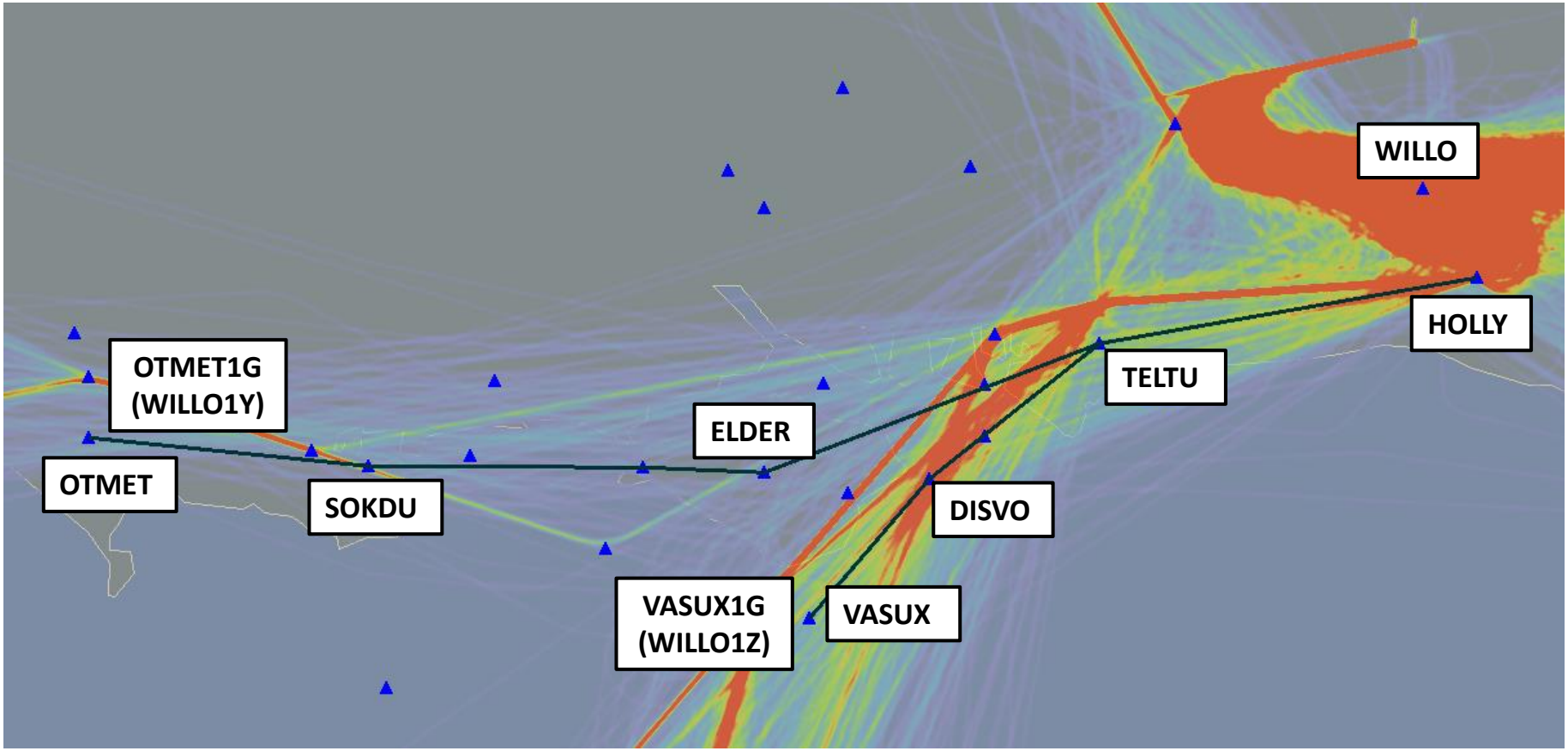

Figure 9: Proposed Gatwick WILLO STARs from the South-West (overlaid on today's aircraft tracks)

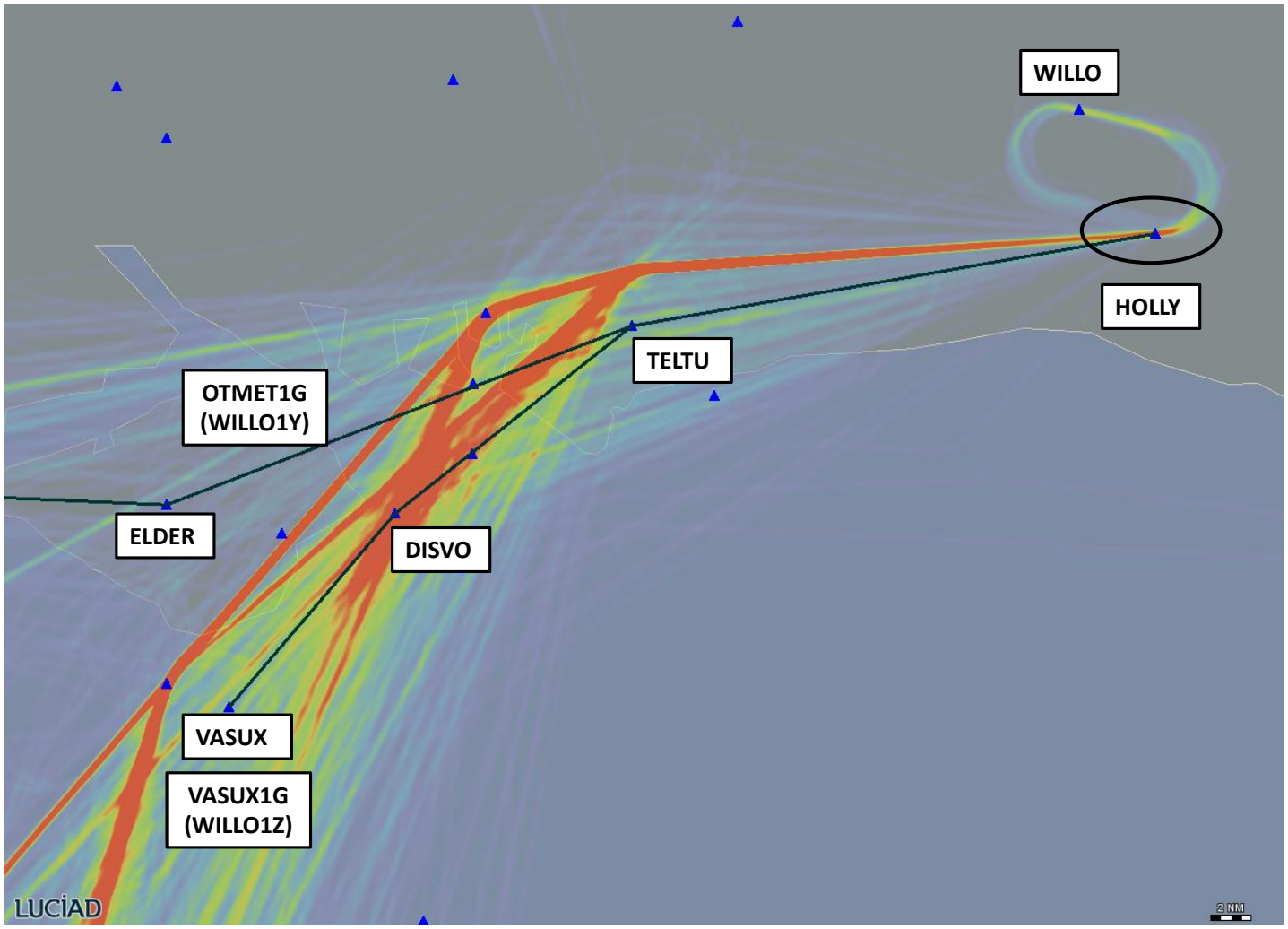

Figure 10: Proposed WILLO STAR - Tracks at FL120 and above

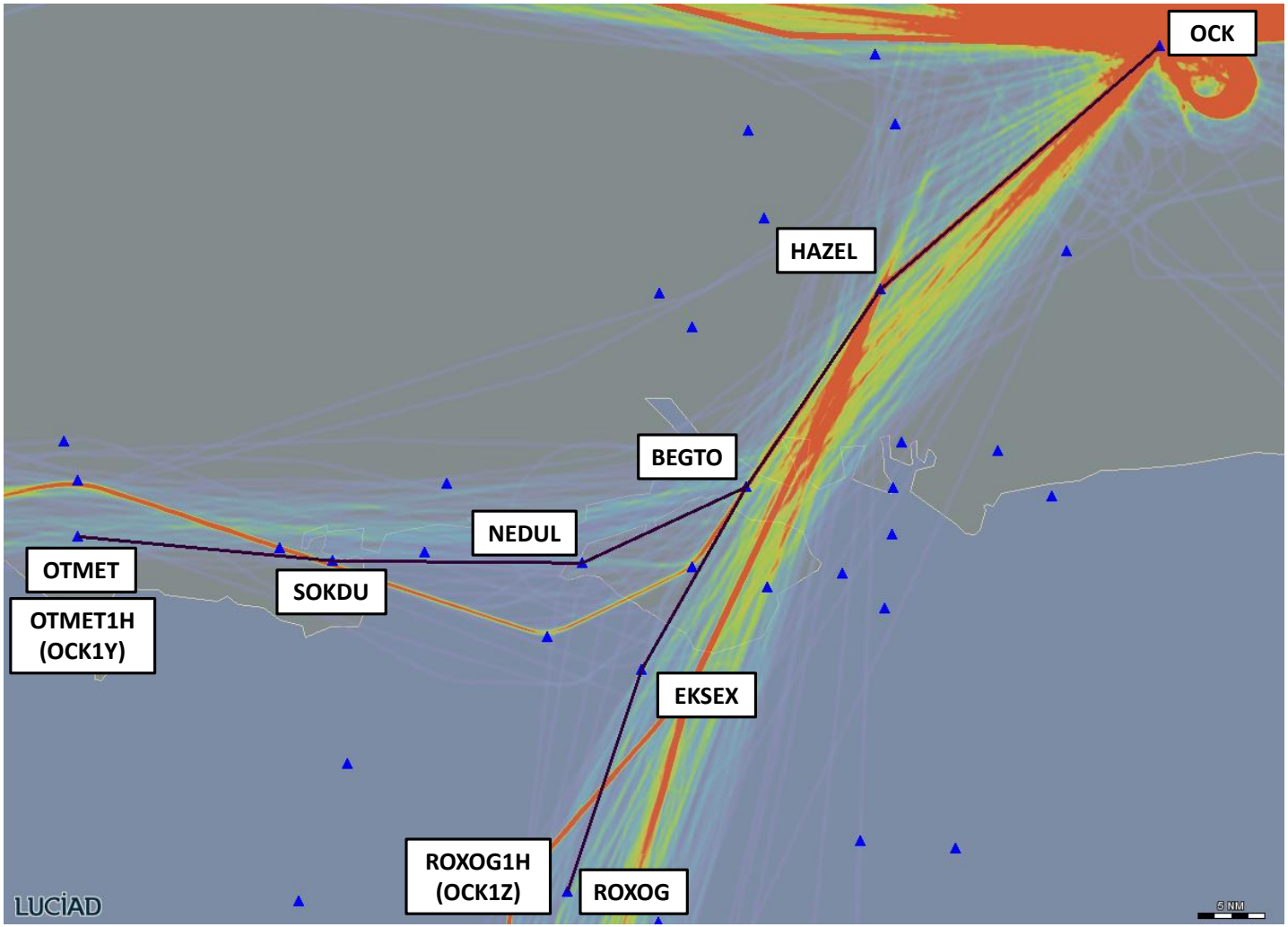

Figure 11: Proposed Heathrow STARs from the south-west (overlaid on today's aircraft tracks)

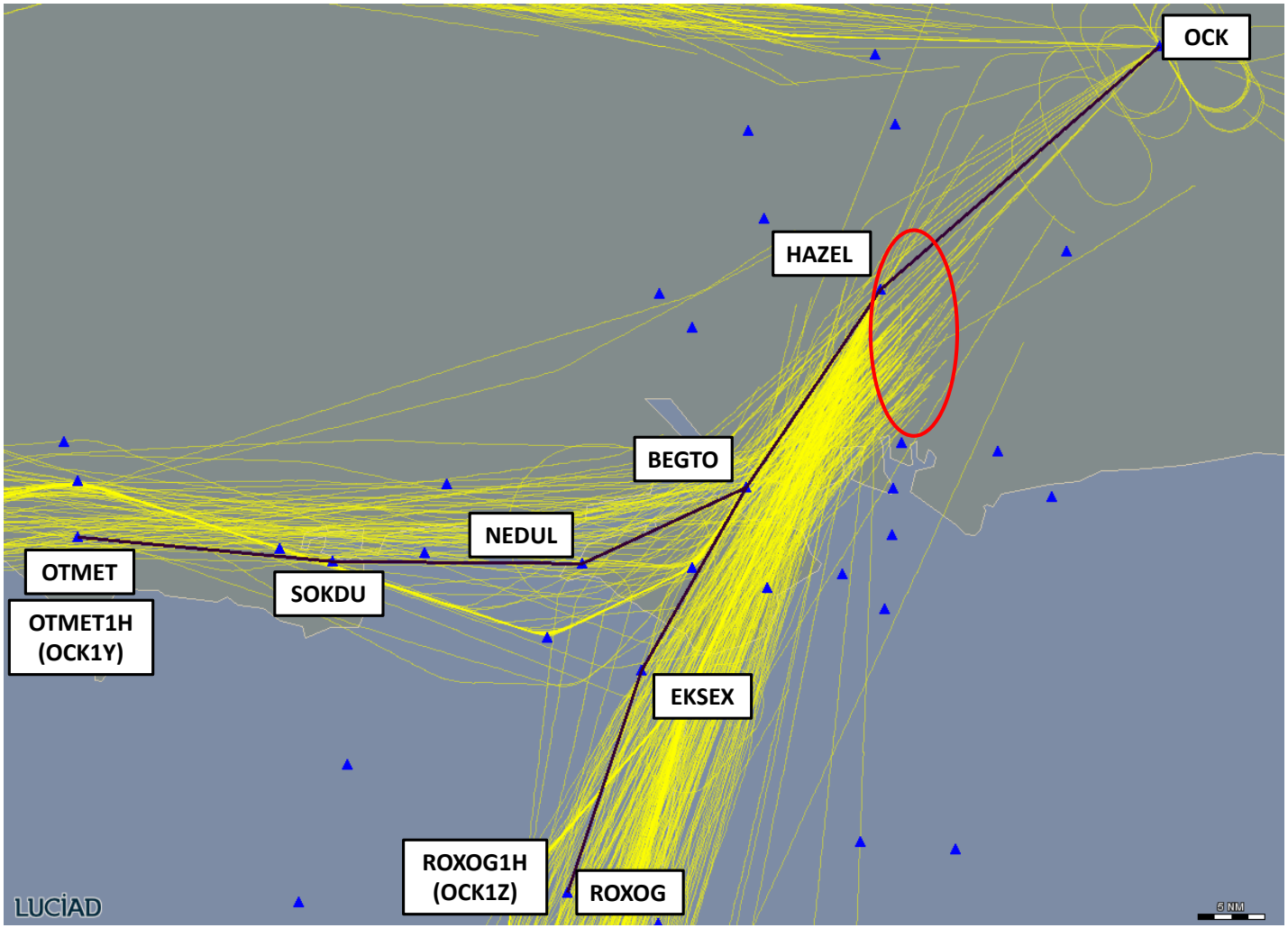

Figure 12: Proposed OCK STAR - Tracks at FL140 and above

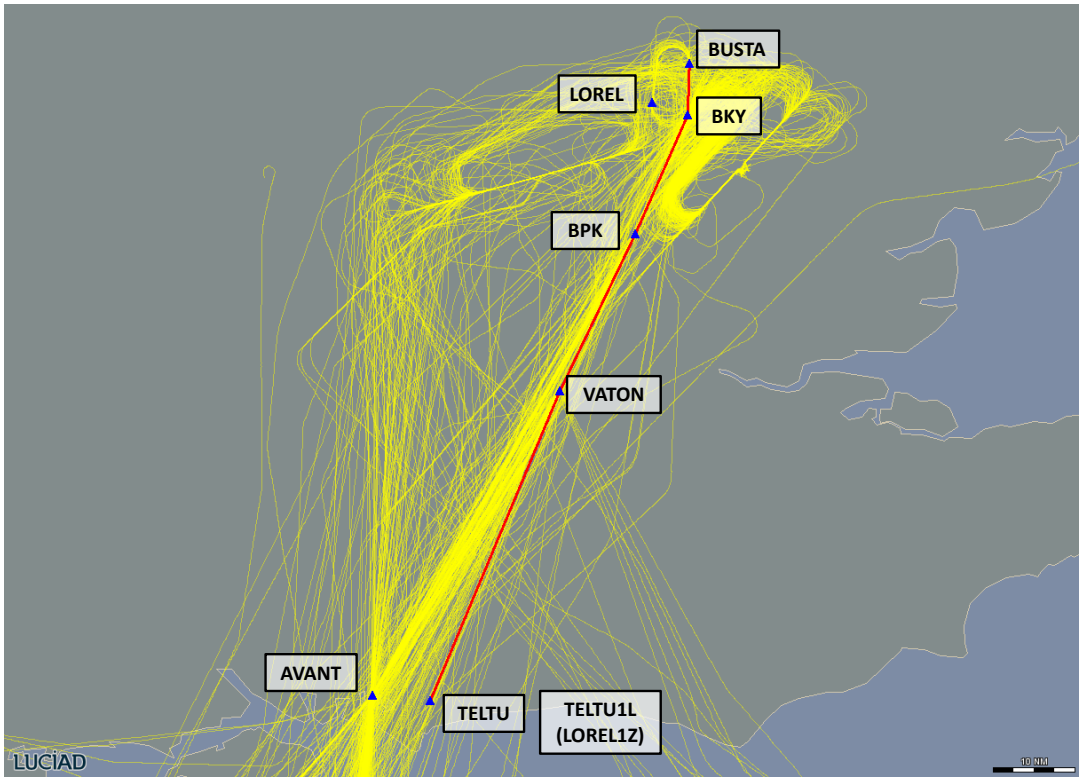

Figure 13: Proposed LOREL STAR from the south-west (overlaid on today's aircraft tracks)

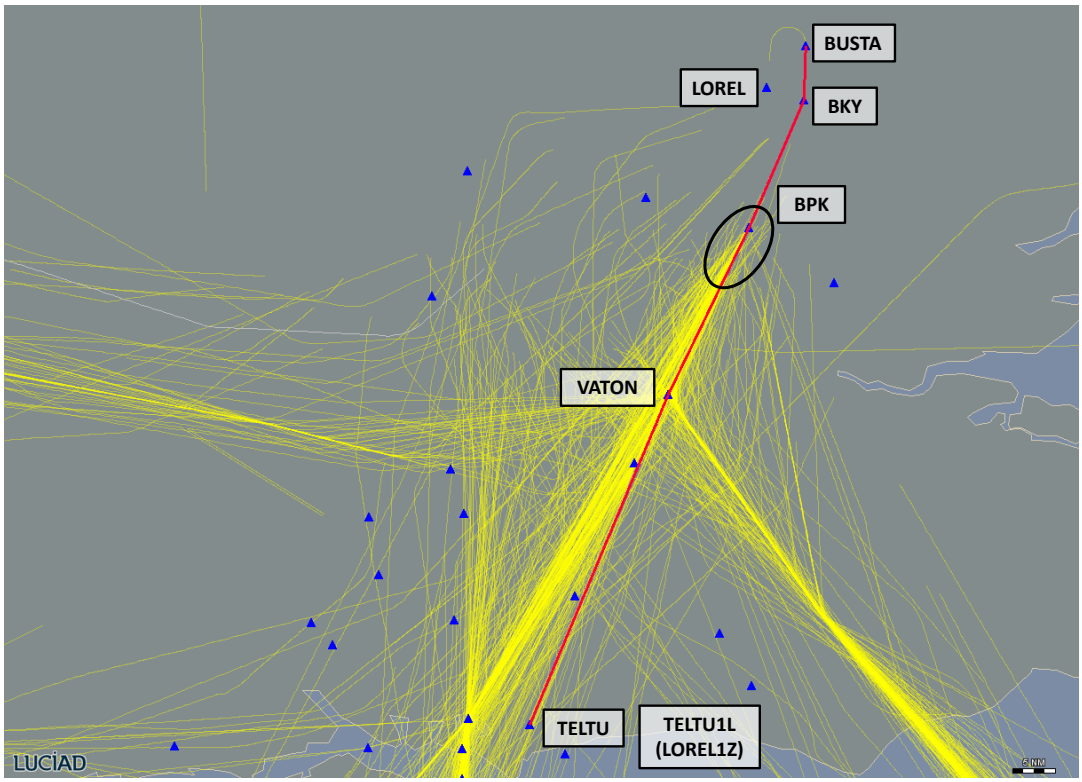

Figure 14: Proposed LOREL STAR - Tracks at FL140 and above

3.2.3 Proposed STAR Designs – Stack-Swap STARs

The NATS PDG have designed new stack swap STARs.

No traffic plots are given as too few aircraft execute stack swaps across a given week (the duration of these samples).

It is envisaged that the majority of the time stack swaps will be managed as they are today on a tactical basis with vectors. These STARs will provide a standardised radio failure procedure and a move towards a systemised stack-swap method which should be more widely used in the future when the majority of the network is systemised.

As the lowest usable level for the hold at which each STAR terminates is FL70 and as the more usual level at which traffic transitions across is FL120 and above, we see this as fulfilling the DfT criteria of 'no change at or below 7000 feet' and therefore outside of the scope for noticeable noise change analysis.

