Head AAA

30 July 2015

LAMP 1A LONDON CITY NETWORK CASE STUDY REPORTS - COVERING BRIEF

The London City Network (above 4000ft) Operational and Consultation Assessments are ready for your assessment and attached, together with the sponsor's ACP and Consultation Feedback Report. The hard copy folder is ready for your collection in London today – this will have the remainder of the Consultation Document relevant to the City Network Consultation – it is too cumbersome to e mail but it will all go on SharePoint.

The Appendix 1 to the Op Report (in the e mail attached) shows the complete controlled airspace consulted on – (includes the extra consultation for the GEGMU STAR for Southend).

The Appendix 2 is an extract from the feedback report and shows the Point Merge network against existing traffic profiles.

The Appendix 3 is a consolidated list of Regulatory Requirements as of today. This will be sent to NATS in due course if the ACP is approved.

Since this report was prepared and given to Mgr AR on 22 June, an issue has since come to light after the NATS 'Train the Trainers' training programme commenced on 26 June. This is in regard to the training regime, and the management of non RNAV1 arrivals both for City and Biggin Hill. The part of Southend CAS (CTA 8 (3500-5500ft) was getting in the way for non RNAV 1 traffic for Biggin Hill which will be vectored; [redacted] has advised me that NATS were going to look at their procedures to clarify how this traffic will be managed. There were also some issues with strip management for City non-RNAV1 ops – again this is being re-looked at by NATS internal teams. [redacted] also has to satisfy himself that the Training Plan is sound and requires 30 days to approve it; as it has yet to be formally presented (he has seen the drafts), this is an outstanding issue which we need to watch. Hence, I have stated in this report that I will check with [redacted] to ensure all training issues are resolved before Mark makes a decision.

Most of the Outstanding Issues are nothing major to be concerned about and relate to work still ongoing. For info, I just received the latest position on the development of the LTC and Southend interface arrangements and the progress of preparing updated procedures for the MoU for the new CAS for Feb 2016. I will look at this and update you/Mark accordingly (it was one of the OIs).

Where you reference to the RDAR (Route Design Assurance Report), this has been reviewed jointly by ATM Ops and myself. We are satisfied that all new interactions for the RNAV 1 designs are satisfactory. The use of historical track dispersion and height attainment in one instance was used to assurance the separation of some Heathrow departures against the City Rwy 09 arrivals and City Rwy 27 SIDs – covered in the Op Report, as we do not yet have formal international guidance for route spacing regarding interacting turning profiles. This is a large document (180+ pages) and I can show you where it is should you wish to see how this work has been completed.

The Environmental Assessment is still WIP with ERCD. This will be provided to you when it is ready.

I shall insert this brief in the ACP folder so Mark has sight of it in his review.

The plan to have all the reports presented to Mark by his return from leave on Monday 24 August is still the position at the moment (subject to delivery of final Env assessments).

Title of Airspace Change Proposal	**London City ACP Network Changes – Module C of LAMP Phase 1a ACP**
Change Sponsor	**NATS (NERL)**
SARG Project Leader	[redacted]
Case Study commencement date	**Issue 1 Received 17 February 2015. Commenced Case Study 4 March 2015** **Issue 2 Received 19 March 2015**
Case Study report as at	**28 July 2015 V 2.1** (typos corrected 17 Sep 15)

Instructions

In providing a response for each question, please ensure that the 'Status' column is completed using the following options:

- **Yes**
- **No**
- **Partially**
- **N/A**

To aid the DAP Project Leader's efficient Project Management it may be useful that each question is also highlighted accordingly to illustrate what is resolved (Green), **not resolved** (Amber) or **not compliant** (Red) as part of the DAP Project Leader's efficient project management.

1.	Justification for change and "Option Analysis"	Status
1.1	**Is the explanation of the proposed change clear and understood?**	Yes

The proposed changes described in this Module C are for London City Airport (LCY) arrival and departure routes above 4,000ft, a new arrival route for Biggin Hill, a change to the arrival route from the south inbound to Southend, and re-aligned Standard Arrival Route(s) (STAR) into the Gatwick TIMBA Hold from the east/northeast.
Fifteen new STARs and six new arrival transitions are proposed to be introduced to facilitate RNAV1 arrival connectivity between the en-route airway structure and LCY and Biggin Hill Airports (See Note 1 below). Five STARs inbound to the Gatwick TIMBA Hold will be realigned, and seven new STARs to Southend Airport will be introduced.