3.3 ATS Routes

The proposed new and revised ATS routes are considered below.

This change will provide a systemised method to replicate the tracks which are predominantly flown today, thus reducing (in most instances) flight planned mileage and subsequent fuel uplift. These changes should reduce the need for tactical intervention and provide more predictable routes for airline planning and delivering separated traffic flows and a more efficient service.

3.3.1 Controlled Airspace and Route Containment

Existing UK policy is to provide 3nm containment between RNAV-1 routes and the CAS or segregated airspace boundary[1]. To maximise efficiency and use of airspace and to ensure additional CAS is not required this change has been designed applying 2nm containment in some instances. Where this is the case it has been highlighted in the SAIP AD1 RSAD with mitigations specific to that route.

In addition to these specific mitigations NATS has produced a generic paper which outlines the case justifying 2nm containment. This is available at Appendix F: Airspace Containment Paper.

3.3.2 Revised ATS Routes

These are existing routes either re-aligned or extended to accommodate the proposed STAR or other route changes.

The old route is highlighted in red whilst the new route is illustrated in green.

[1] Controlled Airspace Containment Policy, CAA SARG, Jan 2014

3.3.2.1 L22

OLD ROUTE (Red): MERLY-MOPAT

NEW ROUTE (Green): BEKDA-MERLY-MOPAT

Between BEKDA-MERLY - Westbound only FL245 to FL460

Used by traffic overflying the London FIR/departing LTMA airfields routing via Shannon airspace.

Includes removal of the 'U' designator prefix from UL22 and transferred from ENR3.2 to ENR3.3 of the UK AIP.

Figure 15: Proposed extension to L22 to new point BEKDA

3.3.2.2 (U)L980

OLD ROUTE (Red): KATHY-AVANT

NEW ROUTE (Green): KATHY-ABSAV-AVANT

UL980 is being aligned with L980 between KATHY and AVANT in order to facilitate removal of the 'U' designator prefix in Spring 2018

No change to use of ATS route or levels

Figure 16: Proposed re-alignment of UL980 to align with L980 KATHY – ABSAV - AVANT

Additionally L980 and UL980 are not aligned between OCK and LAM so the opportunity is being taken to re-designate L980 between OCK and LAM as Q3

3.3.2.3 M17

OLD ROUTE (Red): VATRY–PEMOB–STU–SWANY–KESUP–EXMOR–GIBSO–BILNI-KUMIL

NEW ROUTE (Green): VATRY–PEMOB–STU–SWANY–KESUP–EXMOR-BEKDA

Re-alignment of ATS route

Levels remain FL245-FL460, RNAV-5 east of STU and FL145 – FL460 west of STU

Bi-directional between EXMOR and BEKDA

Removal of 'U' designator prefix and M17/UM17 will be transferred from ENR3.1/3.2 into ENR 3.3 of the UK AIP

Current UM17 route between GIBSO and EXMOR was utilised in 2016 by 1430 aircraft, all of which were Gatwick Oceanic departures. The average level achieved at GIBSO by these aircraft was FL270. The proposed realignment of M17 BEKDA-EXMOR is expected to see no change to this average level in the BEKDA area of FL270. Traffic numbers are expected to remain the same.

The realigned route is to be utilised by traffic departing LTMA/London FIR over-flights exiting the UK into Shannon airspace.

Connectivity via BEKDA will be provided by new routes from the SAM area - N19 and N514 which will both route via BEKDA.

Figure 17: Proposed re-alignment of UM17 BEKDA–EXMOR and promulgated as M17

3.3.2.4 (U)M184

Please note, route designated (U)N863 until 25 May 2017

OLD ROUTE (Red): DIKRO–KOTEM–PILIP–SUSIX-AVANT (RNAV-5)

NEW ROUTE (Green): DIKRO–KOTEM–PILIP–NELKO–AVANT-HEMEL (RNAV-1)

Existing waypoint SUSIX will be removed from the route and UK AIP and new waypoint NELKO will be added. ATS route extended from AVANT to HEMEL. This latter section replaces the Flight Plannable Direct (DCT) currently being evaluated between these two waypoints.

CDR between KOTEM and AVANT subject to the following:

- CDR 1&3 H24 subject D037 & D038 FL195 and above.
- CDR 3 H24 below FL195 subject D037 & D038.

M184 KOTEM – AVANT will be published FL125 to FL245 whilst the AVANT – HEMEL section will be published FL175 to FL245.UM184 will be published FL245 – FL460 for its entirety.

Both M184 and UM184 will be published as eastbound only and both will have westbound level allocation.

The portion between KOTEM and AVANT will be RAD restricted for arrivals into EGNX/BB/BE/SH/NE airfields. In 2016 13724 into these airfields routed via AVANT and a total of 27980 aircraft routed between AVANT and HEMEL on the DCT.

The new RNAV-1 route structure being introduced facilitates removing the FL360 the level cap for these arrivals between Brest ACC and LAC.

Details pertinent to the design of (U)M184 and its spacing in relation to eastbound ATS route (U)M185 and the TELTU 1L (LOREL 1Z) STAR can be found in the SAIP AD1 RSAD.

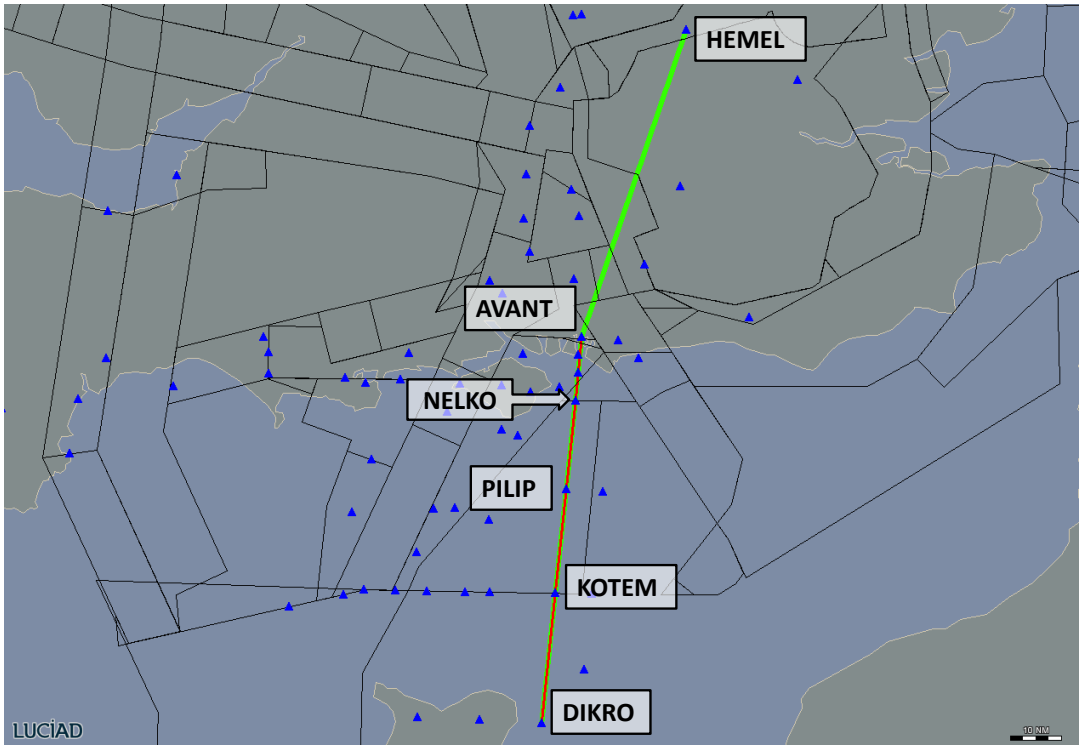

Figure 18: (U)M184

3.3.2.5 (U)M185

OLD ROUTE (Red): ORTAC–ELDER–BEGTO–HAZEL–MID–OCK–BPK–DIGSU-TIPAN (RNAV-5)

NEW ROUTE (Green): (DIKRO - ELDOP)–LUGIS–ADLOG-DESNA–TELTU–MID–OCK–OGTEV–BPK–DIGSU–TIPAN (RNAV-1 between LUGIS and TELTU, RNAV-5 north of TELTU)

OGTEV is a Heathrow runway 09L/R BPK SID truncation point being delivered by the AEG project.

(U)M185 designator is being used for a new route originating in the Brest FIR at DIKRO. This route shall be RAD restricted such that it is only available for LOREL arrivals between LUGIS and TELTU.

Between LUGIS-DESNA M185 will be published with FL195-FL245 and eastbound only; between DESNA-TELTU it will be published FL175-FL245 and eastbound only; and TELTU-BPK it will be published FL85-FL245 and eastbound only between TELTU and MID.

UM185 between LUGIS and BPK will be published FL245-FL460 and eastbound only and north of BPK it will remain unchanged from what is currently published in ENR3.2.

(U)M185 will be CDR1&3 H24 between LUGIS and DESNA subject to activity within Danger Areas D037, D038 & D039.

The introduction of the new portion of this route provide 7nm track separation from conflicting (U)M184 traffic.

The change facilitates the raising of the FL340 level cap for EGSS/SC/GW arrivals to FL380, which encompasses the cruise level for most aircraft.

2016 traffic figures for LOREL arrivals: 29000 aircraft

Details pertinent to the design of (U)M185 and its spacing in relation to eastbound ATS route (U)M184 can be found in the SAIP AD1 RSAD.

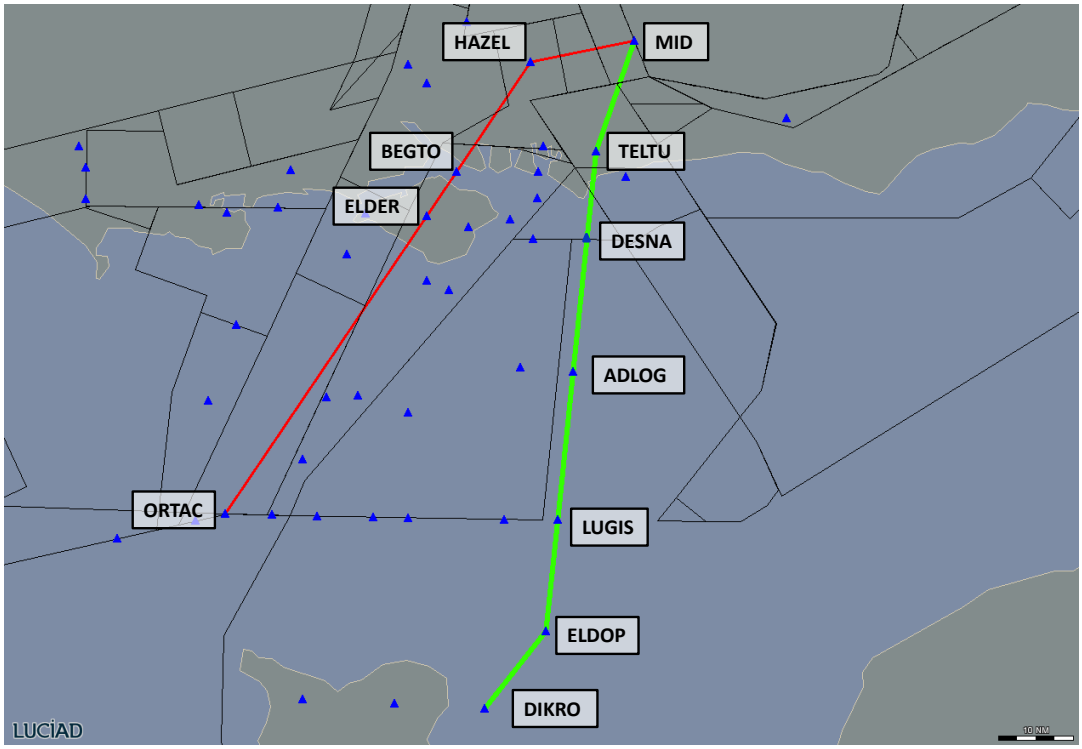

Figure 19: Proposed re-alignment of (U)M185

3.3.2.6 M195

OLD ROUTE (Red): MARUK-LORKU

NEW ROUTE (Green): SAM-MARUK-LORKU

This realigned route will be utilised by traffic routing via SAM and exiting the UK at LORKU

Currently traffic flight plans SAM (U)N621 MARUK UM195 LORKU or SAM (U)N621 LELNA (Yellow track)

Between MARUK and LORKU remains FL245 to FL460, RNAV-5 and Westbound only

The CDR status remains as published between MARUK and LORKU

The 'U' designator prefix will be removed and the routes transferred from ENR3.1/ENR3.2 into ENR3.3 of the UK AIP

Extension between SAM-MARUK FL195-FL460 will be assigned a minimum navigational performance of RNAV-1

In 2016 approximately 35000 aircraft exited the UK via LORKU, all of which will benefit from this reduction in flight planned track mileage.

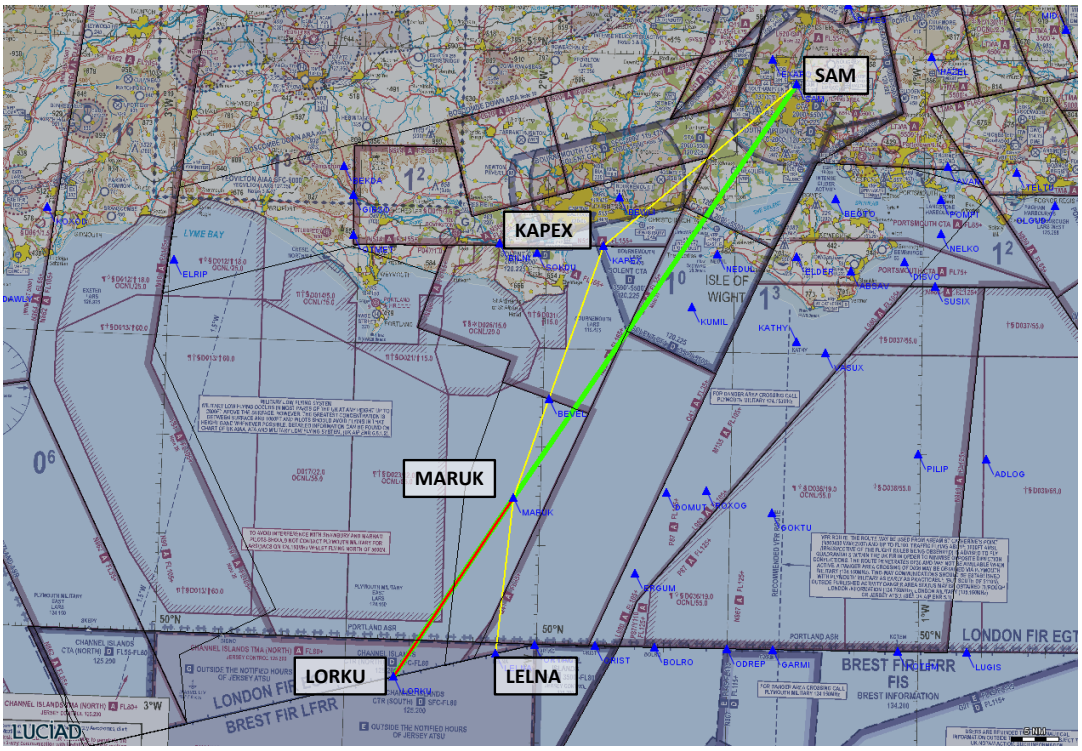

Figure 20: Proposed re-alignment of (U)M195 and removal of U designator

3.3.2.7 N63

OLD ROUTE (Red): KAPEX-LORKU

NEW ROUTE (Green): SAM-OLGUD-LELNA

UN63 is no longer required between KAPEX and LORKU as the proposed M195 provides a shorter routeing for this traffic. Instead the N63 designator will be utilised by traffic routing via SAM and exiting the UK at LELNA. Previously traffic would have flight planned SAM UN621 LELNA (Yellow track).

New route will be published FL195 to FL460, assigned a minimum navigational performance of RNAV-1 and will be westbound only using eastbound level allocation. It will be a CDR 1 & 3 FL195-FL460 H24 subject to activity in D036. N63 does not transit D036, however the activation of D036 initiates complex re-route scenarios for northbound traffic (working LAC S22) and thus conflicts with traffic routing southbound on the realigned N63 (working LAC S20).

N63 will be closed whenever Y110 is available between ORIST and VEXEN. Y110 is used to reroute northbound traffic around the Portsmouth danger areas during periods of activation. On these occasions N63 traffic will flight plan via SAM M195 MARUK N621 LELNA.

The route will have the 'U' designator prefix removed and will be transferred from ENR3.2 into ENR3.3 of the UK AIP

See SAIP AD1 RSAD for details pertinent to the design of N63 and its spacing in relation to ATS route (U)P87 and the ROXOG 1H (OCK 1Z) STAR.

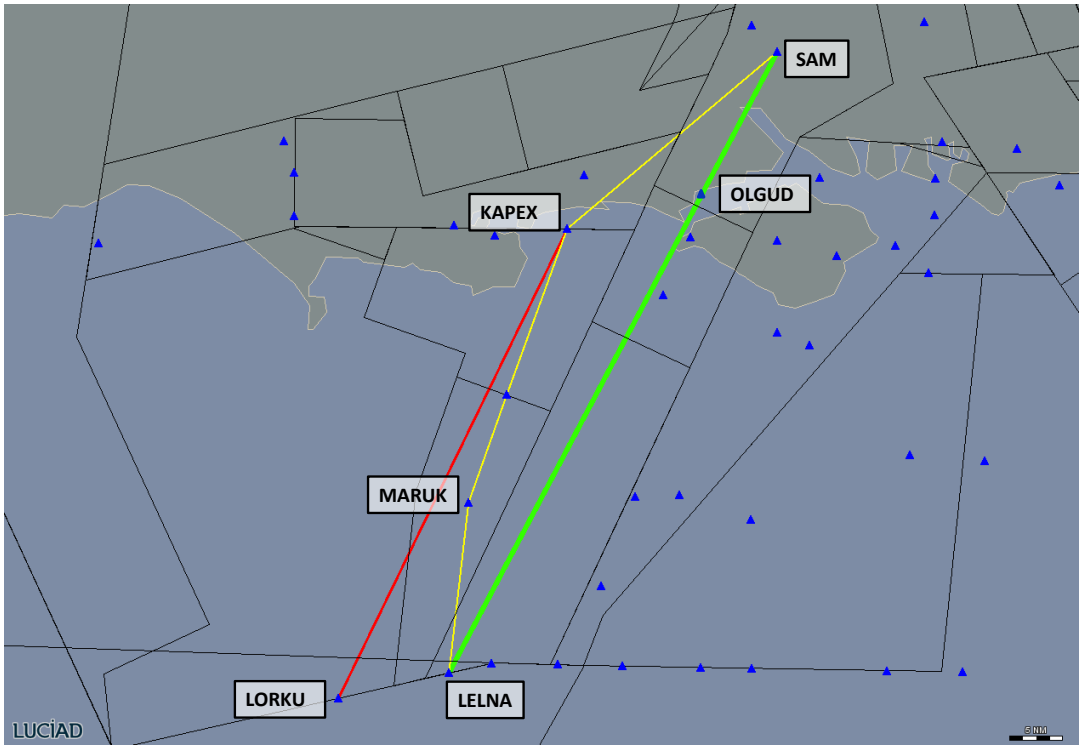

Figure 21: Proposed re-alignment of (U)N63 and removal of U designator prefix

3.3.2.8 N514

OLD ROUTE (Red): POMPI–BEGTO–BEWLI–GIBSO-DIDEL

NEW ROUTE (Green): GASGU–EVTES–EXARO–BEKDA-DIDEL

The realigned N514 will be utilised by Heathrow departures either connecting from the end of the SIDs at GASGU when departing from runway 09L/R or connecting at EVTES when departing from runway 27L/R on GOGSI SIDs (GOGSI N621 EVTES, Yellow track) (see N621 change below, Figure 23: Proposed re-designation of (U)N621).

EGBB/NX and EGSS/GW departures will also be able to utilise this route connecting via Y321 extension from PEPIS which connects at new waypoint EXARO, Blue track (see Y321 change below, Figure 31).

Between GASGU and BEKDA the route will be published FL195-FL460, between BEKDA and DIDEL it will be published FL245-FL460 and between GASGU and DIDEL it will assigned a minimum navigational performance of RNAV-1. West of DIDEL it will remain as currently published in ENR3.2.

Whereas the current N514 is bi-directional between GIBSO and POMPI the realigned N514 is a westbound route only between GASGU and BEKDA. The 'U' designator prefix will be removed and the route transferred from ENR3.2 into ENR3.3 of the UK AIP.

In 2016 traffic figures filing via SAM - GIBSO and likely to utilise the new N514 route are as follows:

- EGLL - 1550
- EGSS/GW/SC – 581
- EGBB/NX/BE – 121

Details pertinent to the design of N514 and the spacing used against TRA002 and CAS boundaries can be found in the SAIP AD1 RSAD

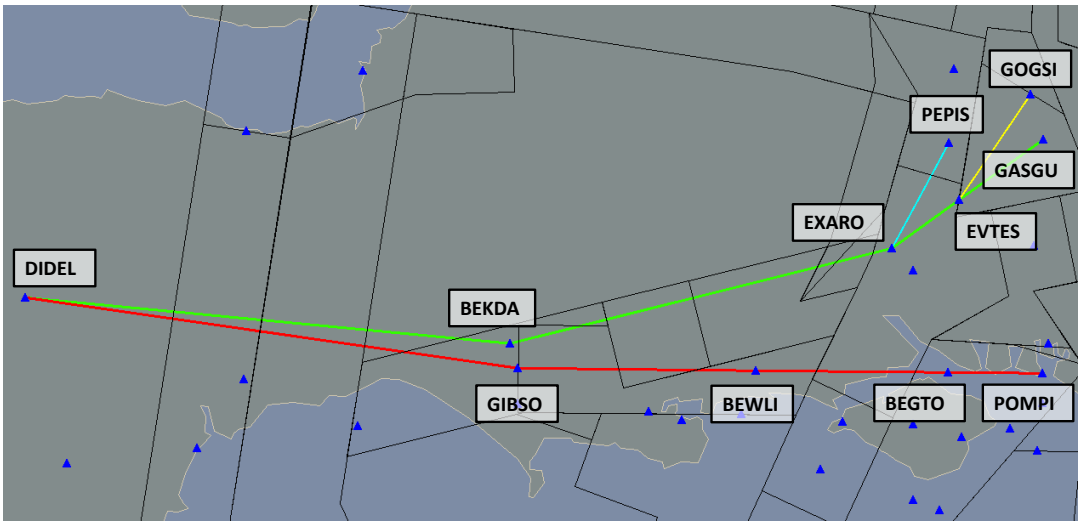

Figure 22: Proposed realignment of (U)N514 and the removal of the U designator prefix.

3.3.2.9 N621

OLD ROUTE: GOGSI–SAM–KAPEX–BEVEL-MARUK (RNAV-5)

NEW ROUTE: GOGSI–EVTES–SAM–KAPEX-MARUK (RNAV-5)N621 is an existing ATS route that will have EVTES added it to provide connectivity for Heathrow departures on the GOGSI SID routeing via the realigned N514 (see previous change).

There is no track change on this route however, BEVEL will be removed from route as it is on a straight leg with no Base Level Change occurring here since the extension of the Portsmouth CTA and it is therefore no longer required and can be removed from NAS and returned to ICARD

As UN621 and N621 are contiguous with the latter no longer being used to define the boundary of CAS the 'U' designator prefix will be removed and the routes transferred from ENR3.1/ENR3.2 into ENR3.3 of the UK AIP.

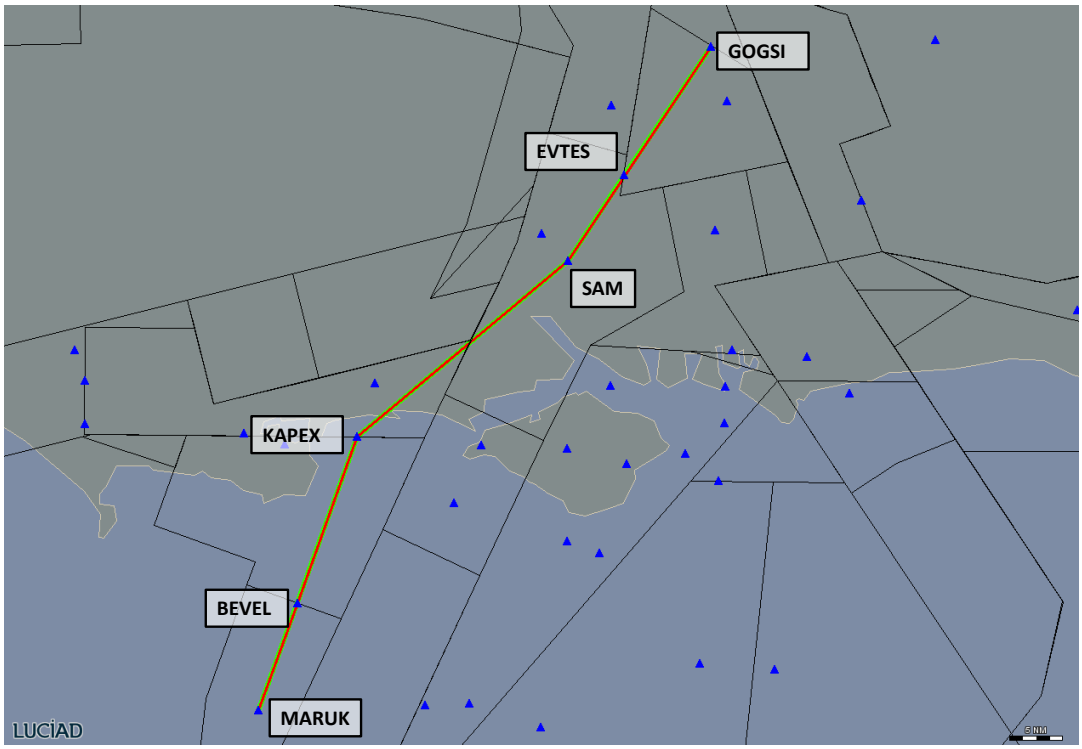

Figure 23: Proposed re-designation of (U)N621 as N621 with U designator prefix and waypoint BEVEL removed

3.3.2.10 (U)N862

OLD ROUTE: LAMAT-BHD

NEW ROUTE: LAMAT-KOXOD-BHD

(U)N862 is an existing ATS route which will have new waypoint KOXOD added for connectivity with the proposed new ATS Route N19 (Yellow track), which subject to the change being approved will pass through KOXOD (see N19, Figure 35).

No change to tracks over the ground.

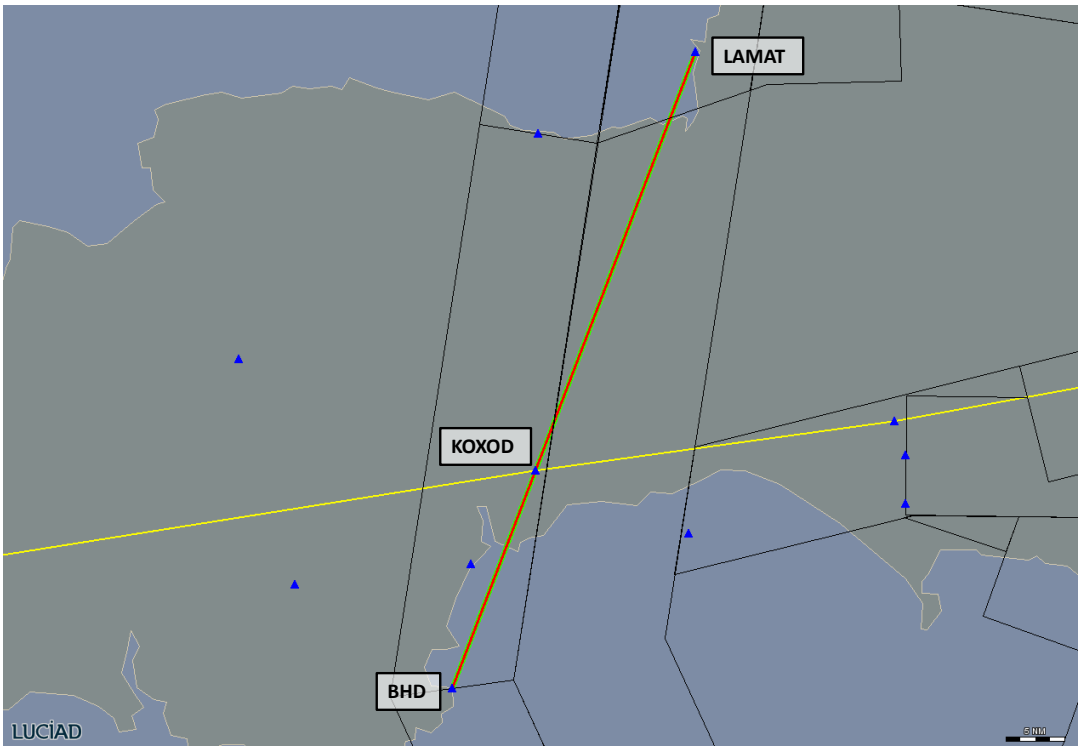

Figure 24: (U)N862 with proposed waypoint KOXOD added at the intersection with proposed route N19

3.3.2.11 (U)N867

OLD ROUTE: AKIKI–GARMI–KATHY–ELDER-SAM

NEW ROUTE: AKIKI–GARMI–VASUX-AVANT

The realigned N867 will be published FL125-FL245 whilst the realigned UN867 will be published FL245-FL460 and will be published eastbound only but with westbound level allocation for flight planning purposes (as per today)

Both routes will be published as CDRs between GARMI and VASUX as follows:

CDR 1 & 3 H24, FL195 and above CDR 3 H24 below FL195 both subject to activity in Danger Area D036.

The route(s) will be RAD restricted for use by LTMA overflights however when there is activity in Danger Areas D037/D038/D039 which closes neighbouring routes it will be used Luton, Stansted, Cambridge, Birmingham and East Midlands inbounds

The majority of flights currently flight plan via (U)N867 (red route) as far as KATHY and then take (U)L980 to AVANT, then onwards. The proposed green route will result in traffic flight planning via VASUX

Very few aircraft file via SAM. An alternative route shall be made available for this small number of aircraft that wish to file this way REVTU (U)P87 BOLRO (U)P83 SAM (Yellow track).

Details pertinent to the design of (U)N867 and its spacing in relation to D037/D038 can be found in the SAIP AD1 RSAD.

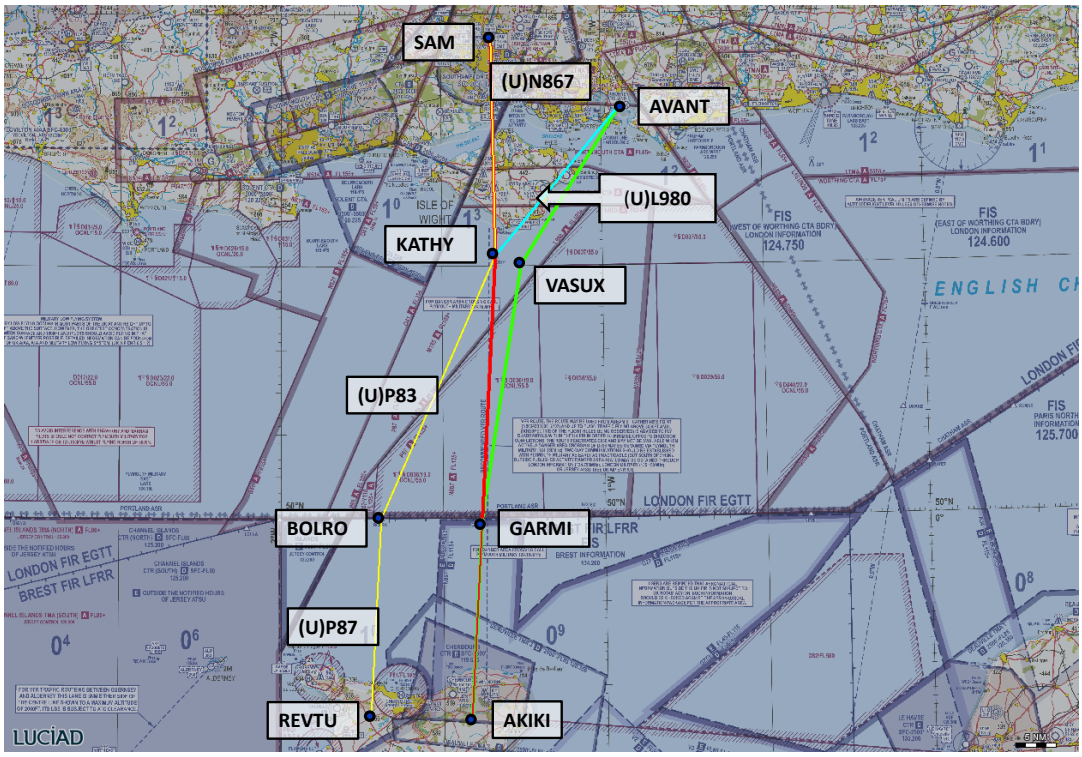

Figure 25: Proposed realignment of (U)N867

3.3.2.12 (U)P87

OLD ROUTE: REVTU–BOLRO-DOMUT (RNAV-5)

NEW ROUTE: REVTU–BOLRO-ROXOG (RNAV-1)

The realigned P87 will be published FL125-FL245 whilst the realigned UP87 will be published FL245-FL460. Both will be published eastbound only but with westbound level allocation for flight planning purposes (as per today). Both routes will be assigned a minimum navigational performance of RNAV-1.

(U)P87 connects with new EGLL/WU STARs at ROXOG.

Both routes will be published as CDRs as follows:

CDR 1 & 3 H24 FL195 and above

CDR 3 H24 below FL195 both subject activity in Danger Area D036

For alignment with French ATC training (U)P87 will be available for Heathrow, Northolt and Gatwick arrivals for 28 days between 9th November 2017 and 7th December 2017 when a temporary LoA will be in place between LAC and Brest. During this time Gatwick arrivals will route REVTU (U)P87 ROXOG L982 VASUX. After 7th December 2017 (U)P87 will be available for Heathrow and Northolt arrivals only.

In 2016 the number of Heathrow and Northolt arrivals via BOLRO totalled 17265.

Details pertinent to the design of (U)P87 and its spacing in relation to eastbound ATS route (U)P88 can be found in the SAIP AD1 RSAD.

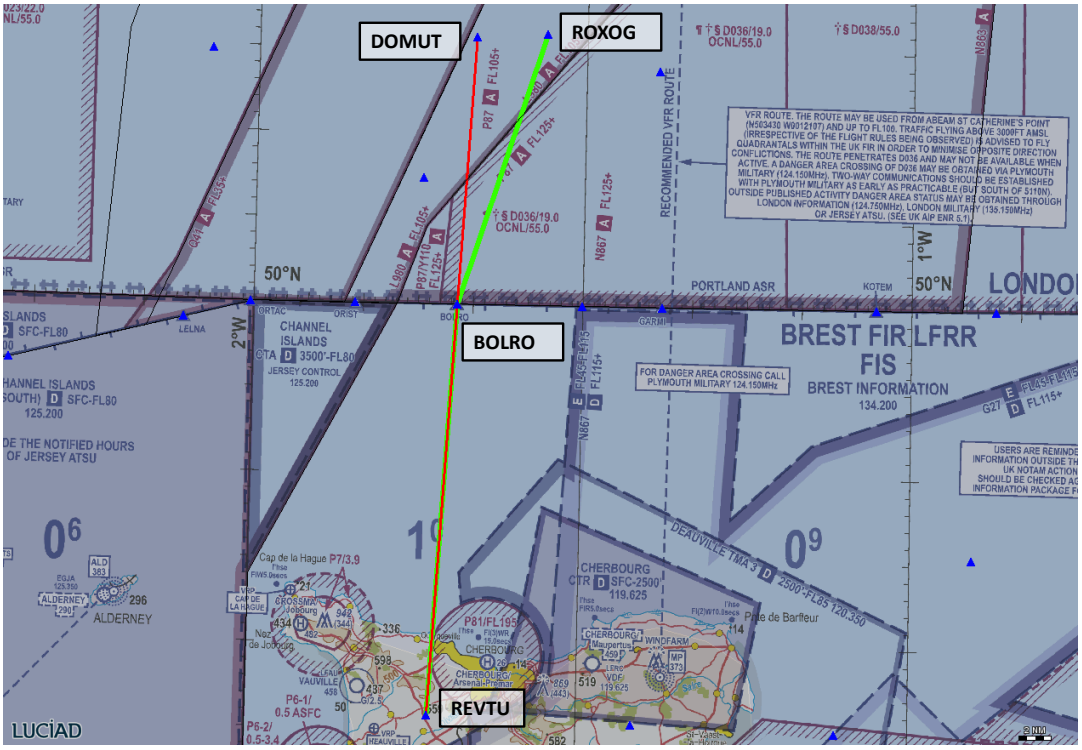

Figure 26: Proposed realignment of (U)P87

3.3.2.13 UP620

OLD ROUTE: CAMBO–SUPAP-TALIGLND…

NEW ROUTE: CAMBO–SUPAP-TALIG–INBUM-LND…

New waypoint INBUM will be added to UP620 between TALIG and LND. INBUM provides route connectivity to/from P86. UP620 to retain an assigned minimum navigation performance of RNAV-5

Figure 27: UP620 with additional way point, INBUM

3.3.2.14 Q3

OLD ROUTE: OCK-HEMEL

NEW ROUTE: LAM–OCK–HEMEL-MOGLI

The route between LAM-OCK is currently designated L980 but L980 on this portion is not co-incident with UL980 (see Para 3.3.2.2 above). To facilitate removing the 'U' designator from UL980 planned for spring 2018, the pre-existing Q3 will be extended to cover the portion of L980 from LAM-OCK and L980 shall be partitioned.

There will be no change to use of ATS route or tracks over the ground as this is a route designator change only. No aircraft fly the full extent of L980 in this area and similarly they are not expected to fly Q3 in its entirety. Instead the route will be used to connect to other routes.

Additionally, Q3 will be extended north from HEMEL to MOGLI to replace a long existing Flight Plannable Direct (DCT) between these two points FL245–FL460). This portion will have the same RAD restrictions that currently apply to the DCT assigned to it and the DCT will be removed from RAD Appendix 4.

The routes will be transferred from ENR3.1/ENR3.2 and published in ENR3.3 of the UK AIP with the U designator prefix removed.

Figure 28: Proposed extensions of (U)Q3 with U designator prefix removed

3.3.2.15 Q41

OLD ROUTE: ORTAC-ASPEN-THRED-KUMIL-NEDUL-SAM-ETRID-PEPIS–TABEN–NORRY–COWLY-WCO

NEW ROUTE: ORTAC-ASPEN-THRED-KUMIL-NEDUL-SAM-ETRID-PEPIS–TABEN–NORRY-COWLY–SILVA

The truncation of the Stansted CPT SIDs at NUGBO resulted in traffic routeing via SILVA and not WCO (1.1nm away). In order to provide connectivity to SAM, SITET and XAMAB it is proposed to realign Q41 to end/start at SILVA.

Currently these EGSS departures route M183 via SILVA to CPT, however connectivity with re-aligned Q41 at SILVA will result in a shortened route for traffic routeing via PEPIS, SITET or XAMAB. For the traffic that routes via SITET the saving is 2.7nm and in 2016 8200 flights from Stansted routed via SITET. With 10700 routing via PEPIS and 2400 via XAMAB.

Arrivals to EGBB/BE which route via Q41 to WCO for the GROVE1B STAR will now be required to use a Flight Plannable Direct (DCT) between COWLY and WCO.

KUMIL is to be removed from the route as this waypoint is no longer required on Q41.

Between SAM and ORTAC Q41 will be capped at FL125. This is due to a requirement for a coincident RNAV-1 route in this area (Z171 see Figure 41) to utilise CAP1385 route spacing from the EGLL/WU ROXOG 1H (OCK 1Z) STAR above FL125. Q41 will continue to provide route connectivity for RNAV-5 aircraft between SAM and ORTAC subject to a maximum cruise level of FL120.

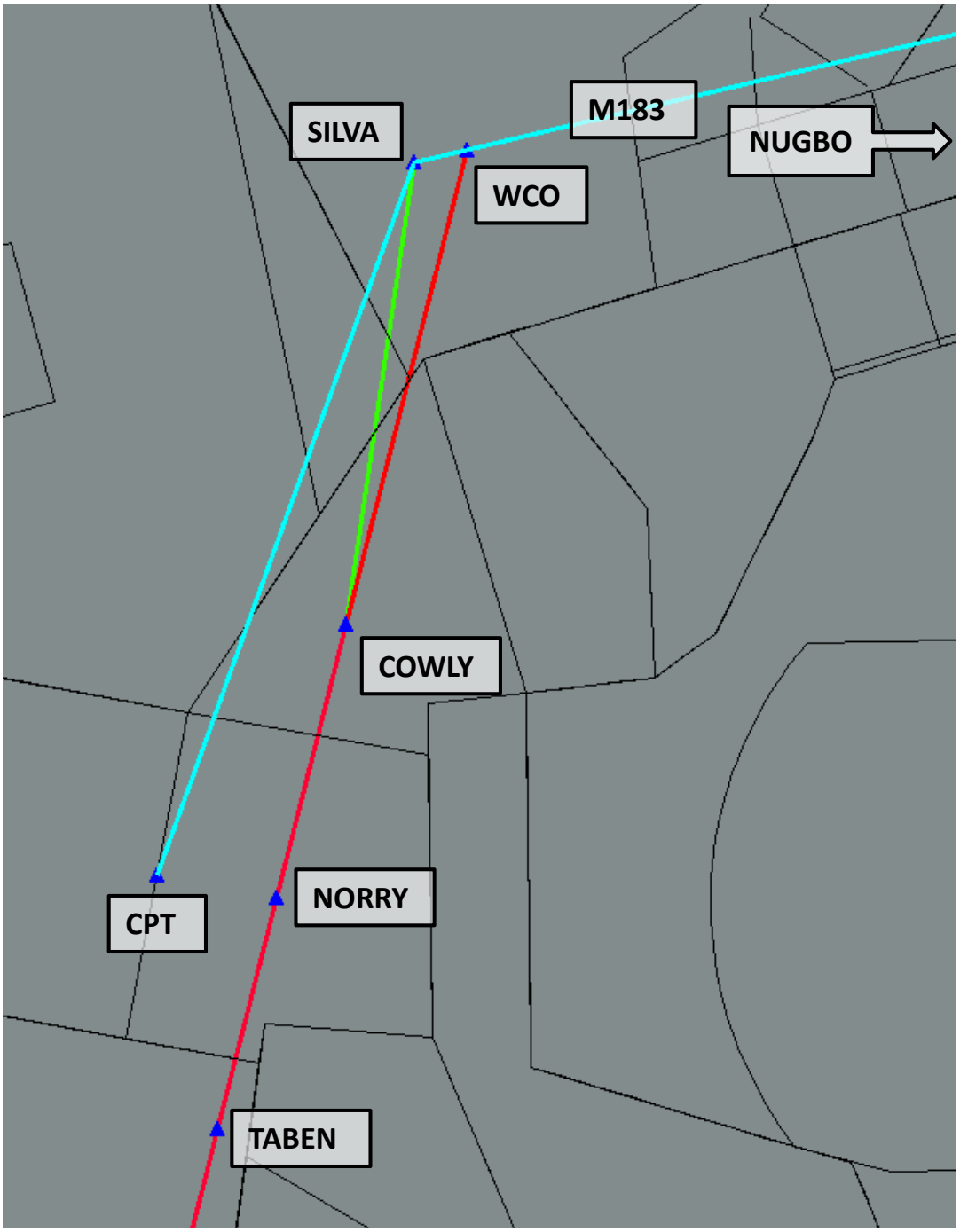

Figure 29: Q41 change with M183

3.3.2.16 Y110

Existing ATS route Y110 will remain as published ORIST-VEXEN-ASPEN but will become a CDR 1&3 H24 FL225-FL460 between ORIST and VEXEN subject to danger area activity in D036.The actual route does not transit D036, however the activation of D036 initiates complex re-route scenarios for northbound traffic. Traffic which will utilise Y110 above FL225 will be "offloaded" from new ATS route (U)P83, a CDR which transits D036. When (U)P83 is closed Y110 will be open, and vice versa. This ensures a route is always available for northbound aircraft.