Six Standard Instrument Departures (SIDs) from LCY are replicated along their entire length, ending at Clacton (CLN), Brookmans Park (BPK) and Compton (CPT) VORs (a VOR is a navigational beacon); these replications are covered by Module B. For departures to the south, this Module covers the two new RNAV SIDs to EKNIIV (see Note 2 below) which replace the 4 conventional SIDs to Dover (DVR) & Lydd (LYD).

At EKNIV, 2 new ATS routes are proposed within existing Controlled Airspace (CAS); M87 routes to UMTUM to join L9 towards DVR, and M91 routes to LYD to join M189, both routes having access to the European route network.

New CAS is proposed to provide protection to the new arrival procedures (see ACP Page 16 Fig 6). This has subsequently been amended by additional consultation and shown in Operational (Op) Report Appendix 1 - this was necessary to provide containment for the Southend GEGMU STARs from the south); a small volume of the Worthing Control Area (CTA) is being raised from FL65 to FL75.

For completeness, the overlap with the LCY consultation and replication proposal in the ACP Module B is repeated here; the EKNIV RNAV SIDs replicate the DVR and LYD conventional SIDs as far as the positions as indicated below, after which the SIDs follow a **new** route alignment. This new route alignment was subjected to consultation by NATS En Route Limited (NERL) from October 2013 – January 2014 and is covered by this ACP module. The new tracks over the ground for the Runway (Rwy) 27 EKNIV1A and Rwy 09 EKNIV1H are shown in the feedback report page 15 Fig 4 and are indicated below:

Rwy 27 DVR/LYD5T SID is replicated by EKNIV1A up to LCN06 (Module B); the new track routeing is: LCN06-LCE06-SODVU-EKNIV (termination point).

Rwy 09 DVR/LYD5U SID is replicated by EKNIV1H up to LCE03, (Module B); the new track routeing is: LCE03-LCE06-SODVU-EKNIV (termination point).

	Note 1. The Rwy 09 RNAV1 arrival Transition will also be used by suitably approved aircraft flying into Biggin Hill; these arrivals will have a common flight path until a position on the LCY downwind track where the transition for Biggin Hill will terminate to enable aircraft to intercept the Instrument Approach Procedure (IAP) for Biggin Hill. Note 2. The conventional SIDs are retained for non RNAV1 operators until full RNAV1 compliance is achieved.	
1.2	**Are the reasons for the change stated and acceptable?**	Yes
	The objective of these changes is to introduce a new, more efficient, system of RNAV routes to replace the current conventional procedures. The justification is covered in depth in the ACP Section 3 page 8. This refers to the European legislation to implement Performance Based Navigation (PBN) procedures and the operational issues which exist with the current arrival and departure procedures. The existing arrival and departures for LCY are inefficient as the climb profile for departures to the south is very much restricted due to other overflying traffic into Heathrow and by departures on the respective DET SIDs from Stansted, Luton and Northolt. The Phase 1A re-design, improves the departure profile for LCY SIDs routeing via EKNIV. The extant arrivals into LCY are very workload intensive as the arrival routes from the west, north and east via SPEAR, and the arrivals from the south via ALKIN, have to be tactically delayed and sequenced by ATC. This results in a high workload for Thames Radar, with traffic having to be vectored around ad hoc patterns over much of Kent at low level causing environmental impacts at lower than the normal altitudes associated with holding; this creates inefficient arrival profiles being vectored at low level with a consequential operational impact for both Air Traffic Controllers and crews leading to increased ATC and cockpit workload. The low level holding also increases fuel burn, and overflight of Kent at lower than normal levels associated with traditional techniques of using holding patterns of 7000ft and above (not possible for LCY arrivals due to the congested airspace in the London TMA). This was clearly demonstrated in the consultation document at page E13, Figs E6 and E7. The proposed point merge structure over the Thames estuary would provide a more systemised method for sequencing the inbound aircraft with greater accuracy whilst causing less environmental impact. The revised arrival flight paths position the flights over water, and hence reduce the noise impact on the population of Kent. The geometries of airspace structures such as point merge are only achievable using modern navigation systems such as RNAV. The changes proposed will therefore provide seamless connectivity between the London City runways and the RNAV en-route structure. Currently, aircraft leave the en-route airways, and join a STAR which terminates some distance from the airport. From that point they expect to be given vectors by ATC to guide them to a point at which they can join one of the published instrument final approaches.	

The new STAR arrival flightpaths will link to an RNAV transition using a point merge arrival design, which in turn will connect to the instrument approach procedure (an example in shown in the ACP on page 11, Fig 4). The diagram in the Consultation Feedback report (page 8 Fig 2 – included as Op Report Appendix 2) will assist with interpretation of the new design, and shows the changes of this design against the existing flight profiles and should be viewed in conjunction with the proposals for new CAS.