Y110 is in conflict with N63. N63 is a CDR which is only available when Y110 is closed, and vice versa.

The route will have the 'U' designator prefix removed and will be transferred from ENR3.2 into ENR3.3 of the UK AIP.

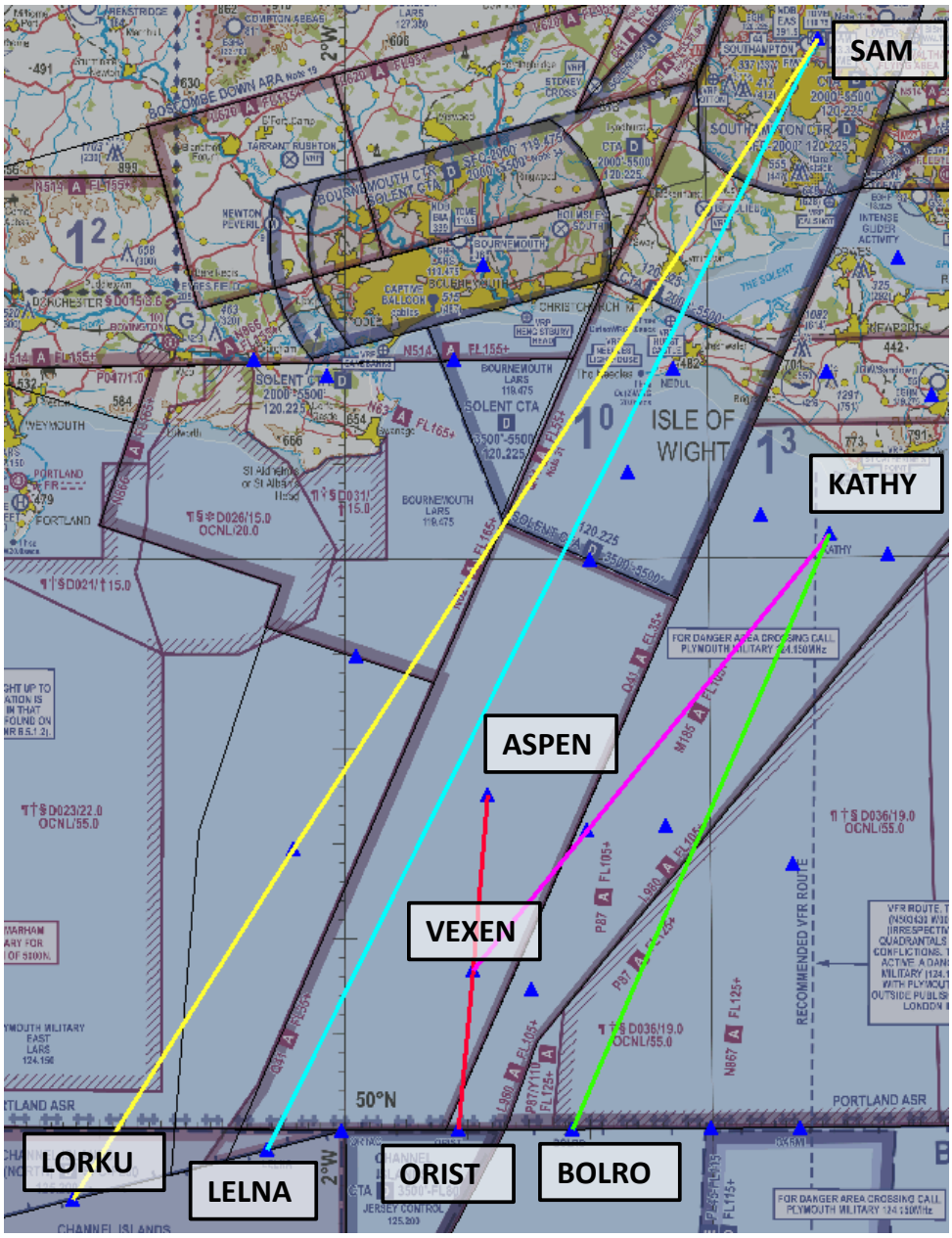

Figure 30: Y110

3.3.2.17 Y321

Existing ATS Route Y321 published in ENR3.3 will be extended south from PEPIS to new waypoint EXARO.

The new portion PEPIS – EXARO will be published FL195-FL460, westbound only and assigned a minimum navigational performance of RNAV-1. It is extended to provide connectivity to the newly realigned N514 (see para 3.3.2.8 above Figure 22).

The new portion will be RAD restricted to traffic departing from EGGW, EGSS, EGSC, EGBB, EGBE and EGNX which currently turn to the west at SAM thereby reducing flight plannable track mileage.

In 2016 flight planned by 490 aircraft.

Details pertinent to the design of Y321 and its proximity to TRA002 can be found in the SAIP AD1 RSAD.

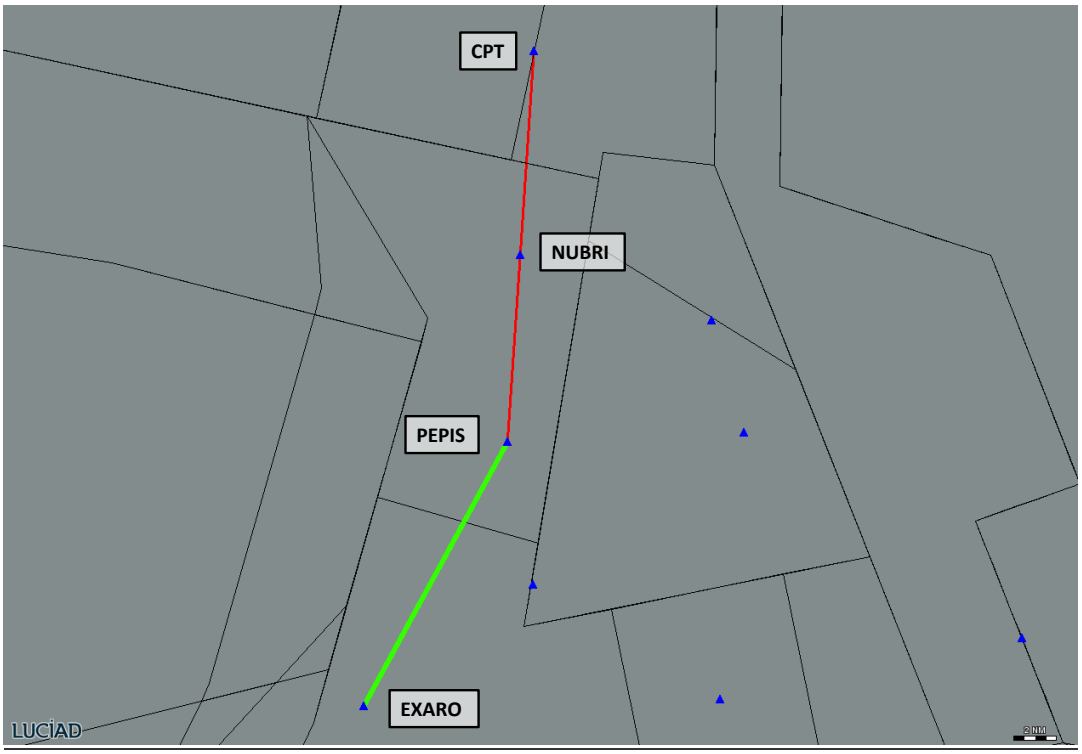

Figure 31: Proposed extension of Y321 PEPIS – EXARO

3.3.3 New ATS Routes

This proposal will establish new ATS Routes to the UK as proposed below. These routes will be promulgated without the U designator prefix in ENR3.3 of the UK AIP unless otherwise stated.

3.3.3.1 L982

L982 will be established as follows: ORIST-ERGUM-ROXOG-VASUX-DISVO-TELTU.

Between existing waypoint ORIST and new waypoint ERGUM it will be published FL195-FL460 whilst from ERGUM to TELTU it will be published FL105-FL460.

It will be assigned a minimum navigational performance of RNAV-1 and will be available eastbound only but with westbound level allocation between ORIST and ERGUM to compliment Brest ACC operational requirements.

It will be available for Channel Islands traffic H24 and as an alternative 'offload route' for LTMA arrivals when neighbouring CDRs to the east are closed due to activity within the Portsmouth Danger Areas.

Details pertinent to the design of L982 and the spacing used against D036/D037/D038 and the Portsmouth CTA controlled airspace boundaries can be found in the SAIP AD1 RSAD.

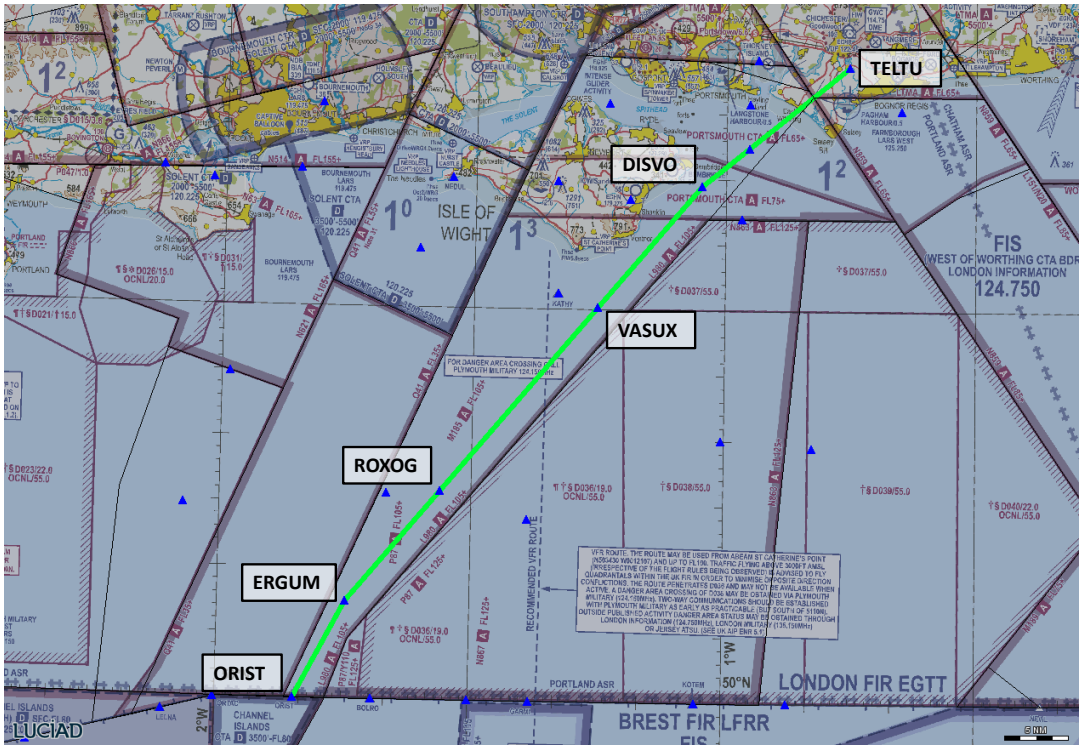

Figure 32: Proposed new RNAV-1 route L982 and its position in relation to Danger Areas D036, D037 and D038

3.3.3.2 (U)N6

N6 will be established from existing waypoint PILIP to new waypoint TELTU. N6 will be published FL195-FL245 whilst UN6 will be published FL245-FL460 with an assigned minimum navigational performance of RNAV-1. Both routes will be CDRs 1&3 H24 and subject to activity within Danger Areas D037 and/or D038.

It's proposed use is as a link route for occasions when D039 is active which then closes the realigned (U)M185 (see Para 3.3.2.5 above and Figure 25). It is therefore used for EGSS/GW/SC arrivals to connect with the TELTU 1L (LOREL 1Z) STAR.

Details pertinent to the design of (U)N6 and its spacing in relation to D039 can be found in the SAIP AD1 RSAD.

Figure 33: Proposed new route (U)N6

3.3.3.3 N17

N17 will be established from existing waypoint RIGDI as follows: RIGDI-ORVUX-DAWLY-ELRIP-OTMET-SOKDU-NEDUL-TELTU. Between RIGDI and DAWLY it will be published FL245-FL460, between DAWLY and SOKDU FL195-FL460 and between SOKDU and TELTU FL175-FL460. It will be assigned a minimum navigational performance of RNAV-1 and will be Eastbound only.

EGLL/KK/WU/SS/SC/GW. Based on 2016 traffic figures this totals 7610 flights.

Details pertinent to the design of N17 and its spacing in relation westbound ATS route N19 can be found in the SAIP AD1 RSAD.

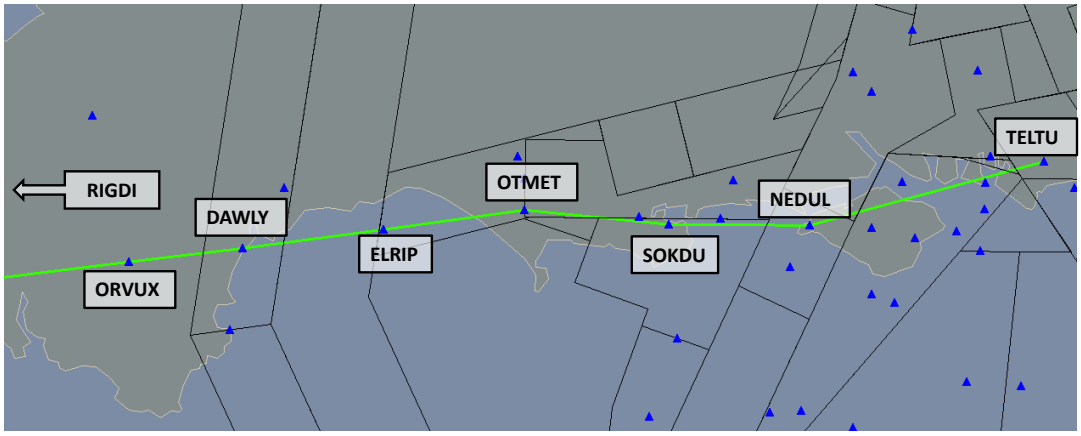

Figure 34: Proposed new RNAV-1 ATS Route N17

3.3.3.4 N19

N19 is established as follows: SAM-BEKDA-KOXOD-GAPLI.

N19 is established with an assigned minimum navigational performance of RNAV-1. Between SAM and BEKDA it will be published FL195-FL460 and west of BEKDA it will be published FL245-FL460. N19 will be available westbound at all levels but only available eastbound FL345-FL460.

Details pertinent to the design of N19 and its spacing in relation to TRA002, controller airspace boundaries and eastbound ATS route N17 can be found in the SAIP AD1 RSAD.

Based on traffic figures from 2016 9610 EGKK departures (filed via GIBSO and are therefore likely to flight plan via N19.

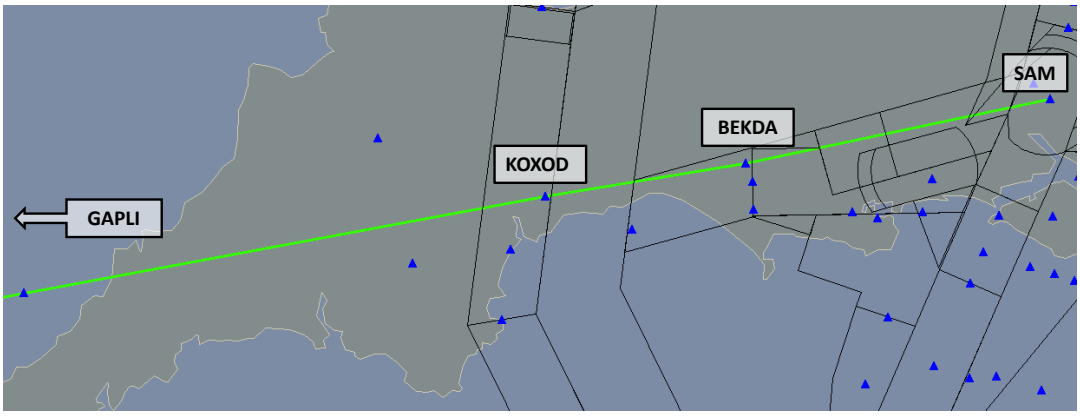

Figure 35: Proposed new route RNAV-1 ATS Route N19 SAM – BEKDA – KOXOD – GAPLI

3.3.3.5 N513

N513 is established from existing waypoint DIDEL to new waypoint ELRIP. It will be published FL245-FL460 with an assigned minimum navigational performance of RNAV-1 and will be available eastbound only.

It will be RAD restricted available only for EGKK/LL/WU/SS/SC/GW arrivals and provides the connectivity to N17 from traffic routeing via DIDEL. Currently this traffic routes on N514 to GIBSO, but N514 will only be available for westbound traffic after this change. Without N513 the only way of flight planning to reach the new RNAV-1 STARs would be via DAWLY. This would be a significant extension in track mileage which is not necessary.

Based on 2016 traffic figures around 4460 flights per annum are likely to flight plan via N513.

Figure 36: Proposed new RNAV-1 ATS Route N513

3.3.3.6 (U)P83

(U)P83 is established from existing waypoint BOLRO as follows: BOLRO-KATHY-SAM.

P83 will be published FL125-FL245 whilst UP83 will be published FL245-FL460. Both routes will have an assigned minimum navigational performance of RNAV-5.

Both routes will be CDRs between BOLRO and KATHY as follows:

CDR 1 & 3 H24 FL195 and above subject to activity within Danger Area D036

CDR 3 H24 below FL195 subject to activity within Danger Area D036.

Both routes will be available eastbound only but with westbound level allocation due to ATC operational reasons.

This route will be the only RNAV-5 CDR in the Portsmouth Danger Areas (D036-D040). It is positioned to ensure route connectivity to the remaining RNAV-5 ATS route network at KATHY. North of KATHY it connects to SAM for aircraft inbound to Brize Norton and Oxford.

When (U)P83 is closed RNAV-5 aircraft shall flight plan via REVTU - Y110 – VEXEN – (U)L980 – KATHY. Y110 between ORIST and VEXEN is a CDR FL225-FL460 which is only available when (U)P83 is closed.

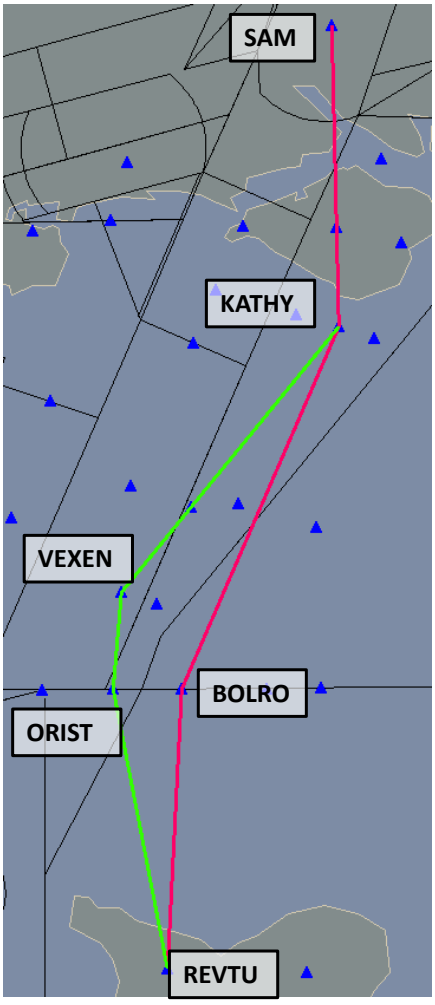

Figure 37: (U)P83

3.3.3.7 P86

P86 is established from existing waypoint MABUG as follows: MABUG–INBUM–ORVUX–KOXOD. It will be published as a bi-directional route FL245-FL460 and have an assigned minimum navigational performance of RNAV-1.

P86 provides a shortened routeing for traffic routeing via MABUG UT7 PEMAK/INBUM UP620 SUPAP either from N19 (westbound traffic) or to N17 (eastbound LTMA inbounds). In addition to providing a significant track mileage saving, P86 ensures the shortest flight plannable route to exit the London FIR at ADRUD is via BEKDA and therefore encourages operators to flight plan the new systemised route network. Without this route it would be a shorter route to flight plan via SAM (U)L620 LND.

Based on 2016 traffic figures 2016 around 358 aircraft would utilise this route however this number may increase due to the shortened routeing provided by P86.