With the proposed RNAV structure, the new RNAV STARs will route to holding fixes at JACKO (to the northeast), normally descending to FL 90, and to GODLU (close to DVR in the southeast), normally descending to FL100. The diagram in the Consultation Feedback report (page 8 Fig 2 – Op Report Appendix 2) shows aircraft flight paths to these positions compared with existing profiles. When arriving at JACKO or GODLU, if there was no other traffic ahead in the arrival flows, which would necessitate sequencing of the arrival from that point behind the aircraft ahead, the arrival would be cleared on the transition procedures directly to the merge point RAVSA (located just to the north east of the Isle of Sheppey) via, as appropriate, either BABKU in the north, or ELMIV in the south and given tactical descent by Thames Radar to altitudes associated with the vertical arrival profiles. From the merge point RAVSA, the aircraft will continue to fly along the Thames estuary to either intercept the Instrument Landing System (ILS) for Rwy 27, or to turn at NEPNA onto the downwind arrival track for Rwy 09. In the case of Biggin Hill arrivals, they will follow the Rwy 09 profile for LCY Rwy 09 until position OSVEV, after which, these aircraft will be turned to intercept the Biggin Hill ILS procedure for Rwy 21.

If, on arrival at BABKU or ELMIV there is other traffic ahead, then the aircraft will be sequenced behind the traffic in front and instructed to fly along the ARC of the point merge design until such time as it could be turned to the merge point RAVSA when the required track distance is achieved behind the traffic ahead (a term known as linear holding). The advantage of this system is that aircraft do not need to be vectored and they will follow the pre-determined arrival track which is programmed into the aircraft Flight Management System (FMS); hence workload is reduced for both the controller and the crew. In really busy conditions, aircraft could end up flying the full arcs with traffic on the inner arc 1000ft above traffic on the outer arc, so that either aircraft on each arc is separated from the other but can still be turned towards the merge point without conflicting with each other. A full NATS explanation of how the point merge arrival procedure works is in the consultation document at Page F13 Section 3.3 onwards.

In extreme conditions such as bad weather, aircraft could be instructed to hold at JACKO or GODLU until such time as an approach could be commenced; however, these 2 holds would normally only be used for contingency holding, as the traditional holding delay is now absorbed on the linear hold by aircraft following the arcs.

Compared with the ad hoc techniques currently used by Thames Radar due to existing airspace constraints, pilots will now have better awareness of the expected route in advance, and the route from airway to runway will be defined in the aircraft's FMS. Vectoring by ATC will only be necessary for sequencing (using the point merge features) and for giving shortcuts, when traffic levels permit. Delays, especially in the ad hoc patterns used at low level over Kent will be reduced, with any delay being absorbed in linear holding over the sea

	and at a higher altitude; thus reducing the impact on population over land as is currently the case with traffic held at low level over Kent. With the arrival flow re-positioned along the Thames estuary, the realigned LCY southern SIDs which routed via DET VOR, will now route slightly further to the east to EKNIV, the track of which passes through the new Southend Control Zone (CTR) but the vertical profile will result in the SIDs being above the Southend CAS. This enables the Thames Radar controller to tactically climb the departure above the arriving traffic, thus achieving an improved climb profile. By using RNAV1 procedures the aircraft will follow the pre-determined flight path over the ground /sea, which alleviates the controller from having to continuously vector the traffic; this leaves the controller free to tactically clear both departures and arrivals on the required vertical profiles to safely achieve the required vertical separation. Effectively the departure 'jumps' the arrival, and hence environmental benefits are achieved all round with both arrivals flying over the sea compared with the existing profiles which are more over land (and at lower levels), and the LCY southern departures benefit from a much earlier climb as the Stansted, Luton and Northolt DET SIDs have been re-routed away from the LCY departure track. At the network level the new RNAV arrivals & departure procedures will therefore enable the ATC network to operate more efficiently, in a much more systemised manner. The RNAV replication of the lower altitude portions (below 4,000ft) of the conventional procedures enables the higher level network to be seamlessly linked to the airport by contiguous procedures. This permits the many benefits of RNAV for the higher altitude portions to be secured, whilst keeping the changes in the noise-sensitive lower altitude portions to an absolute minimum (see ACP Module B for details of the replication portions). The improved systemisation of the network, combined with the RNAV replication of the portions below 4,000ft, enables environmental benefits such as facilitating improved climb and descent profiles. For a breakdown of the environmental benefits for track mileage comparisons, fuel burn and CO_2 emissions, see the LAMP Phase 1 Bridging ACP Attachment 1 (NATS Ref LAMP G). A major environmental benefit is that arrivals from the south are routed over Kent at much higher levels and will now fly the descent profile from around FL 100 over the sea and along the Thames estuary to join the final approach tracks, and similarly, arrivals from the north / north east will be re-routed east of the Shoeburyness danger areas over the sea and will commence their descent from around FL 90 over the sea and along the Thames estuary. The technique of using a Point Merge arrival design is that both the arrival patterns from the north and south will therefore be effectively sequenced into an orderly arrival flow by using this linear holding technique over the sea (as opposed to the existing ad hoc system over land) which will cause less environmental disturbance as is otherwise the case with the existing management of arrival traffic over Kent at low level. The changes to the arrival patterns is shown in the Consultation Feedback Report on page 8 Fig 2 (Op Report Appendix 2). On this diagram, the existing pattern of flight paths is shown, with the new point merge arrival flight paths superimposed.	
1.3	**Have all appropriate alternative options been considered, including the 'do nothing' option?**	Yes

	Doing nothing, would not permit the improvements as highlighted in the ACP to be realised. Additionally, the requirements of the PBN mandate due in the UK could not be achieved, nor compliance with forthcoming European legislation for the implementation of PBN procedures.
1.4	**Is the justification for the selection of the proposed option sound and acceptable?** Yes The LCY changes in Module C of LAMP Phase 1A are designed such that the routeing of the LCY SIDs will enable integration into the LAMP Phase1A Network changes. There are substantial benefits to be realised by a semi-systemised route network design such that the LCY SIDs to the south via EKNIV will be tactically climbed above the arrivals flying down the Thames estuary via merge point RAVSA. There will be a reduction in controller workload, a reduction in flight deck workload, both factors being a significant contribution to enhancement of flight safety, as departures will be flying RNAV procedures following the designed flight path as coded up into the aircraft FMS, and, as is demonstrated in this ACP Module, subject to the environmental analysis by ERCD, there will be environmental benefits to be realised due to the re-alignment of departure and arriving flight paths. [redacted] Note: As LCY SIDs have to be capped initially at 3000ft because of other traffic in the London Terminal Control Area (LTMA) (e.g. Heathrow arrivals), the design cannot be fully systemised; therefore, whilst the traffic will fly the pre-determined flight paths as per the navigation database coding for each procedure, this alleviates the controller vectoring, hence a reduction in workload and a significant reduction in radio transmissions, all of which improves flight safety. The controller still has to issue the vertical climb to the LCY SIDs, but even so, workload reduction benefits will be realised by both ATC and flight deck crews. The justification is therefore appropriate as the change achieves a reduction in the NATS Risk Index for Thames Radar, a more predictable and pre-determined flight path for arrivals and departures, reduced ATC and flight deck workload, all of which contribute significantly to the enhancement of flight safety. In addition, as a result of the SID switching proposed in Modules A and D, there are environmental benefits to be realised with the improved climb profiles of the SIDs from Stansted, Luton, Northolt and LCY, and re-positioning of the LCY arrival profiles more over the sea. The position of the point merge arcs is equally appropriately located which allows traffic from all directions to be sequenced in from the north via BABKU or from the south via ELMIV. This is a positive move in improving the traffic management of all traffic operating into the extremely densely congested area of the LTMA and with the revised design, the low level departure conflictions with the DET SIDs is removed. The design therefore provides benefits for Luton, Northolt, Stansted, LCY, the Gatwick TIMBA arrivals and Southend as highlighted in the NATS Environmental analysis which has been reviewed by the CAA Environmental Research and Consultancy Department (ERCD) (see the ERCD report).

2.	Airspace Description and Operational Arrangements	Status
2.1	**Is the type of proposed airspace clearly stated and understood?**	Yes

1. New RNAV5 STARs routeing to new RNAV holds at JACKO and GODLU for LCY. (With RNAV5 STARs, this means that non-RNAV1 operators may still use this arrival route to these holds, after which they will be vectored to final approach by Thames Radar with appropriate tactical integration with RNAV1 operators following the point merge arrival procedures).

2. New arrival transitions (the point merge procedures) to facilitate RNAV1 arrival connectivity between the en route airway structure and the instrument approach procedures for LCY and Biggin Hill Airports (See Note 1 below).

3. Revised STAR alignments inbound to the Gatwick TIMBA Hold from the south, east and northeast.

4. New STARs to Southend Airport from the south.

5. Six RNAV1 PBN SID replications for LCY along their entire length, ending at CLN, BPK and CPT VORs (these are covered by Module B although there is slight overlap with the EKNIV SIDs – see below).