Figure 38: Proposed new RNAV-1 ATS Route P86

3.3.3.8 (U)P88

(U)P88 is established from existing waypoint in the Brest FIR REVTU as follows: REVTU-ODREP-GOKTU-VASUX. New waypoint ODREP will be the Coordination (COP) on the FIR boundary.

In the UK P88 will be published FL125-FL245 whilst UP88 will be published FL245-FL460. Both routes will have an assigned minimum navigational performance of RNAV-1.

Both routes will be CDRs as follows:

CDR 1 & 3 H24 FL195 and above subject to activity within Danger Area D036

CDR 3 H24 below FL195 subject to activity within Danger Area D036.

Both routes will be available eastbound only but with westbound level allocation due to ATC operational reasons. It will have a RAD restriction making it only available for Gatwick arrivals.

This route starts in the Brest FIR to split EGKK and EGLL arrivals as far South as possible. Currently Brest ACC are permitted to transfer aircraft to LAC at the same level on the existing (U)P87 and (U)N867 as these routes are spaced by 12nm. This new route requires a change to the levels of acceptance of traffic from Brest ACC to LAC. LAC are not able to accept traffic at the same level on (U)P88 and (U)N867. From ODREP however (U)P88 will be spaced 7nm from (U)P87 providing a new systemised route network for EGKK arrivals against the EGLL arrivals on (U)P87. This route will be deployed on 9th November, but will be RAD restricted as closed until 7th December to allow Brest ACC additional time for controller training. Whilst it is closed Gatwick arrivals will route via (U)P87.

Based on 2016 traffic figures the number of aircraft likely to flight plan (U)P88 will be around 37700 per annum.

Details pertinent to the design of (U)P88 and its spacing in relation to D037/D038, eastbound ATS route (U)P87 and the ROXOG 1H (OCK 1Z) STAR can be found in the SAIP AD1 RSAD.

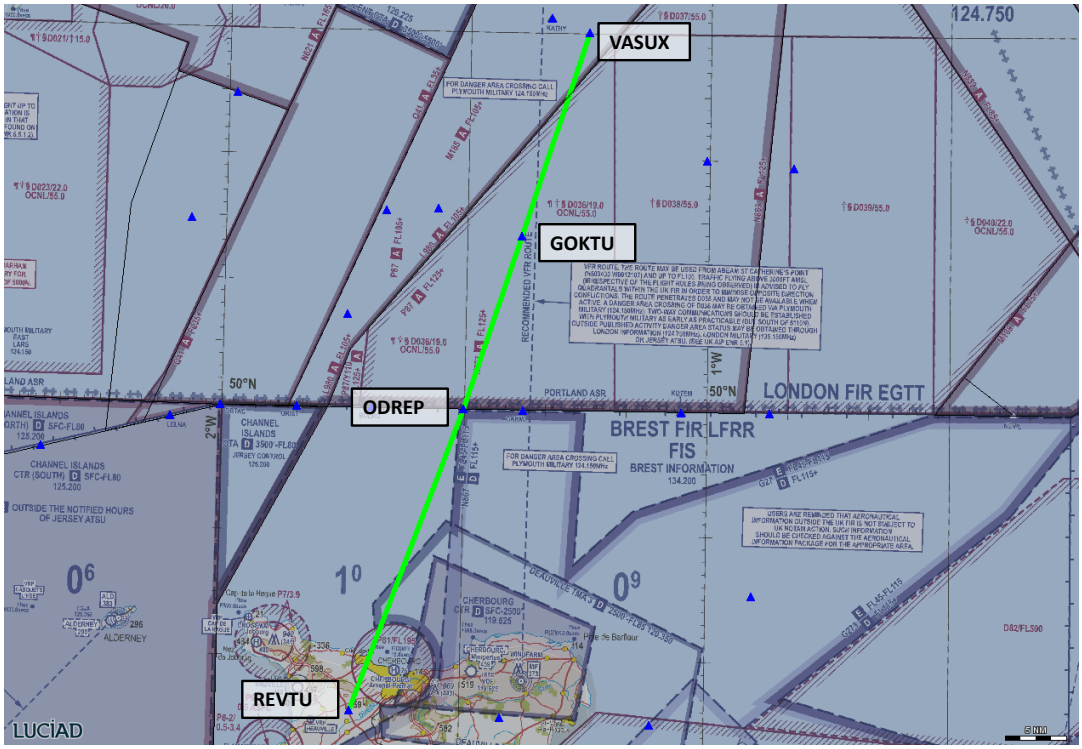

Figure 39: Proposed new RNAV-1 ATS Route (U)P88

3.3.3.9 Y113

Y113 is established from existing waypoint ORTAC on the FIR boundary to new waypoint ERGUM to connect with the proposed new route L982. It will be established FL105-FL460, it will have an assigned minimum navigational performance of RNAV-1 and will be available eastbound only.

Based on 2016 it will be used by around 8150 flights per annum.

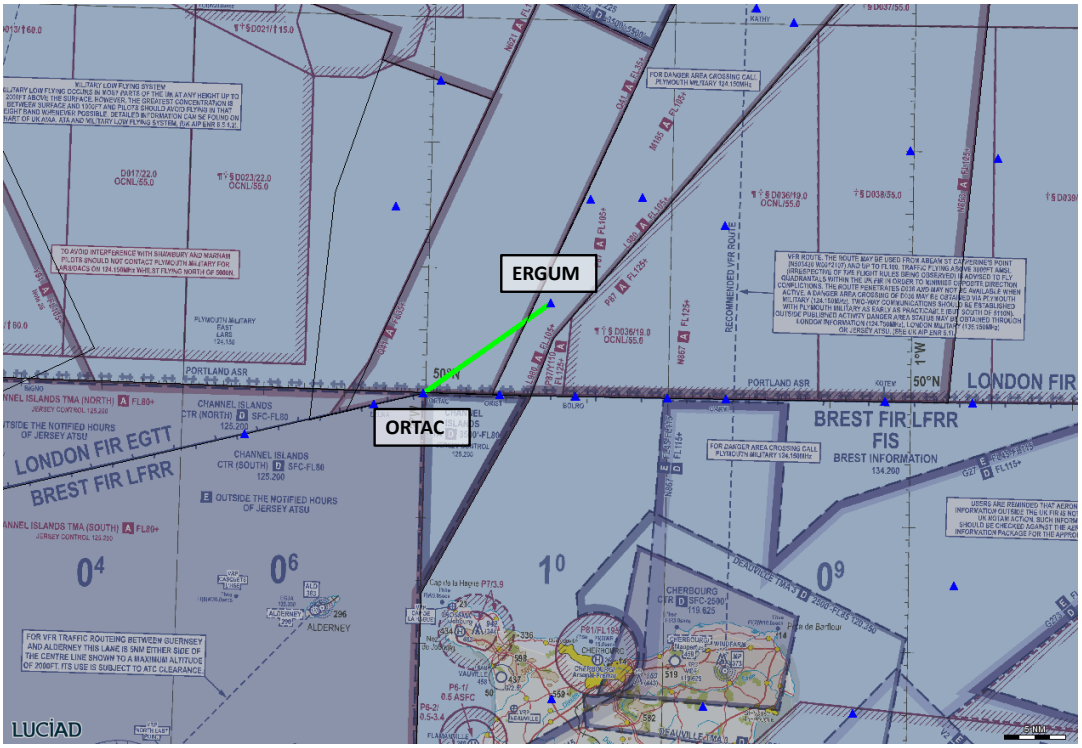

Figure 40: Proposed new RNAV-1 ATS Route Y113

3.3.3.10 Z171

New ATS route Z171 will be coincident with existing ATS route Q41 as follows: SAM-NEDUL-THRED-ASPEN-ORTAC.

Z171 will be published FL125-FL460 and will have an assigned minimum navigational performance of RNAV-1.

Z171 utilises CAP1385 route spacing from the EGLL/WU ROXOG 1H (OCK 1Z) STAR. Q41 will continue to provide route connectivity for RNAV-5 aircraft between SAM and ORTAC subject to a maximum cruise level of FL120.

Details pertinent to the design of Z171 and the route spacing used against (U)P87/ROXOG 1H (OCK 1Z) are included in the SAIP AD1 RSAD.

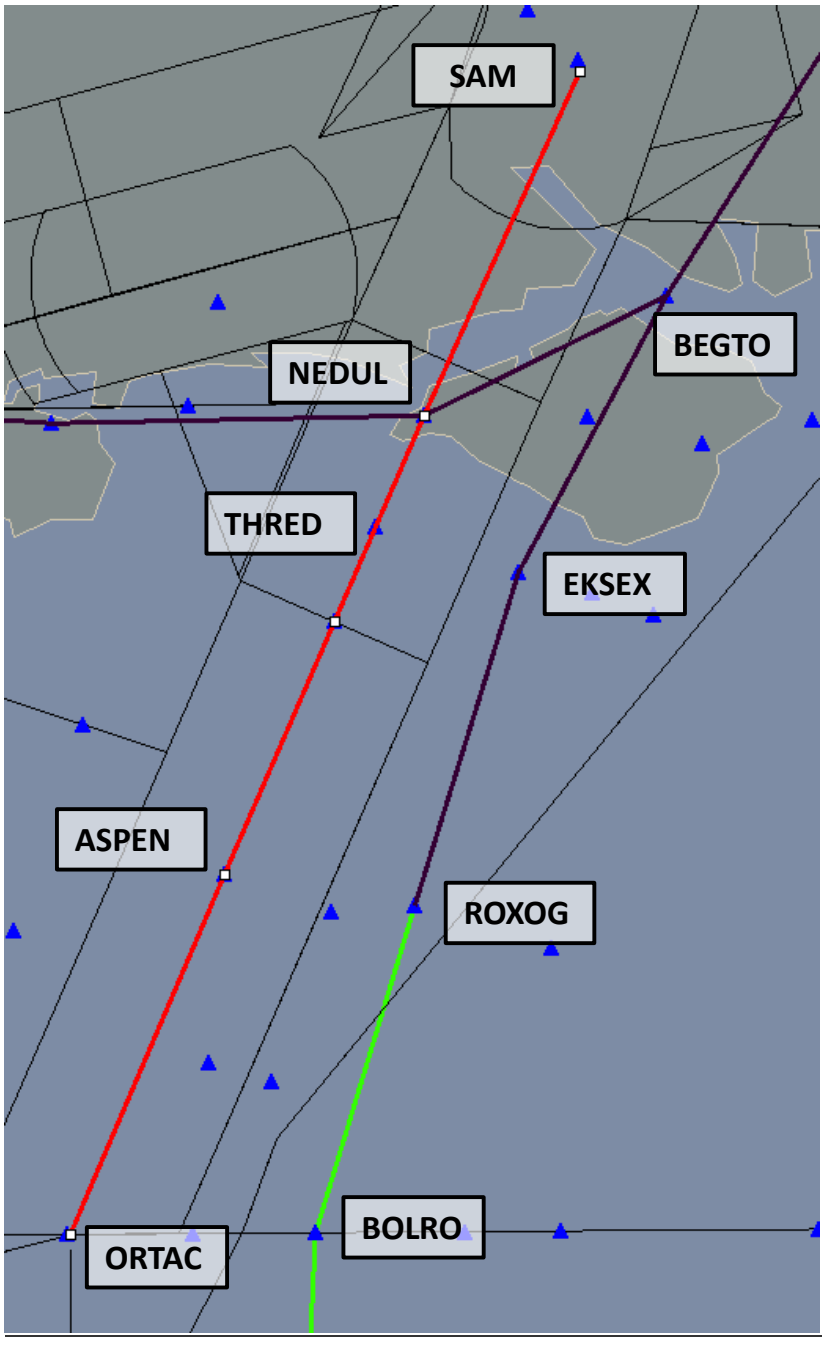

Figure 41: Z171

3.4 Addressing the Design Principles

The Design Principles on which these changes are predicated are listed in Section 1.3 Design Principles. This section describes how each principle has been addressed.

3.4.1 Provide a closely spaced route structure using RNAV-1 navigation standard

Most of the proposed STARs and ATS routes are specified to RNAV-1 standards. Where the change requires less than the current 3nm CAS separation, individual mitigations have been included (these are contained in the SAIP AD1 RSAD) as well as a generic argument for 2nm containment. The proposed changes help segregate the flows of traffic and improve efficiency as a consequence.

3.4.2 Improve flight profiles (height and track length)

The proposed routes/STARs should result in a reduction in flight planned fuel uplift – see section 2.5 and standardised flight planning. It should also require less tactical intervention.

3.4.3 Maintain access for non RNAV-1 compliant aircraft

The proposal will not immediately remove the extant conventional STARs, holds or RNAV-5 routes. These will be removed at a later date once it has been determined that the respective fleets on each route are fully RNAV-1 equipped.

In the meantime an RNAV-1 'attention getter', which has previously been used in NATS operations, has been implemented. This will highlight to controllers any non-RNAV-1 equipped aircraft.

3.4.4 No changes to routes or tracks at or below 7000ft

The route changes are above the minimum holding stack level which in the LTMA is always at least 7000ft.

Figure 10, Figure 12 and Figure 14 illustrate inbound traffic at FL140 and above. In the case of OCK and LOREL these images demonstrate that traffic is at these levels after the common point at which the new STARs align with the existing STARs and therefore there will be no change to tracks over the ground or noise profile at or below 7000ft.

For the new WILLO STARs, Figure 10 illustrates that the majority of traffic today is entering the hold at FL120 and above. This is not likely to alter with the implementation of this change. When these details are combined with Figure 43 which illustrates the vast number of tracks in the vicinity of the WILLO hold at and below 7000ft it can be assumed that there will be no noticeable change in noise patterns to people on the ground.

The use of RNAV-1 routes that separate the traffic flows would be expected to reduce the amount of vectoring required, however tactical direct routeing would still be used when appropriate. Therefore, whilst some concentration on the new routes above 7000ft is expected, many aircraft will still be positioned over the same areas as they are today.

In particular, tactical intervention (vectoring or routeing direct) will still be required to achieve a stream of arrivals into the next sectors.

3.4.5 No increase in Controlled Airspace volumes

No additional Controlled Airspace (CAS) is required as a result of this proposal.

3.4.6 No impact to GA operations

There is no foreseen impact to GA operations as a result of this proposal.

3.4.7 No adverse impact to military operations

The UK Ministry of Defence (MOD) have been consulted and confirm they have no objection to the proposal, see Appendix A: Evidence of Consultation with Military, Airports & Airlines.

3.5 Proposed New Airspace/Route Definition & Usage

The new ATS Route structure is defined in the NATS PDG report (previously submitted to SARG) the Airspace Design Definition document (see Appendix C: Proposed AIP Amendments, Airspace Design Document & WGS84 Form and as detailed earlier in this ACP.

The existing conventional WILLO and OCK STARs have en-route holds associated to and aligned with them. These will remain with the implementation of the new RNAV-1 STARs and will be used by RNAV-1 and RNAV-5 aircraft with entry being made via vectoring and direct route instructions from ATC.

As today, the proposed stack swap STARs will not be flight plannable but will be used on a tactical basis. Initially they will be issued rarely with controllers who will instead mainly use vectors. Use of the route is expected to increase in the future as ATC become more systemised. The stack-swaps are expected to operate at the same levels as today. Namely no lower than FL120 and more usually FL140 to FL150.

3.5.1 ATC Sectors

To incorporate the revised ATS route structure into the Swanwick ATC operation there are boundary changes, both lateral and vertical, to several Area and Terminal Control sectors. These are: Sector 18, 19, 20, 21, 22, 25, TC WILLO and TC CPT. In the area known as the TELTU triangle (see Figure 44) dispensation will be sought to allow TC CPT Controllers to continue to use 3nms separation up to FL215 in what will become AC airspace. This will be assured by ensuring that no conflicting traffic (that is not already known to TC CPT) is allowed to penetrate the TELTU triangle without coordination.

Figure 42: TELTU TRIANGLE

3.5.2 Holds

En-Route

The currently published en-route holds of BILNI, DOMUT and KATHY are not positioned on any of the proposed RNAV-1 STARs. They are therefore sometimes referred to as 'Floating Holds'. Pilots will be directed to them tactically. They are listed in ENR3.6 but currently do not have an associated chart.

NATS asserts that it is acceptable to utilise "floating holds" in this situation because they are used extremely rarely for contingency purposes only and there is only one hold published for each waypoint in question (see UK AIP ENR 3.6). Data was examined for two 3 month periods (Dec 2015 - Feb 2016, and July – September 2016).

During this time no aircraft used the holds in question. This does not indicate that the holds are never used but serves as a demonstration that it is a rare event.

Holding Stacks

The spread of current tracks and approach angles to the holds will mean that there is no discernible difference to today in terms of track into the hold and joining procedures for pilots.

3.5.3 TELTU 1G (TIMBA 1E) stack-swap STAR

The proposed STAR has the common joining point of SFD with the existing stack swap STAR (TIMBA 1C, see Figure 3) which is above FL70 as they descend into the TIMBA hold.

Figure 43 (two weeks in September 2016) demonstrates that the area between SFD and TIMBA is crisscrossed with Gatwick and other traffic at FL70 and below. A slight realignment of the STAR running into SFD is unlikely to be noticed for one to two flights per day and all will be above 7000ft.

Figure 44 from the same sample dates shows the typical location of flights when they reach FL70, inbound to and outbound from Gatwick. It illustrates that they are well away from SFD with inbound flights staying high to allow outbound flights via SFD to climb.

Inbound flights are at circa FL100 at SFD, the common joining point with the current STAR. Therefore, any change in the approach to SFD as a consequence of a change to the design of the STAR will occur above FL100.

It is expected that the full STAR will be used more often for stack-swapping aircraft over time, however the numbers of aircraft performing a stack swap is not expected to increase.

This STAR provides a consistent radio failure procedure.

3.5.4 AMDUT 1G/ARNUN 1G (WILLO 1M & 1N) stack-swap STARs

As today the proposed stack-swap STARs will not be flight-plannable but will be used on a tactical basis. They are expected to operate at the same levels as today. Namely no lower than FL120 and more usually FL140 to FL150.

Figure 45 illustrates that some of the track is over the sea and shows that the area between ARNUN and the South coast and then between HASTY/AMDUT and the coast inbound to SFD is crisscrossed with Gatwick and other traffic at FL70 and below. It is highly unlikely that one to two flights per day on this route, above 7000ft, will be noticed.

Figure 46 illustrates the typical location of flights when they reach FL70, inbound and outbound from Gatwick. It illustrates that they are well away from SFD with inbound flights staying high to allow outbound flights via SFD to climb.

Inbound flights are at circa FL100 at SFD, the common joining point with the current STAR. So any change in the approach to SFD as a consequence of a change to the design of the STAR will occur above FL100.

It is expected that the full STAR will be used more often for stack-swapping aircraft over time, however the numbers of aircraft performing a stack swap is not expected to increase. They do provide a consistent radio failure procedure.