6. For LCY departures to the south, 2 new RNAV1 SIDs to EKNIIV (see Note 2) which replace 4 conventional SIDs to DVR & LYD.

7. At EKNIV, 2 new ATS routes are proposed within existing CAS; M87 routes to UMTUM to join L9 towards DVR, and M91 routes to LYD to join M189, both routes having access to the European route network.

8. New CAS is proposed to provide protection to the new arrival procedures (see Op Report Appendix 1), and a small volume of the Worthing CTA is being raised from FL65 to FL75.

9. En-route and contingency holds are included with the LCY, Southend and Gatwick STARs.

10. Re-sectorisation of NATS London Area Control (LAC) and London Terminal Control (LTC) sector boundaries, with a transfer of delegation of ATS in French airspace from LAC to LTC.

2.2	**Are the hours of operation of the airspace and any seasonal variations stated and acceptable?**	N/A
	1. The revised CAS is H24. 2. The new ATS routes will be promulgated as H24 (within existing CAS) although LCY closes at night and on Saturday afternoon and Sunday morning. 3. The new LCY SIDs and STARs are published primarily for the duration of the opening hours of LCY; for promulgation purposes these are H24. 4. The GEGMU arrival route for Southend is H24. Note: Whilst the Stansted, Luton and Northolt SID are re-routed towards CLN to join M84 and M85 as appropriate (Stansted during the day - 0600-2300), the DET SIDs for Stansted will be available during the night when LCY is closed, or for a very few departures from Stansted and Luton during the day (expected to be either freight traffic from Stansted or occasional positioning flights to Gatwick). In case of query by some class G users, the SARG Case Officer (CO) considered options to vary the lower limits of CAS required for the arrival procedures when LCY is closed. Given this is from Saturday lunchtime until Sunday lunchtime, and the fact that Southend is still open H24, there could be potential confusion regarding promulgation on charts and the high risk that CAS activation time of various CAS segments will be mis-understood/misread if variable hrs of operation was considered. It was therefore considered that in this particular circumstance, this is not practical.	
2.3	**Is any interaction with adjacent domestic and international airspace structures stated and acceptable including an explanation of how connectivity is to be achieved?**	Yes
	Has the agreement of adjacent States been secured in respect of High Seas airspace changes?	Ongoing

	The integration of the PBN Replicated SIDs into the Air Traffic Services (ATS) en-route network is unchanged except for the new RNAV1 SIDs for Rwy 09 and 27 via EKNIV which are integrated into the ATS en-route network at EKNIV where they will join a new ATS route. The arrival LCY STARs will connect via the existing en-route network and will end at a holding fix at JACKO or GODLU, where thereafter, arrival flight paths are based on RNAV1 Transitions using a new arrival Point Merge procedure providing connectivity to the IAPs for the runways in use. For Southend, the GEGMU STAR connects via the existing en-route network flight and will end at a holding fix GEGMU, after which they will be vectored by Southend ATC to final approach for the appropriate Instrument Approach Procedures (IAPs). The new ATS route over the sea ((U)M84) routeing CLN-NONVA-ABTUM-KONAN (FIR Bdy) and the new CAS east of the Thames Estuary will be notified to ICAO in accordance with existing procedures.	
2.4	**Is the supporting statistical evidence relevant and acceptable?**	Yes
	The Bridging Module provides statistics for RNAV1 and traffic operating into the airports concerned. Approximately 70% of LCY operations are currently RNAV equipped, with the remainder still relying on conventional navigation. When the RNAV1 mandate becomes effective in November 2019, conventional procedures for LCY will be withdrawn. Until then there will be a mix of RNAV1 and conventional operations. The NATS Environmental Analysis document will cover the ACP fuel and track distance elements of the proposal. This fuel and CO_2 analysis provided by NATS supports the entire ACP proposal and is at Attachment 1 to the Bridging Module ACP which has been subject to evaluation and verification by ERCD (see the ERCD report).	
2.5	**Is the analysis of the impact of the traffic mix on complexity and workload of operations complete and satisfactory?**	Yes
	Until conventional SIDs are withdrawn, there will be a mix of operations at LCY. The ACP Module B has adequately explained this and how traffic will be managed by ATC: This is an important factor, and therefore the text is re-produced below for completeness.	