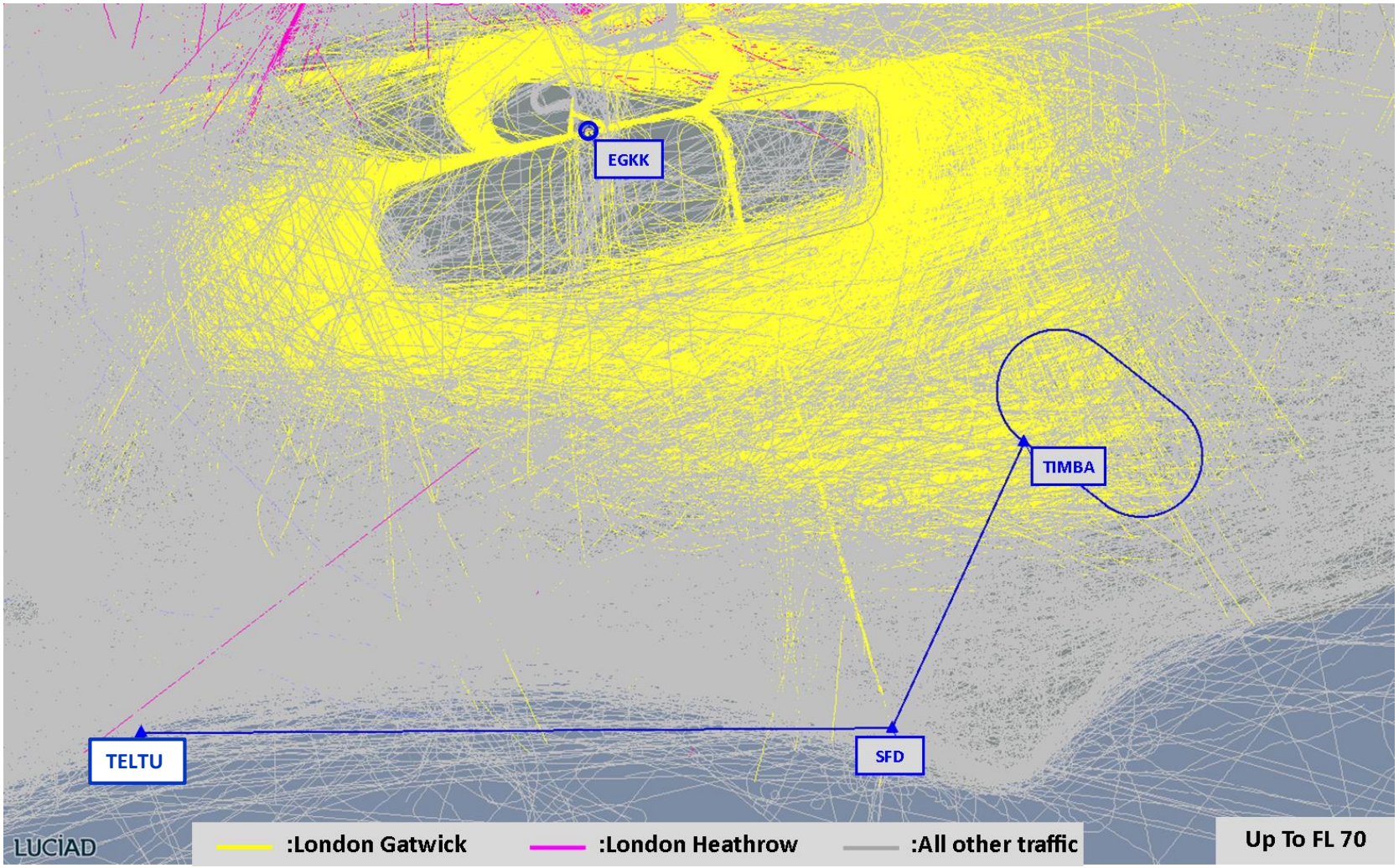

Figure 43: Proposed TELTU 1G (TIMBA 1E) STAR - All Traffic FL70 and Below

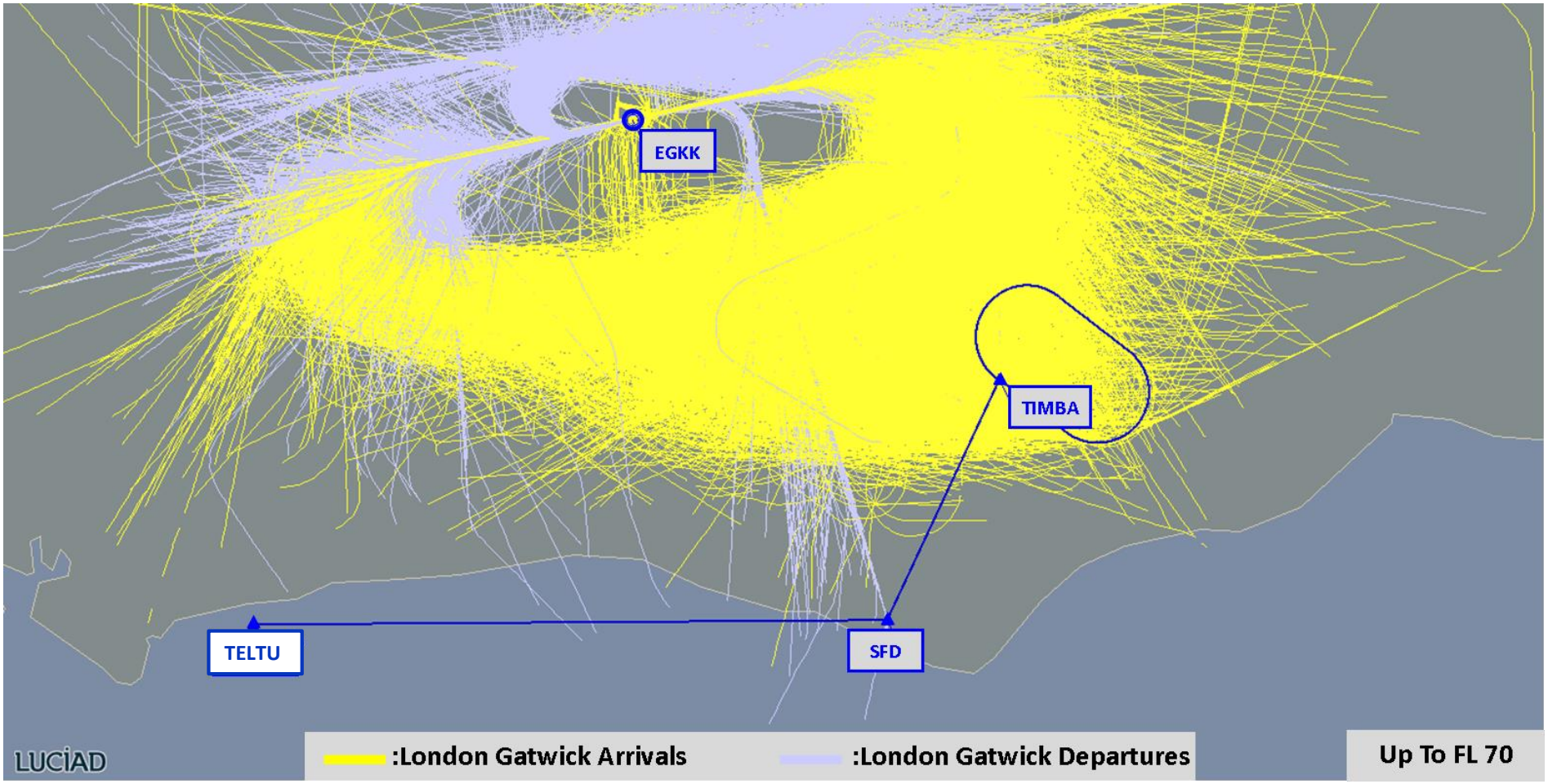

Figure 44: Proposed TELTU 1G (TIMBA 1E) STAR – Gatwick Inbounds & Outbounds FL70 and Below

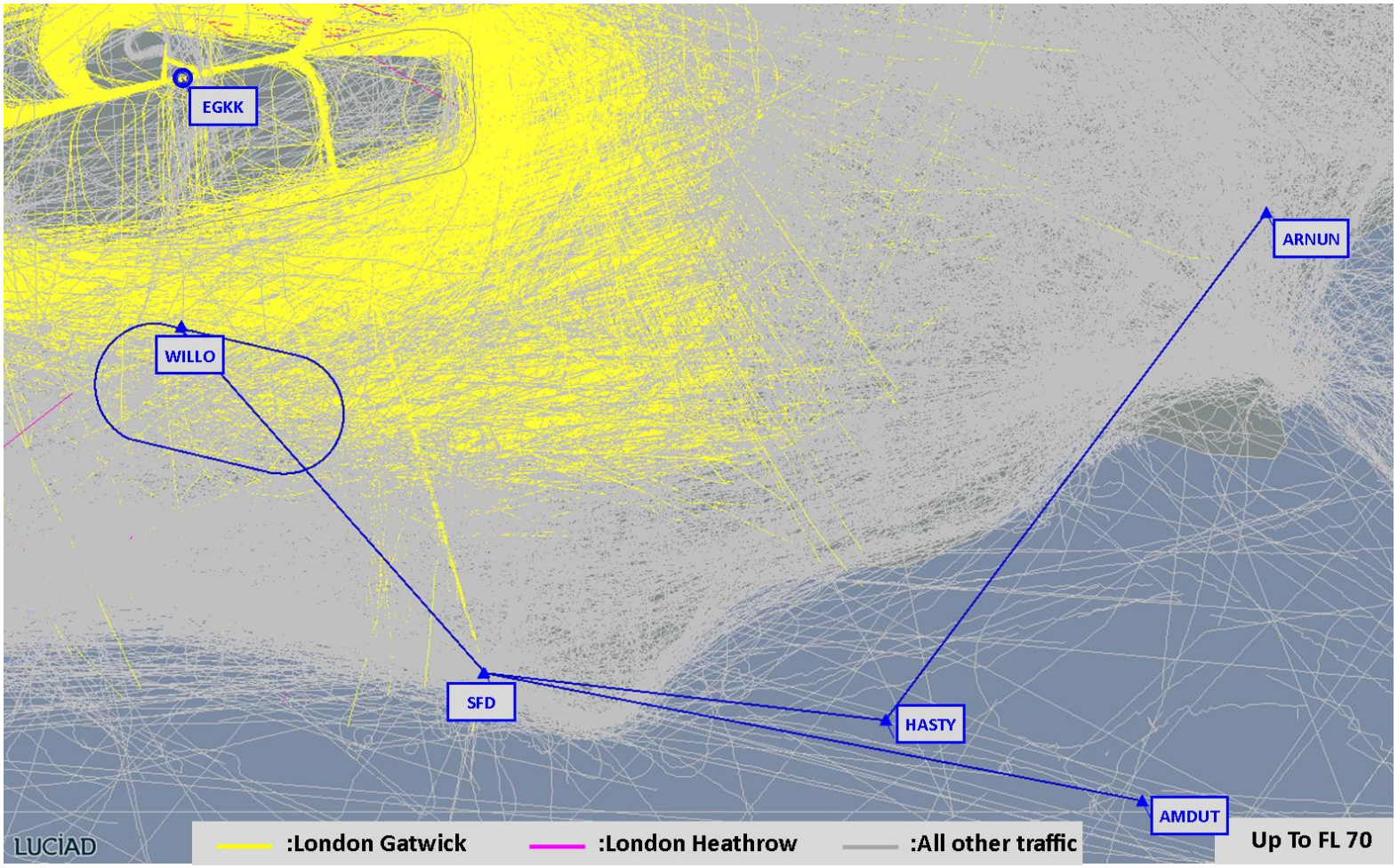

Figure 45: WILLO stack-swap STARs - All Traffic FL70 and Below

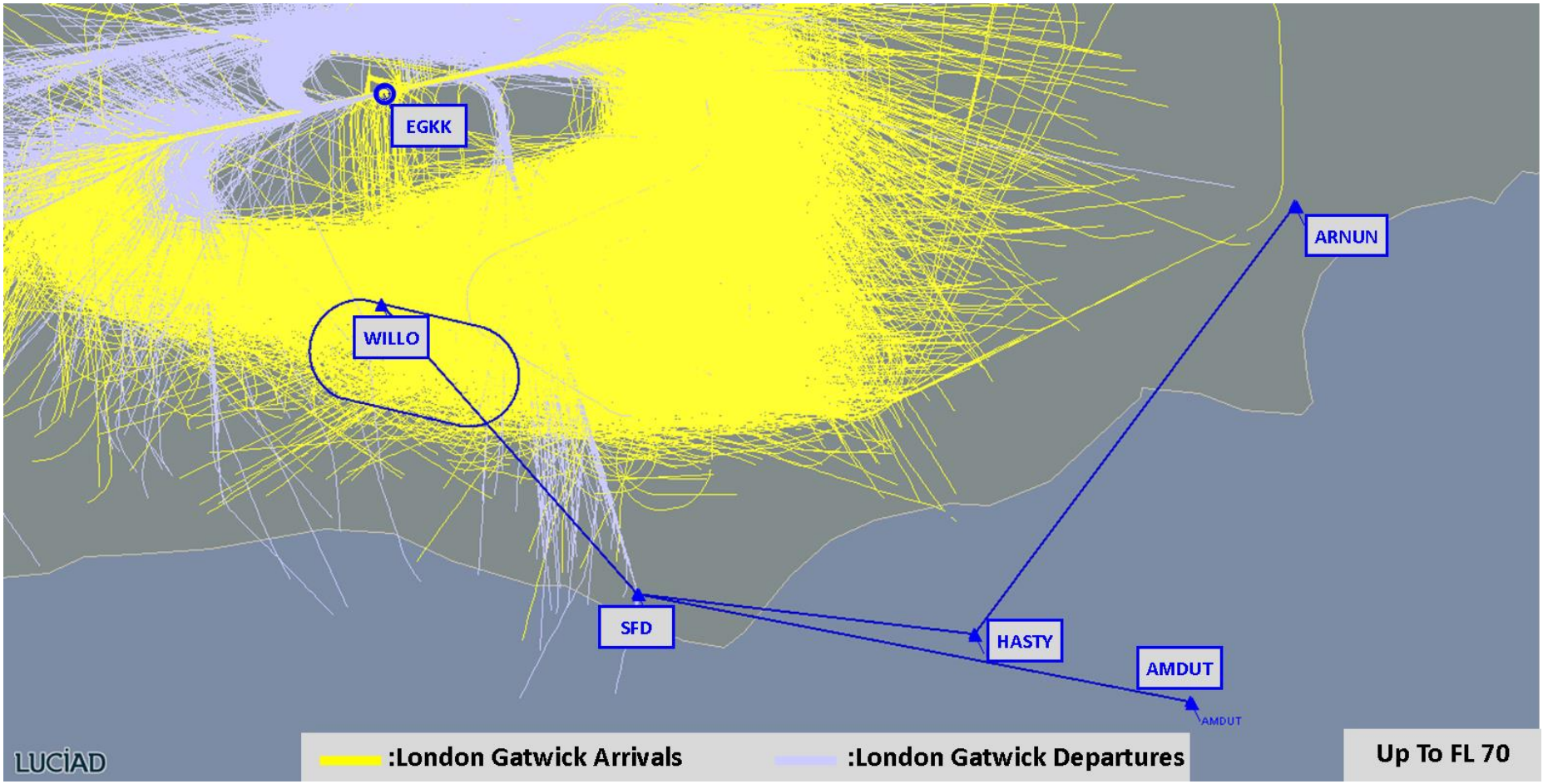

Figure 46: WILLO stack-swap STARs – Gatwick Inbound & Outbound flights FL70 and Below

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4 Impacts of Airspace Change

4.1 Net Impacts Summary for Proposed Routes

Category	Impact	Evidence
Safety/Complexity	Use of RNAV-1 reduces workload and therefore complexity	See Sections 2.6 & 4.3
Capacity/Delay	Use of RNAV-1 reduces workload and therefore complexity	See Sections.2.4
Fuel Efficiency	Fuel uplift savings for all flights on the route	See Sections 2.5 & 4.9
CO_2	Fuel uplift savings for all flights on the route	See Section 4.9
Noise – Leq/SEL	No significant impact	Changes all above 7000ft. See Section 3.4.4
Tranquillity & visual intrusion on AONBs & National Parks	No significant impact	Changes all above 7000ft. See Section 3.4.4 & 4.10
Local Air Quality	No significant impact	Changes all above 7000ft. See Section 3.4.4 & 4.10
Other Airspace Users	No impact	See Sections 4.4, 4.5 & 4.6

Table 3: Net Impacts Summary

4.2 UK Units Affected by the Proposal

The proposal affects the following NATS sector groups:

BHD – new RNAV-1 ATS routes introduced in this sector group on the S6/S20 interface

WOR – new RNAV-1 ATS routes (including both CDRs and permanent routes). New RNAV-1 STARs for Heathrow, Northolt, Gatwick, Luton, Stansted and Cambridge. Change in standing agreement between S20 and S22 (FL180 increased by 3000ft to FL210 – facilitated by this change).

TC South – new RNAV-1 STARs for Heathrow, Northolt and Gatwick.

4.3 Safety Issues/Analysis

Ensuring the safety of proposed changes is a NATS priority. As such the proposal has been developed, and will be implemented in accordance with NATS Safety Management System.

All proposed procedures have been designed in accordance with ICAO PANS-OPS RNAV procedure design criteria.

All proposed procedures have been determined to be "flyable" and no flyability testing has been undertaken.

4.4 Military Implications & Consultation

The military have raised no objection to the changes. See Appendix A: Evidence of Consultation with Military, Airports & Airlines.

4.5 General Aviation Airspace Users Impact

No new CAS is proposed and there is no impact on GA activities.

4.6 Commercial Air Transport Impact

As the primary driver for SAIP AD1 is to make the route network more efficient, no adverse operational impacts are predicted for commercial aircraft operators. The following airlines, which regularly utilise the ATS routes involved, were fully briefed about the changes at the Flight Efficiency Partnership Meeting at Prestwick Centre on the 23rd of Feb 2017:

[redacted]

They were presented with the information available at the time which was that the change includes:

- New WILLO (5.5nm saving) and OCK (7nm saving) STARs via BOLRO
- New WILLO (2nm saving) and OCK (3.5nm saving) STARs via GIBSO
- RNAV1 ATS routes to/from Sector 6 to remove head on interaction at GIBSO
- RNAV1 Off Load route for UN863 for EGGW and EGSS traffic (capacity benefit for Sector 19)
- EGSS/EGGW arrivals 3.3nm saving and increase of level restriction from FL340 to FL380
- EGBB/EGNX arrivals 2.7 nm saving and maximum level restriction lifted from FL360 to unlimited

- RNAV1 CDR SAM-OLGUD-LELNA to reduce track mileage for EGBB/BE/SS/SC/NX/MC departures routeing which currently route via UN621 (3nm saving)
- RNAV1 route (M195) to reduce track mileage for EGLL/KK/GW/WU/LF/TD/LK/TF departures routeing via LELNA (will be able to route SAM-MARUK-LELNA – 2nm saving)
- C.3KT fuel savings
- Requirement of changes to sector boundaries for AC

No objection was raised from the airlines present and no actions specific to this proposal were forthcoming. See Appendix A for slidepack and meeting notes.

4.7 Impact on Adjacent ANSPs

DSNA Ouest (Brest) ACC have been involved with the development of this proposal. The forecast benefits of this proposal can only be fully realised by starting some of the new/revised ATS routes ((U)M185 and (U)P88) in the French UIR. The routes require some changes to the transfer of control conditions between Brest and LAC (Swanwick) and these will be detailed in the appropriate LoA.

These changes have been agreed by Brest and by DSNA Direction des Operations – see appendix E. The routes will be published in the French AIP in November but not available for use until controller training is completed at Brest ACC for full opening on December the 7th 2017.

No other adjacent ANSP is directly affected by this proposal although several ANSPs including Jersey ATC will require map updates for the letter of agreement.

4.8 Airport Impact

This proposal has no impact on airport operations, however Gatwick, Heathrow, Northolt, Luton, Stansted and Cambridge have been consulted and none object to the proposal (see Appendix A: Evidence of Consultation with Military, Airports & Airlines.).

An exceptional engagement process was conducted at the request of Heathrow Airport Ltd whereby NATS attended several HAL operational, working and community groups to communicate the nature of the change and to discuss the likely impacts of the change. NATS key message was that there should be no noticeable impact below 7000ft.

The Heathrow engagement presentations are at Appendix A: Evidence of Consultation with Military, Airports & Airlines.

4.9 CO_2 Environmental Analysis Impact

The proposal will provide enabled fuel benefits as described in the fuel analysis report. See Appendix D: Environmental Benefit Assessment.

4.10 Local Environmental Impacts

There are no changes to tracks at or below 7000ft and therefore no local consultation has been undertaken (see paragraph 3.4.4) except that covered in Section 4.7 above, on behalf of HAL.

4.11 Economic Impact

NATS is not aware of any established methodology that is widely accepted as providing a complete and robust economic valuation of the environmental impacts of changes to airspace structure. Furthermore, NATS will not base the case for change on an economic valuation of environmental impact and therefore does not propose to attempt to provide or develop such analysis.

5 Analysis of options

This proposal has been developed to provide a closely spaced route structure that broadly mirrors the existing vectoring practices. As such the design scope was limited and the only alternative option considered was the 'do-nothing' option. The airspace in question is considerably constrained by the position of Danger Areas, Temporary Reserved Areas and traffic delivery which would be acceptable to Brest ACC.

NATS is committed to modernising the route network and to systemising traffic flows. Likewise we are committed to ensuring efficiency of the operation in terms of delay and fuel consumption. Doing nothing was rejected on the basis that it would not achieve the above commitments.

The ADD at Appendix C: Proposed AIP Amendments, Airspace Design Document & WGS84 Form details the final design iteration prior to submission. This is a living document and as such has been through several iterations to arrive at this stage. Previous iterations of the document illustrating the evolution of the design are available on request.

6 Airspace Description Requirement

CAP 725, Appendix A Paragraph 5, provides a list of requirements for a proposed airspace description. These are listed below:

	CAA CAP725, Appendix A paragraph 5 Requirement. "The proposal should provide a full description of the proposed change including the following:"	**Description for this Proposal**
A	The type of route or structure; e.g. Airway, UAR, Conditional Route, Advisory Route, CTR, SIDs/STARs, Holding Patterns, etc;	RNAV-1 STARs and new ATS routes as detailed in section 3
B	The hours of operation of the airspace and any seasonal variations;	The STARs and link routes will be available H24, 7 days per week subject to airport operating restrictions and RAD restrictions.
C	Interaction with domestic and international en-route structures, TMAs or CTAs with an explanation of how connectivity is to be achieved. Connectivity to aerodromes not connected to CAS should be covered;	Various link routes will connect the STARs to the ATS network. See section 3
D	Airspace buffer requirements (if any);	See RSAD
E	Supporting information on traffic data including statistics and forecasts for the various categories of aircraft movements (Passenger, Freight, Test and Training, Aero Club, Other) and Terminal Passenger numbers;	Traffic data for current STAR usage is detailed in section 2.3. The new STARs are not expected to influence the traffic volumes routing through them.
F	Analysis of the impact of the traffic mix on complexity and workload of operations;	The new ATS routes and STARs will start to position traffic appropriately to reduce controller workload, reduce complexity, raise level restrictions and reduce flight planned track mileage. See section 3
G	Evidence of relevant draft Letters of Agreement, including any arising out of consultation and/or Airspace Management requirements;	A list of LoAs which require amendment is listed in Appendix G.