Non-RNAV1 Capable Aircraft (ACP Module B Section 5.3)

All aircraft operating at London City Airport must be RNAV5 capable. The proposed new SIDs & arrival transitions require RNAV1 capability. Since initially, not all aircraft operating at the airport will be RNAV1 capable, the conventional procedures will remain available for use for those aircraft/crews that are not RNAV1 equipped/certified. ATC will be aware of traffic that is not RNAV1 capable and this traffic will be sequenced accordingly, using ATC vectoring. Within London Terminal Control (LTC) units, the strips for non-RNAV1 equipped aircraft will include "R5" to indicate the RNAV5 equipage of the aircraft. The strip will also be placed in a cream coloured strip holder to make it stand out.

Arriving Aircraft (ACP Section Module B 5.3.1)

RNAV1 certified aircraft will utilise the point merge structure described in Module C of the ACP and feed traffic directly into the replicated arrival tracks described in this ACP.

Non RNAV1 certified aircraft will be able to flight plan RNAV5 STARs to the JACKO or GODLU stacks. From there the flight plan routing will be SPEAR – ALKIN or DET-ALKIN respectively. Real Time Simulation (RTS) has confirmed that in practice ATC will vector the non-RNAV1 aircraft along the sequencing legs towards the merge point in sequence and then vector to establish on the ILS. The aircraft will be vectored along the same tracks as the RNAV traffic (with slightly broader tolerances) and will be manually sequenced with other arriving aircraft.

Departing Aircraft (ACP Module B Section 5.3.2)

Non-RNAV1 capable departing aircraft will use the remaining conventional SIDs. Controller intervention will be required once airborne to integrate them with the RNAV en route network structure. (These flights will also require a telephone coordination between LCY Tower and Thames Radar).

These issues have been discussed with SARG ATM Ops inspectors to ascertain that there would be no operational issues regarding traffic mix with this proposal. The ATM Ops Inspectors have confirmed that adequate measures will be in place to cater for the mix of RNAV and conventional arrivals and departures. Note comment regarding this in the final conclusion section.

Non RNAV 1 arrivals for Biggin Hill and Rochester would be handled by ATC (traffic to these airfields currently use the existing LCY STARs to ALKIN). These aircraft will continue to be radar vectored by ATC.

2.6 **Are any draft Letters of Agreement (LoA) and/or Memoranda of Understanding (MoU) included and, if so, do they contain the commitments to resolve ATS procedures (ATSD) and airspace management requirements?** — Yes

Draft LoAs with adjacent continental Area Control Centres (ACCs) have been provided for initial review. Updates to revisions will follow the normal LoA review process. The MoU between NATS and Shoeburyness for (U)M85 operations is covered in Module D.

It is understood that the co-ordination procedures between LTC and Southend established for the new CAS established at Southend in April 2015 are subject to ongoing review and will contain appropriate updated to reflect the revised routeing of the EKNIV SIDs.

2.7 **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, what action has the sponsor carried out to resolve any conflicting interests?** — Reviewed

CAS lower limit changes have been proposed over the Thames estuary, Kent and over part of the English Channel (See ACP page 16 Fig 6) where parts of the CLN and Worthing CTAs need to be lowered. The following areas were subjected to initial consultation

Area	Current Base-Ceiling	Proposed
A	CLN CTA (8) FL85-195	LTMA 5500ft-FL195 becomes part of LTMA 8 (lowered for PM)
B	CLN CTA (8) FL85-195	CLN CTA FL65-FL195 (lowered for PM)
C	WOR CTA (1) FL65-195	LTMA 5500ft-FL195 becomes part of LTMA 8 (lowered for PM)
D	WOR CTA (4) FL85-195	WOR CTA FL65-FL195 (lowered for PM)
E	WOR CTA (1) FL65-195	WOR CTA FL75-195 (raised)
F	Division between LTMA 15 and LTMA 25; both 5500ft –FL195	Remove LTMA 15 and combine areas LTMA 8/15/25 for simplicity (LTMA 8 also subsumes areas A & C)

Note 1: Area D is the small sliver south of Area B.

Note 2: The original consultation did not cover Areas E (raising CAS) and Area F (rationalisation) as these options had not been identified for change at that time.

After the ACP submission on 17 Feb 15, NATS advised the SARG CO in March that in order to provide protection for the Southend GEGMU STAR, it was necessary to lower some CAS in the vicinity of ATSAP (over the sea northeast of North Foreland on the Kent coast). This had not been identified by the time the original consultation was conducted as the Southend STAR at that time had a different alignment further to the west. NATS was therefore advised to further consult aviation stakeholders on additional CAS which had to be lowered from FL 105 to FL 65 (parts of CLN CTA 9 and WOR CTA 5). This further consultation was carried out in April 2015.