H	Evidence that the Airspace Design is compliant with ICAO Standards and Recommended Practices (SARPs) and any other UK Policy or filed differences, and UK policy on the Flexible Use of Airspace (or evidence of mitigation where it is not);	See NATS Procedure Design Group report previously submitted to SARG. ICAO STAR designation convention **may** be introduced with the RNAV STARs in this change.
I	The proposed airspace classification with justification for that classification;	There is no change to the airspace classification as a result of this proposal
J	Demonstration of commitment to provide airspace users equitable access to the airspace as per the classification and where necessary indicate resources to be applied or a commitment to provide them in-line with forecast traffic growth. 'Management by exclusion' would not be acceptable;	No Change
K	Details of and justification for any delegation of ATS.	Not applicable

7 Operational Impact

CAA CAP725, Appendix A Paragraph 7, provides a list of requirements for operational impact. These are listed below:

	CAA CAP725, Appendix A paragraph 7 requirements. "An analysis of the impact of the change on all airspace users, airfields and traffic levels must be provided, and include an outline concept of operations describing how operations within the new airspace will be managed. Specifically, consideration should be given to:"	**Evidence of Compliance/Proposed Mitigation**
a	Impact on IFR General Air Traffic and Operational Air Traffic or on VFR General Aviation (GA) traffic flow in or through the area;	See Section 3 & 4
b	Impact on VFR operations (including VFR Routes where applicable);	see Section 3 & 4
c	Consequential effects on procedures and capacity, i.e. on SIDs, STARs, and/or holding patterns. Details of existing or planned routes and holds;	See Section 3 & 4
d	Impact on aerodromes and other specific activities within or adjacent to the proposed airspace;	See section 4
e	Any flight planning restrictions and/or route requirements.	See Sections 3 & 4

8 Supporting Infrastructure & Resources

CAA CAP725, Appendix A Paragraph 6, provides a list of requirements for supporting infrastructure/resources. These are listed below:

	CAA CAP725, Appendix A Paragraph 6, general Requirements	**Evidence of Compliance/Proposed Mitigation**
a	Evidence to support RNAV and conventional navigation as appropriate with details of planned availability and contingency procedures.	See Section 3.3
b	Evidence to support primary and secondary surveillance radar (SSR) with details of planned availability and contingency procedures.	No change to extant radar coverage, which is demonstrably sufficient
c	Evidence of communications infrastructure including R/T coverage, with availability and contingency procedures.	Some sectorisation changes. DOCs have been checked and it is confirmed that no change to the existing DOCs are required.
d	The effects of failure of equipment, procedures and/or personnel with respect to the overall management of the airspace must be considered.	No change
e	The Proposal must provide effective responses to the failure modes that will enable the functions associated with airspace to be carried out including details of navigation aid coverage, unit personnel levels, separation standards and the design of the airspace in respect of existing international standards or guidance material.	The RNAV-5 network is being retained in parallel with this deployment.
f	A clear statement on SSR code assignment requirements is also required.	No change
g	Evidence of sufficient numbers of suitably qualified staff required to provide air traffic services following the implementation of a change.	No changes in staffing will be required as a result of this proposal

9 Airspace & Infrastructure Requirements

CAA CAP725, Appendix A Paragraphs 11-14, provides a list of requirements for airspace and infrastructure. These are listed below:

	CAA CAP725, Appendix A paragraph 11: General Requirements	**Evidence of Compliance/Proposed Mitigation**
A	The airspace structure must be of sufficient dimensions with regard to expected aircraft navigation performance and manoeuvrability to fully contain horizontal and vertical flight activity in both radar and non-radar environments;.	There will be no change to current airspace volumes as a consequence of this change.
B	Where an additional airspace structure is required for radar control purposes, the dimensions shall be such that radar control manoeuvres can be contained within the structure, allowing a safety buffer. This safety buffer shall be in accordance with agreed parameters as set down in CAA SARG Policy Statement 'Safety Buffer Policy for Airspace Design Purposes Segregated Airspace';	Not applicable
C	The Air Traffic Management (ATM) system must be adequate to ensure that prescribed separation can be maintained between aircraft within the airspace structure and safe management of interfaces with other airspace structures;	Reasonable allowance for separation has been made in designing these routes commensurate with agreed RNAV-1 standards. See Sections 3 & 4
D	Air Traffic Control (ATC) procedures are to ensure required separation between traffic inside a new airspace structure and traffic within existing adjacent or other new airspace structures;	Reasonable allowance for separation has been made in designing these routes commensurate with agreed RNAV-1 standards. See Sections 3 & 4 and SAIP AD1 RSAD
E	Within the constraints of safety and efficiency, the airspace classification should permit access to as many classes of user as practicable;	No change to airspace classification
F	There must be assurance, as far as practicable, against unauthorised incursions. This is usually done through the classification and promulgation.	Standard AIRAC notification timescales for change
G	Pilots shall be notified of any failure of navigational facilities and of any suitable alternative facilities available and the method of identifying failure and notification should be specified;	No change
h	The notification of the implementation of new airspace structures or withdrawal of	Changes will be notified in good time (one AIRAC cycle)

	redundant airspace structures shall be adequate to allow interested parties sufficient time to comply with user requirements. This is normally done through the AIRAC cycle;	
i	There must be sufficient R/T coverage to support the ATM system within the totality of proposed controlled airspace.	There are no proposed changes to the dimensions of CAS and aircraft already fly the proposed route. R/T coverage is demonstrably adequate for the task.
j	If the new structure lies close to another airspace structure or overlaps an associated airspace structure, the need for operating agreements shall be considered;	Not applicable
k	Should there be any other aviation activity (low flying, gliding, parachuting, microlight site, etc.) in the vicinity of the new airspace structure and no suitable operating agreements or ATC Procedures can be devised, the Change Sponsor shall act to resolve any conflicting interests;	Not applicable

	CAA CAP725, Appendix A paragraph 12: ATS Route Requirements	**Evidence of Compliance/Proposed Mitigation**
A	There must be sufficient accurate navigational guidance based on in-line VOR/DME or NDB or by approved RNAV derived sources, to contain the aircraft within the route to the published RNP value in accordance with ICAO/EuroControl Standards;	The proposed route is contained within airspace currently populated with numerous routes where navigation coverage is well proven and the navaid system is demonstrably appropriate for the task.
B	Where ATS routes adjoin Terminal Airspace there shall be suitable link routes as necessary for the ATM task;	Suitable link routes included as part of this ACP
C	All new routes should be designed to accommodate P-RNAV navigational requirements.	All routes are designed to a minimum standard of RNAV-5, but most routes are RNAV-1

	CAA CAP725, Appendix A paragraph 13: Terminal Airspace Requirements	Evidence of Compliance/Proposed Mitigation
a	The airspace structure shall be of sufficient dimensions to contain appropriate procedures, holding patterns and their associated protected areas;	CAS structures are sufficient and holding patterns are not affected. See SAIP AD1 RSAD and Appendix F: Airspace Containment Paper
b	There shall be effective integration of departure and arrival routes associated with the airspace structure and linking to designated runways and published IAPs;	See Sections 3 & 4
c	Where possible, there shall be suitable linking routes between the proposed terminal airspace and existing en-route airspace structure;	See Section 3
D	The airspace structure shall be designed to ensure that adequate and appropriate terrain clearance can be readily applied within and adjacent to the proposed airspace;	No change
E	Suitable arrangements for the control of all classes of aircraft (including transits) operating within or adjacent to the airspace in question, in all meteorological conditions and under all flight rules, shall be in place or will be put into effect by Change Sponsors upon implementation of the change in question (if these do not already exist);.	No change
F	Change Sponsors shall ensure that sufficient VRPs are established within or adjacent to the subject airspace to facilitate the effective integration of VFR arrivals, departures and transits of the airspace with IFR traffic;	Not applicable
G	There shall be suitable availability of radar control facilities;	The proposed routes are contained within airspace currently populated with numerous routes where radar coverage is well proven and is demonstrably appropriate for the task.
H	Change Sponsors shall, upon implementation of any airspace change, devise the means of gathering (if these do not already exist) and of maintaining statistics on the number of aircraft transiting the airspace in question. Similarly, Change Sponsors shall maintain records on the numbers of aircraft refused permission to transit the airspace in question, and the reasons why. Change Sponsors should note that such records would enable ATS Managers to plan staffing requirements necessary to effectively manage the airspace under their control;	Not applicable
I	All new procedures should, wherever possible, incorporate Continuous Descent Approach (CDA) profiles after aircraft leave the holding facility associated with that procedure.	No change to any procedures after the hold fixes currently used

	CAA CAP725, Appendix A paragraph 14: Off Route Airspace Requirements	Evidence of Compliance/Proposed Mitigation
	There are no proposed changes to off route airspace structures.	

10 Environmental Requirements

This section details the required elements of an Environmental Assessment for the Phase 2 ACP development, based upon CAP 725 Appendix B.

The requirements in this section are grouped by the degree of compliance expected from airspace change sponsors. In following this guidance:

- **Must** – change sponsors are to meet the requirements in full when this term is used.
- **Should** – change sponsors are to meet these requirements unless there is sufficient reason which must be agreed in writing with the CAA SARG case officer and the circumstances recorded in the formal airspace change documentation.
- **May** – change sponsors decide whether this guidance is appropriate to the circumstances of the airspace change.

	Requirement		**Ref.**	**Page**	
1	In order to ensure that the various areas for environmental assessment by CAA SARG are addressed, Change Sponsors should submit the documentation with the following clearly defined sections: Description of the airspace change (refer to 28 – 33); Traffic forecasts (refer to 34 – 38); An assessment of the effects on noise (refer to Sections 4 and 5); An assessment of the change in fuel burn/CO2 (refer to Section 6); An assessment of the effect on local air quality (refer to Section 7); and An economic valuation of environmental impact, if appropriate (refer to Section 9).	General	Para 2	B-1	Section 2.1 & 3 Section 2.3 Section 2.6 & 4.9 Section 4.8 Section 2.6 & 4.8 Section 4.10

2	It is considered unlikely that airspace changes will have a direct impact on animals, livestock and biodiversity. However, Change Sponsors should remain alert to the possibility and may be required to include these topics in their environmental assessment.	General	Para 18	B-4	See Section 4.10
3	Environmental assessment should set out the base case or current situation so that changes can be clearly identified.	General	Para 19	B-4	See Section 2.5 For reasons stated in No.1 above, no specific environmental analysis has been undertaken.
4	Environmental assessment should follow the Basic Principles listed in CAP 725.	General	Para 20	B-4	See Section 2.5 For reasons stated in No.1 above, no specific environmental analysis has been undertaken.
5	A technical document containing a comprehensive and complete description of the airspace change including the environmental impact will be required and must be produced for all airspace changes.	General	Para 25	B-6	See Sections 3 & 4
6	It may be appropriate for Change Sponsors to produce a more general description of the airspace change and the rationale for its proposal in an easy-to-read style for public consumption. If such an additional separate document is produced, it must contain details of the environmental impact of the proposal.	General	Para 25	B-6	Not applicable
7	The environmental assessment must include a high quality paper diagram of the airspace change in its entirety as well as supplementary diagrams Illustrating different parts of the change. This diagram must show the extent of the airspace change in relation to known geographical features and centres of population	Airspace Design	Para 28	B-7	See Sections 2 & 3
8	The proposal should consider and assess more than one option, then demonstrate why the selected option meets safety and operational requirements and will generate an overall environmental benefit or, if not, why it is being proposed.	Airspace Design	Para 29	B-7	See Sections 4 & 5

9	The Change Sponsor must provide CAA SARG with a complete set of coordinates describing the proposed change in electronic format using World Geodetic System 1984 (WGS 84). In addition, the Sponsor must supply these locations in the form of Ordnance Survey (OS) national grid coordinates.	Airspace Design	Para 30	B-7	The proposed routes are contained within existing CAS as described in Section 2.
10	This electronic version must provide a full description of the horizontal and vertical extent of the zones and areas contained within the airspace change. It must also include coordinates in both WGS 84 and OS national grid formats that define the centre lines of routes including airways, standard instrument departures (SID), standard arrival routes (STAR), noise preferential routes (NPR) or any other arrangement that has the effect of concentrating traffic over a particular geographical area.	Airspace Design	Para 30	B-7	See Section 2
11	Change Sponsors should provide indications of the likely lateral dispersion of traffic about the centre line of each route. This should take the form of a statistical measure of variation such as the standard deviation of lateral distance from the centre line for given distances along track in circumstances where the dispersion is variable.	Airspace Design	Para 31	B-7	As there is no reason for there to be any change to the current tracks this has not been included in the analysis
12	Sponsors may supply the outputs from simulation to demonstrate the lateral dispersion of traffic within the proposed airspace change or bring forward evidence based on actual performance on a similar kind of route. It may be appropriate for Sponsors to explain different aspects of dispersion e.g. dispersion within NPRs when following a departure routeing and when vectoring – where the aircraft will go and their likely frequency	Airspace Design	Para 31	B-7	As there is no reason for there to be any change, this has not been included in the analysis
13	Change Sponsors must provide a description of the vertical distribution of traffic in airways, SIDs, STARs, NPRs and other arrangements that have the effect of concentrating traffic over a particular geographical area	Airspace Design	Para 32	B-7	No change to current operations
14	For departing traffic, sponsors should produce profiles of the most frequent type(s) of aircraft operating within the airspace. They should show vertical profiles for the maximum, typical and minimum climb rates achievable by those aircraft.	Airspace Design	Para 32	B-7	Not Applicable

15	A vertical profile for the slowest climbing aircraft likely to use the airspace should also be produced.	Airspace Design	Para 32	B-8	Not Applicable
16	All profiles should be shown graphically and the underlying data provided in a spread sheet with all planning assumptions clearly documented.	Airspace Design	Para 32	B-8	Not Applicable
17	Change Sponsors should explain how consideration of CDA and LPLD is taken into account within their proposals	Airspace Design	Para 33	B-8	This change will not affect the ability of IFR traffic to perform CDAs & LPLD
18	In planning changes to airspace arrangements, sponsors may have conducted real and/or fast time simulations of air traffic for a number of options.	Traffic Forecasts	Para 34	B-8	Not Applicable
19	Change Sponsors must include traffic forecasts in their environmental assessment.	Traffic Forecasts	Para 35	B-8	Growth of traffic does not affect the design and therefore traffic forecast figures have not been supplied.
20	Information on air traffic must include the current level of traffic using the present airspace arrangement and a forecast. The forecast will need to indicate the traffic growth on the different routes contained within the airspace change volume.	Traffic Forecasts	Para 35	B-8	Growth of traffic does not affect the design and therefore traffic forecast figures have not been supplied.
21	The sources used for the forecast must be documented.	Traffic Forecasts	Para 35	B-8	Not Applicable
22	Typically, forecasts should be for five years from the planned implementation date of the airspace change. There may be good reasons for varying this – for example, to use data that has already been made available to the general public at planning inquiries, in airport master plans or other business plans	Traffic Forecasts	Para 36	B-8	Not Applicable
23	It may also be appropriate to provide forecasts further into the future than five years: examples are extensive airspace changes or where traffic is forecast to grow slowly in the five-year period but faster thereafter.	Traffic Forecasts	Para 36	B-8	Not Applicable

24	It may be appropriate for Change Sponsors to outline the key factors [affecting traffic forecasts] and their likely impact. In these circumstances, Sponsors should consider generating a range of forecasts based on several scenarios that reflect those uncertainties – this would help prevent iterations in the assessment process.	Traffic Forecasts	Para 37	B-8	A range of forecasts has not been produced. The justification for change is not sensitive to the degree to which traffic grows.
25	Traffic forecasts should contain not only numbers but also types of aircraft. Change Sponsors should provide this information by runway (for arrivals/departures) and/or by route with information on vertical distribution by height/altitude/flight level as appropriate.	Traffic Forecasts	Para 38	B-9	Not Applicable
26	Types of aircraft may be given by aircraft type/engine fit using ICAO type designators. If this is not a straightforward exercise, then designation by the UK Aircraft Noise Contour Model (ANCON) types or by seat size categories would be acceptable	Traffic Forecasts	Para 38	B-9	Not Applicable
27	Change Sponsors must produce Leq, 16 hours noise exposure contours for airports where the proposed option entails changes to departure and arrival routes for traffic below 4,000 feet agl based on the published minimum departure and arrival gradients. Under these circumstances, at least three sets of contours must be produced: Current situation – these may already be available as part of the airport's regular environmental reporting or as part of the airport master plan; Situation immediately following the airspace change; and Situation after traffic has increased under the new arrangements (typically five years after implementation although this should be discussed with the CAA SARG Case Officer).	Noise	Para 44	B-11	As traffic numbers are not expected to change by any noticeable or quantifiable extent and the routes will remain the same, noise analysis has not been undertaken.
28	The contours should be produced using either the UK Aircraft Noise Contour Model (ANCON) or the US Integrated Noise Model (INM) but ANCON must be used when it is currently in use at the airport for other purposes.	Noise	Para 46	B-12	Not Applicable
29	Terrain adjustments should be included in the calculation process (i.e. the height of the air routes relative to the ground are accounted for).	Noise	Para 47	B-12	Not Applicable

30	Contours must be portrayed from 57 dBA Leq, 16 hours at 3 dB intervals.	Noise	Para 48	B-12	Not Applicable
31	Contours should not be produced at levels below 54 dBA Leq, 16 hours because this corresponds to generally low disturbance to most people.	Noise	Para 48	B-12	Not Applicable
32	Change Sponsors may include the 54 dBA Leq, 16 hours contour as a sensitivity analysis but this level has no particular relevance in policy making.	Noise	Para 48	B-12	Not Applicable
33	A table should be produced showing the following data for each 3 dB contour interval: Area (km2); and Population (thousands) – rounded to the nearest hundred.	Noise	Para 49	B-12	Not Applicable
34	It is sometimes useful to include the number of households within each contour, especially if issues of mitigation and compensation are relevant: This table should show cumulative totals for areas/populations/households. For example, the population for 57 dBA will include residents living in all higher contours. The source and date of population data used should be noted adjacent to the table. Population data should be based on the latest available national census as a minimum but more recent updated population data is preferred. The areas calculated should be cumulative and specify total area within each contour including that within the airport perimeter.	Noise	Para 50	B-12	Not Applicable

35	Contours for assessment should be provided to CAA SARG in both of the following formats: Electronic files in the form of a comma delimited ASC2 text file containing three fields as an ordered set (i.e. coordinates should be in the order that describes the closed curve) defining the contours in Ordnance Survey National Grid in metres: Field Name Units 1 Level dB 2 Easting six figure easting OS national grid reference (metres) 3 Northing six figure northing OS national grid reference (metres) Paper version overlaid on a good quality 1:50 000 Ordnance Survey map. However, it may be more appropriate to present contours on 1:25 000 or 1:10 000 Ordnance Survey maps.	Noise	Para 51	B-13	Not Applicable
36	Contours for a general audience may be provided overlaid on a more convenient map (e.g. an ordinary road map with a more suitable scale for publication in documents). The underlying map and contours should be sufficiently clear for an affected resident to be able to identify the extent of the contours in relation to their home and other geographical features. Hence, the underlying map must show key geographical features, e.g. street, rail lines and rivers.	Noise	Para 53	B-13	Not Applicable
37	SEL footprints must be used when the proposed airspace includes changes to the distribution of flights at night below 7,000 feet agl and within 25 km of a runway. Night is defined here as the period between 2300 and 0700 local time. If the noisiest and most frequent night operations are different, then footprints should be calculated for both of them. A separate footprint for each of these types should be calculated for each arrival and departure route. If SEL footprints are provided, they should be calculated at both 90 dBA SEL and 80 dBA SEL.	Noise	Para 56	B-13	Not Applicable
38	SEL footprints may be used when the airspace change is relevant to daytime only operations. If SEL footprints are provided, they should be calculated at both 90 dBA SEL and 80 dBA SEL.	Noise	Para 56	B-14	Not Applicable

39	SEL footprints for assessment should be provided to CAA SARG in both of the following formats: Electronic files in the form of a comma delimited ASC2 text file containing three fields as an ordered set (i.e. coordinates should be in the order that describes the closed curve) defining the footprints in Ordnance Survey National Grid in metres: Field Field Name Units 1 Level dB 2 Easting six figure easting OS national grid reference (metres) 3 Northing six figure northing OS national grid reference (metres) Paper version overlaid on a good quality 1:50 000 Ordnance Survey map. However, it may be more appropriate to present footprints on 1:25 000 or 1:10 000 Ordnance Survey maps.	Noise	Para 57	B-14	Not Applicable
40	SEL footprints for a general audience may be provided overlaid on a more convenient map (e.g. an ordinary road map with a more suitable scale for publication in documents). The underlying map and footprints should be sufficiently clear for an affected resident to identify the extent of the footprints in relation to their home or other geographical features. Hence, this underlying map must show key geographical features, e.g. streets, rail lines and rivers. Calculations should include terrain adjustments as described in the section on Leq contours	Noise	Para 58	B-14	Not Applicable
41	Change Sponsors may use the percentage highly annoyed measure in the assessment of options in terminal airspace to supplement Leq. If they choose to use this method, then the guidance on population data for noise exposure contours set out should be followed. Sponsors should use the expression and associated results in calculating the number of those highly annoyed. If they wish to use a variant method, then this would need to be supported by appropriate research references.	Noise	Para 65	B-15	Not Applicable

42	Change Sponsors may use the LDEN metric but, if they choose to do so, they must still produce the standard Leq, 16 hours contours as previously described. If airspace change sponsors wish to use the LDEN metric they must do so in a way that is compliant with the technical aspects of the Directive and any supplementary instructions issued by DEFRA. Sponsors should note the requirement for noise levels to be calculated as received at 4 metres above ground level. In particular, the guidance on how contours are to be portrayed, as described in the section dealing with Leq contours applies. Calculations should include terrain adjustments as described in the section on Leq contours. An exception regarding LDEN contours is the production of a table showing numerical data on area, population and households which should be presented by band (e.g. 55 dBA to 60 dBA) rather than cumulatively as for UK Leq contours (e.g. >55 dBA). Change Sponsors should make it clear where areas/counts are by band or cumulative.	Noise	Para 67 & 69 & 70	B-15 & B-16	Not Applicable
43	Change Sponsors may use the LNight metric within their environmental assessment and consultation. If they do so, SEL footprints must also be produced. Calculations should include terrain adjustments as described in the section on Leq contours.	Noise	Para 73	B-16	Not Applicable
44	Change Sponsors may use difference contours if it is considered that redistribution of noise impact is a potentially important issue.	Noise	Para 78	B-17	Not Applicable
45	Change Sponsors may use PEI as a supplementary assessment metric.	Noise	Para 85	B-19	Not Applicable
46	Change Sponsors may use the AIE metric as a supplementary assessment metric. If the sponsor uses PEI as a supplementary metric then AIE should also be calculated as both metrics are complementary.	Noise	Para 87	B-19	Not Applicable
47	Change Sponsors may vary the information displayed in Operations Diagrams providing that the diagram is a fair and accurate representation of the situation portrayed.	Noise	Para 88	B-20	Not Applicable

48	Change Sponsors may use maximum sound levels (Lmax) in presenting aircraft noise footprints for public consumption if they think that this would be helpful. This does not replace the obligation to comply with the requirement to produce sound exposure level (SEL) footprints, where applicable.	Noise	Para 95	B-21	Not Applicable
49	Change Sponsors may produce diagrams portraying maximum sound event levels (Lmax) for specific aircraft types at a number of locations at ground level beneath the airspace under consideration. This may be helpful in describing the impact on individuals. It is usual to include a table showing the sound levels of typical phenomenon e.g. a motor vehicle travelling at 30 mph at a distance of 50 metres.	Noise	Para 96	B-21	Not Applicable
50	Change Sponsors must demonstrate how the design and operation of airspace will impact on emissions. The kinds of questions that need to be answered by the sponsor are: Are there options which reduce fuel burn in the vertical dimension, particularly when fuel burn is high e.g. initial climb? Are there options that produce more direct routeing of aircraft, so that fuel burn is minimised? Are there arrangements that ensure that aircraft in cruise operate at their most fuel-efficient altitude, possibly with step-climbs or cruise climbs?	Climate Change	Para 102	B-22	See Sections 4 & 5
51	Change Sponsors should estimate the total annual fuel burn/mass of carbon dioxide in metric tonnes emitted for the current situation, the situation immediately following the airspace change and the situation after traffic has increased under the new arrangements – typically five years after implementation. Sponsors should produce estimates for each airspace option considered.	Climate Change	Para 106	B-23	Not applicable
52	Change Sponsors should provide the input data for their calculations including any modelling assumptions made. They should state details of the aircraft performance model used including the version numbers of software employed.	Climate Change	Para 107	B-23	Not Applicable

53	Where the need to provide additional airspace capacity, reduce delays or mitigate other environmental impact results in an increase in the total annual fuel burn/ mass of carbon dioxide in metric tonnes between the current situation and the situation following the airspace change, Sponsors should provide justification.	Climate Change	Para 108	B-23	Not applicable
54	Change Sponsors must produce information on local air quality only where there is the possibility of pollutants breaching legal limits following the implementation of an airspace change. The requirement for local air quality modelling will be determined on a case by case basis as discussed with the CAA SARG Case Officer and ERCD. This discussion will include recommendations of the appropriate local air quality model to be used. Concentrations should be portrayed in microgrammes per cubic metre (µg.m-3). They should include concentrations from all sources whether related to aviation and the airport or not. Three sets of concentration contours should be produced: Current situation – these may already be available as part of the airport's regular environmental reporting or as part of the airport master plan; Situation immediately following the airspace change; and Situation after traffic has increased under the new arrangements – typically five years after implementation although this should be discussed with the DAP Project Leader.	Local Air Quality	Para 115	B-25	Not Applicable
55	Contours for assessment should be provided to CAA SARG in similar formats to those used for noise exposure contours. Where Change Sponsors are required to produce concentration contours they should also produce a table showing the following data for concentrations at 10 µ.m-3 intervals: Area (km2); and Population (thousands) – rounded to the nearest hundred.	Local Air Quality	Para 116	B-25	Not Applicable
56	The source and date of population data used should be noted adjacent to the table. Population data should be based on the latest available national census as a minimum but more recent updated population data is preferred.	Local Air Quality	Para 117	B-25	Not Applicable

57	Change Sponsors may wish to conduct an economic appraisal of the environmental impact of the airspace change, assessing the economic benefits generated by the change. If undertaken, this should be conducted in accordance with the guidance from HM Treasury in the Green Book (HM Treasury, 2003). If Change Sponsors include a calculation of NPV then they must show financial discount rates, cash flows and their timings and any other assumptions employed. The discount rate must include that recommended in the Green Book currently set at 3.5%. Additionally, other discount rates may be used in a sensitivity analysis or because they are representative of realistic commercial considerations	Economic Valuation	Para 124 & 126	B-27	No such appraisal has been undertaken, see section 4.11.

Appendices

Appendix A: Evidence of Consultation with Military, Airports & Airlines.

MOD Engagement

Sent to MoD

Sent separately

Response from MoD

Sent separately

Airline engagement

Presented to the Airlines

Sent separately

Minutes from Carrier Panel (Response from Airlines)

Sent separately

Gatwick Airport Limited Engagement

The following email was received from GAL and indicates that no internal challenges were raised against the proposal and that GAL broadly supports the aspirations behind the change.

Sent separately

Heathrow Airport Limited Engagement

The following Powerpoint slides were discussed with the HAL AGG.

Sent separately

This prompted a submission of support from the HAL AGG for the proposed changes. See email below.

Sent separately

Appendix B: Evidence of Aircraft Flight Levels Approaching Holds

Also see presentation to Heathrow AGG at Appendix A.

Heathrow – OCK

Figure 47 illustrates aircraft below FL100. They are well beyond HAZEL, the current common point on EGLL STARS before descending to FL100 and below. Proposed routings to HAZEL (illustrated) will not be significantly shorter so will not affect noise below 7000ft.

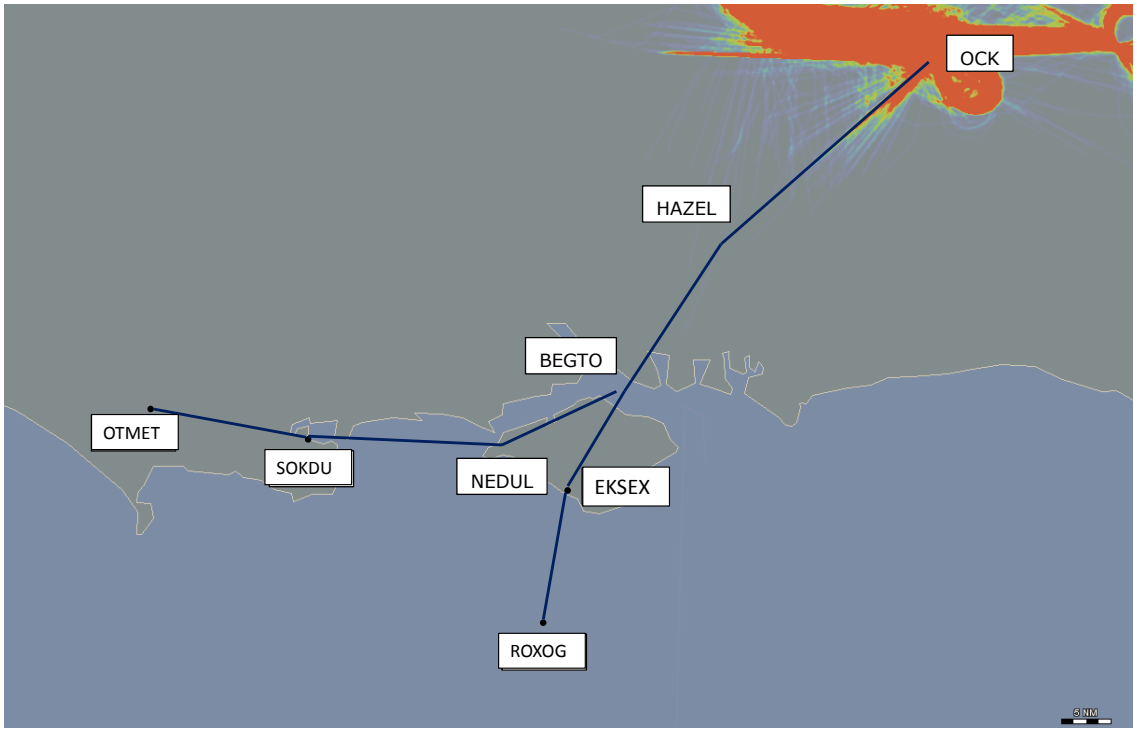

Figure 47: Heathrow OCK Arrivals

Similarly, the broad range of direct tracks should remain the same as today. Figure 48 illustrates current aircraft tracks FL200 and below with an overlay of the proposed routings. Direct routings from along the proposed tracks should look similar after the change is implemented and all above FL100 until after HAZEL, as today.

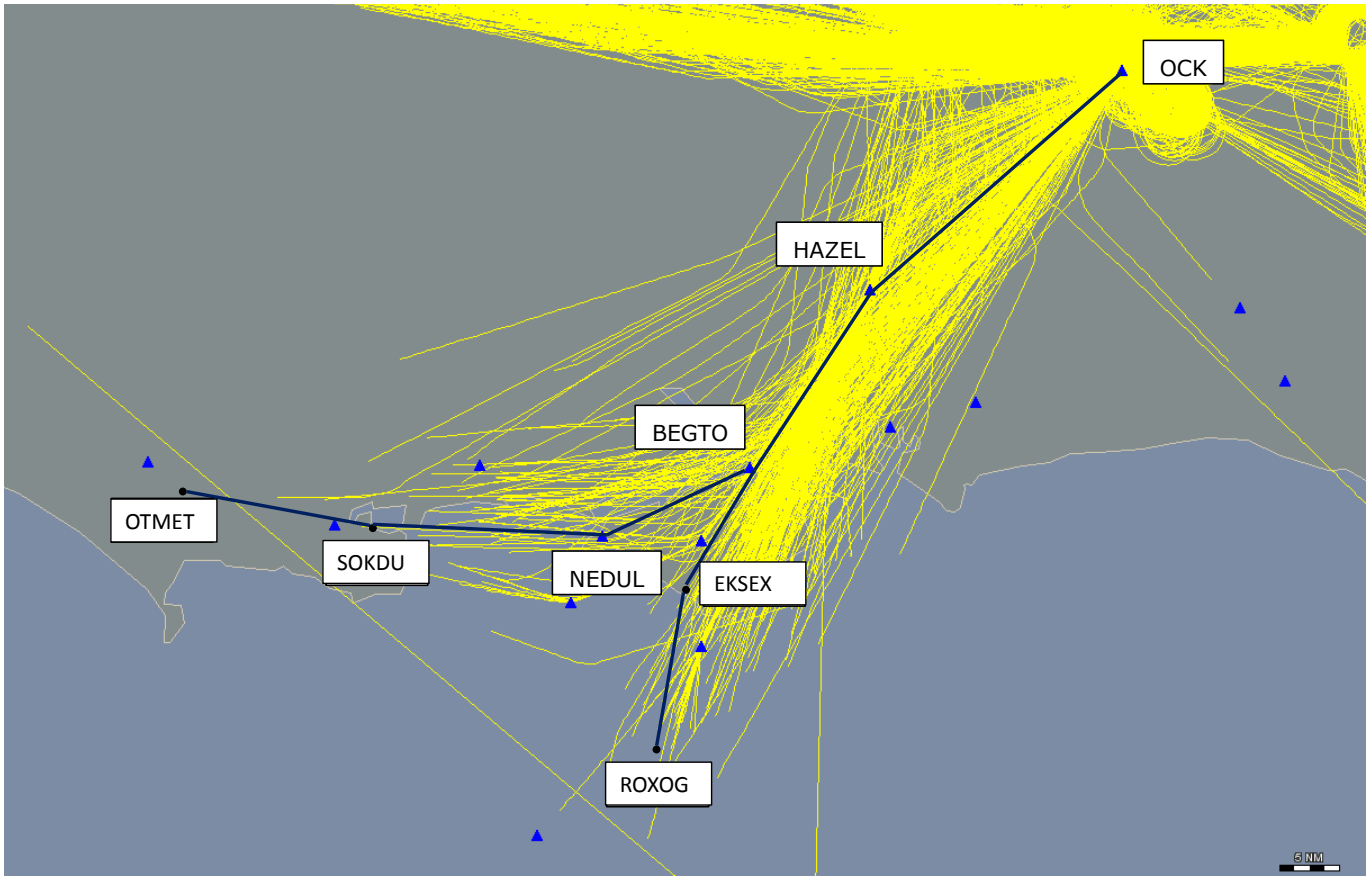

Figure 48: Heathrow OCK Individual Arrival Tracks (FL200 and below)

Gatwick – WILLO

Figure 49 illustrates current aircraft patterns FL70 and below. The ringed area shows aircraft which have been vectored directly to final approach. This will not change in the immediate future after the implementation of this proposal. Aircraft left on the new RNAV-1 routes are likely to follow a similar descent profile to today and be at HOLLY before descending below FL70 as today (see Figure 50). There should therefore be no noticeable change to tracks and descent profiles over the ground.

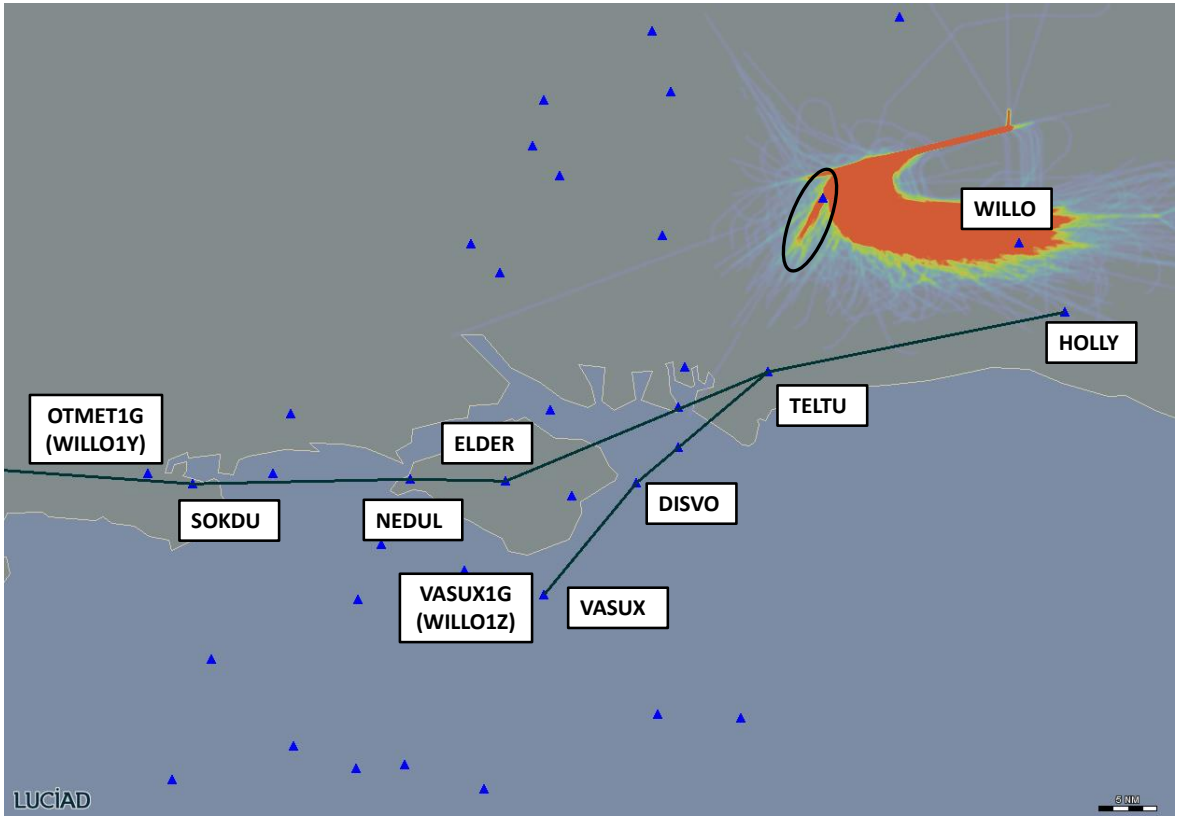

Figure 49: Gatwick WILLO Arrivals

Figure 50 illustrates current flights FL150 and below. The spread of tracks is not predicted to change below FL70 and is likely to be just as varied after the change is implemented due to tactical controller intervention in giving direct routings when possible.

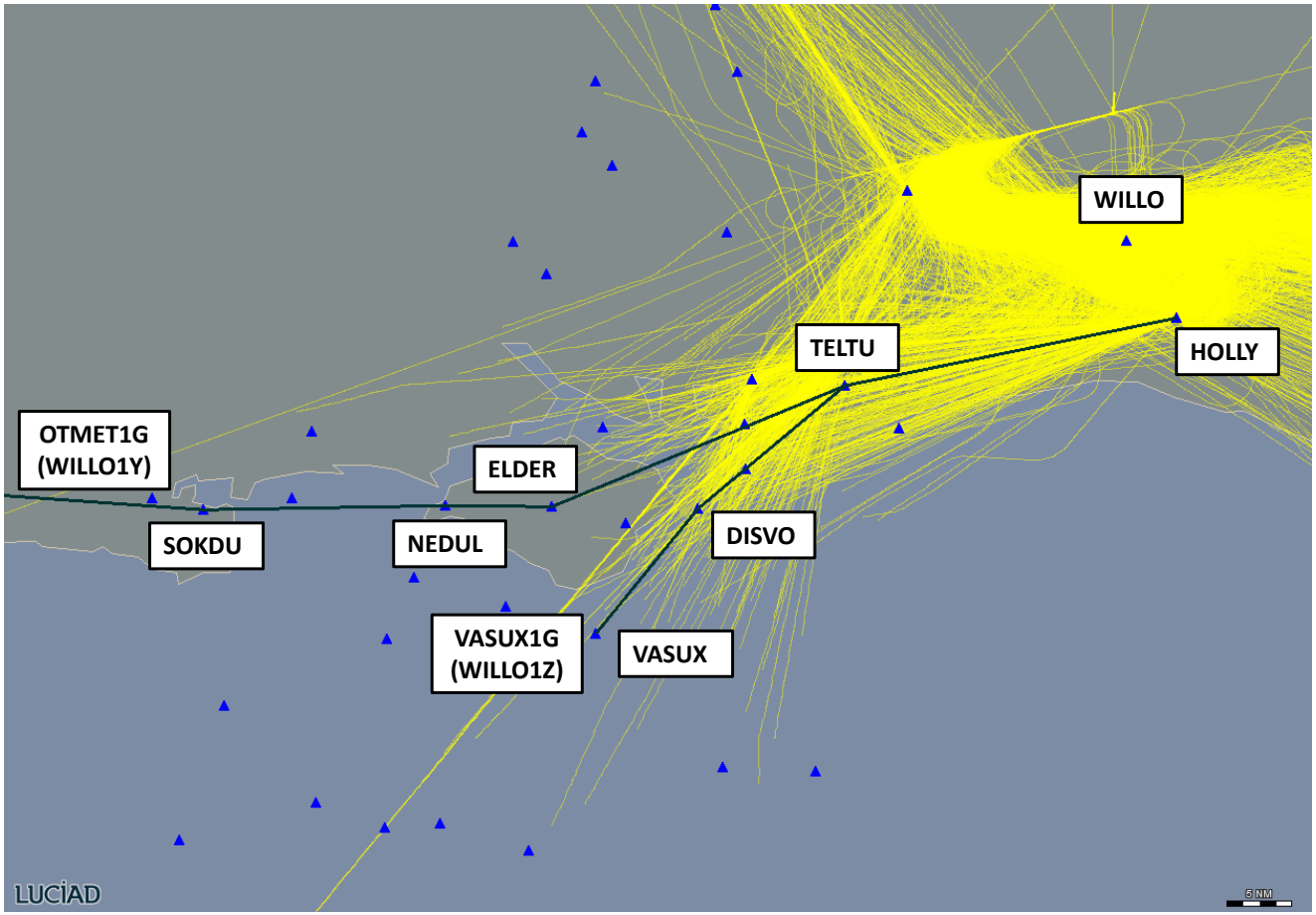

Figure 50: Gatwick WILLO Individual Arrival Tracks (FL150 and below)

Appendix C: Proposed AIP Amendments, Airspace Design Document & WGS84 Form

AIC Changes

Sent separately

Airspace Design Document

Sent separately

WGS84

Sent separately

Appendix D: Environmental Benefit Assessment

Sent separately

Appendix E: List of letters of agreement and evidence of engagement with Brest ACC

Sent separately.

Appendix F: Airspace Containment Paper

Sent separately

Appendix G: Letters of Agreement

LoA Title	Procedure Change	Map Change	No Change
Aberporth – STU RCA/PTA			X
Southampton/Bournemouth-DAWLY joiners and leavers			X
Bournemouth-BCN joiners and leavers			X
Brize Norton			X
Castle Martin and Manorbier			X
Exeter-GIBSO joiners and leavers			X
FOST	X	X	
Gloucester			X
Hereford		X	
UM79 GAT into NT/NV			X
Lulworth	X	X	
Penetration of Salisbury Plain Danger Areas			X
Newquay- joiners and leavers			X
Pendine			X
MOSUN			X
SWMDA D046		X	
Yeovilton		X	X
Severn Group		X	
Shoeburyness			X
Dunkeswell		X	
Swindon Corridor			X
Riles Gliding Areas			X
JACIG Open Skies			X

Civil/mil Coordination procedures		X	
Warton			X
Eskmeals			X
BGA-TRA(G)s			X
AMC	X		
NWMTA and Aberporth			X
Amsterdam			X
Brest	X	X	
Brussels			X
Dublin			X
Reims		X	
Maastricht Brussels sectors		X	
Lille			X
France-CBA1		X	
France Channel Sector		X	
Jersey	X	X	
Shannon	X	X	