The final proposals for CAS are therefore shown at Op Report Appendix 1. A sample of objections to the original proposals for additional CAS are highlighted:

STAKEHOLDER ORGANISATIONS INDICATING A LARGE IMPACT

1. [redacted] objecting to Class A – [redacted] believed it should be Class C or D to permit VFR access. – See Section 2.9.
2. Four environmental stakeholders objecting were associated with Gatwick proposals, where actually, there was no proposal to lower CAS; these were therefore not associated with the CAS change over the sea for the LCY and consequently not relevant to the changes proposed in Module C.

STAKEHOLDER ORGANISATIONS INDICATING A MEDIUM OR SMALL IMPACT

There were a number of responses (5) indicating medium or small impact including one response concerning maritime patrol and atmospheric research.

GENERAL PUBLIC ONLINE RESPONSES

Of review of the 23 online responses to the consultation indicating a large impact (as per feedback report Section 12.2 on page 90), only 2 could be found from members of the public with a GA aviation interest; these related to funnelling and lowering of CAS, airspace classification and access when LCY was closed. The other objections stating a large impact were not from airspace users – these responses were included with responses concerning environmental changes to the Gatwick proposals, and were therefore not relevant nor connected to the CAS proposed in Module C.

	OBJECTIONS TO THE FURTHER CAS CONSULTED ON IN APRIL The only objection was from [redacted] who opposed Class A as was the case in the main consultation. [redacted] repeated [redacted] belief that it should be Class C or D to permit VFR access - See Section 2.9. No action appears to have been taken by the sponsor to address this particular feedback as it was the same response as was provided to the original consultation concerning the classification of CAS. This is covered at paragraph 2.10 and therefore we would discount Class D as an option. It appears there was limited aviation response to the proposed changes of CAS, but nevertheless, NATS has considered the feedback and as a result, has raised part of the Worthing CTA 1 to the southeast of Lydd from FL65 to FL75 – shown as area E in the Appendix 1. The feedback of these comments was summarised in the initial 2014 LAMP Feedback Report on pages 87-90. Considering the few GA objections, I would therefore consider that given the location where CAS will be lowered to 5500ft/FL65 (mainly over the sea), this has minimal impact on GA operations. There have been no detailed impact assessments as to how many GA sorties are actually affected above 5500ft/FL65 where the changes are proposed. Therefore, in the absence of such impact assessments, GA activity overland does not appear to be seriously impacted, and the new CAS over the sea (lower limits 5500ft/FL65) should also have minimum impact on GA activity. Regarding the comments relating to maritime patrol and atmospheric research, there are mechanisms for these type of flights to gain access to CAS and therefore these flights should not be affected. It should be noted that whilst the SARG CO has requested NATS to consider additional options for raising CAS, there may well be further opportunities to raise CAS once the relevant analysis by NATS is complete.	
2.8	**Is the evidence that the Airspace Design is compliant with ICAO SARPs, Airspace Design & FUA regulations, and Eurocontrol Guidance satisfactory?**	Yes

No critical design issues were evident. A summary of non compliances is below together with action to address the issue.

London City and Southend.

STARs

The containment of the GEGMU and GODLU STARs adjacent to Danger Area D037 resulted in less than 5NM; this is addressed in the RDAR. Two minor examples of segment lengths being less than the required minima. On these procedures, no issues were evident in flyability checks; nevertheless, the sponsor will be advised to monitor the performance of arrivals and provided feedback to SARG IFP.

Holds

Some hold protected areas infringed other airspace structures. This has been addressed in the RDAR, and action highlighted in the regulatory requirements

Transitions

Two minor examples of segment lengths being less than the required minima. No issues were evident in flyability checks, therefore the sponsor will be advised to monitor the performance of arrivals and provided feedback to SARG IFP.

SIDs

There was one design non-compliance - the location of the first waypoint is closer than 1NM + along track tolerance. It was accepted at the Framework Briefing that this could be accepted if the design proved flyable in the formal flight simulator flyability checks. This has proved to be the case and therefore is accepted. The BPK SIDs were initially designed with a speed of 250 kts at BPK. This has been revised to 200kts to ensure the turn at LNN05 can be satisfactorily performed.

Charts

Comments on the Draft Charts will be fed back to AIS for incorporation into the formal AIP charts subject to ACP approval.

	Gatwick TIMBA STARs STARs & Holds The SARG Instrument Flight Procedure (IFP) assessment concluded that the STAR inbound routing minor alignment changes to TIMBA are relatively minor and no issues arose. The ARNUN and AMDUT contingency holds are RNAV. As a consequence of the introduction of RNAV STARs to TIMBA, this means that the TIMBA Hold for these STARs will change to RNAV status although STARs from the west to TIMBA remain conventional. Whilst technically, the TIMBA Hold becomes a mix of RNAV and conventional holds as depicted on the respective charts, in reality, there is no difference in how aircraft will fly the holds. GAL has been advised. Flyability checks for ARNUN and AMDUT have yet to be completed; however, given the entry and exit procedures are un-complicated, the IFP regulator does not expect any major issues to arise. Charts The draft charts from NATS PDG have been examined. There are a number of corrections to be made – this will be addressed at the end of the IFP assessment, then charts will be forwarded to NATS AIS for AIP amendments and checked by the SARG IFP regulator before being approved for publication – all subject to ACP approval.	
2.9	**Is the proposed airspace classification stated and justification for that classification acceptable?**	Yes
	The changes to CAS are lowering lower vertical limits and therefore some class G will change to Class A. All the upper routes (in Modules A, D & E) are Class C. Given the rationale for the change to provide protection for the arrivals, the volume of CAS proposed is effectively in the phase of flight for the arrivals such that to have a mix of Visual Flight Rules (VFR) traffic is not completely appropriate. If the proposed CAS was Class D, then high workload would arise which would require additional ATC resource for which NATS is not appropriately staffed for. Additionally, the disruption VFR traffic would cause in Class D at the levels where change is proposed would be counter-productive to an efficient flow of arrivals. Given that the majority of changes are over the sea, there is not the same volume of VFR traffic present compared to VFR flight over land, therefore SARG AR considers that the Class A is appropriate with this proposal.	

2.10	**Within the constraints of safety and efficiency, does the airspace classification permit access to as many classes of user as practicable?**	No
	It is not practical to integrate VFR traffic in the area where Class A will be lowered, and therefore VFR traffic will be excluded from the area where CAS will be lowered. However, Instrument Flight Rules (IFR) transit traffic prepared to fly in Class A airspace could still be accommodated in accordance with the rules pertaining to the entry requirements for flight in Class A.	
2.11	**Is there assurance, as far as practicable, against unauthorised incursions? (This is usually done through the classification and promulgation)**	Yes
	The RNAV designs will be promulgated via a double AIRAC cycle. The publication of the ICAO 1:500,000 Southern England edition VFR chart will be brought forward from March 2016 to February 2016. This has been co-ordinated with AIS.	
2.12	**Is there a commitment to allow access to all airspace users seeking a transit through controlled airspace as per the classification, or in the event of such a request being denied, a service around the affected area?**	Yes
	Transit arrangements for IFR traffic are permitted in accordance with extant regulations. VFR traffic would not be permitted to enter Class A.	
2.13	**Are appropriate arrangements for transiting aircraft in place in accordance with stated commitments?**	Yes
	For IFR transits in Class A.	
2.14	**Are any airspace user group's requirements not met?**	Yes
	There was no overwhelming objection from aviation users for CAS over the sea. The one main objection from [redacted] is one of principle relating to access and airspace classification. There was no quantifiable impact assessment from [redacted] regarding the number of flights affected, and therefore in the absence of this, and given the proposals to lower CAS are over the sea where we believe GA activity is extremely limited, it is concluded that GA operations are not seriously affected by this proposal.	
2.15	**Is any delegation of ATS justified and acceptable? (If yes, refer to Delegated ATS Procedure).**	Yes
	Delegated ATS in La Manche east Low is transferred from LAC to LTC FL115-FL195. LTC will provide 5NM separation within this airspace. The French regulator will be advised.	

2.16	**Is the airspace structure of sufficient dimensions with regard to expected aircraft navigation performance and manoeuvrability to contain horizontal and vertical flight activity (including holding patterns) and associated protected areas in both radar and non-radar environments?**	Yes
	The RNAV5 STARs have adequate protection in accordance with the SARG Airspace Regulation airspace containment policy (i.e. 5NM either side of the nominal track, except for the GODLU and GEGMU STARs which are adjacent to the corners of D037 near the Isle of Wight – see Section 2.17 below. The RNAV Hold protected area for **JACKO** is fully contained within existing and part of the new proposed CAS. The RNAV Hold protected area for **GODLU** is partially contained within existing and part of the new proposed CAS in the London FIR. Part of the area lies in the Paris FIR. A Regulatory Requirement therefore needs to be issued to NATS to ensure traffic entering the GODLU Hold does not cross into the Paris FIR (this is a technical issue and in reality is not expected to occur). The RNAV transitions are contained within CAS, although, as with the current position with radar vectoring downwind for LCY Rwy 09, aircraft are less than 3NM from the edge of CAS. This is mitigated in the RDAR by the application of radar monitoring. The SIDs are contained in CAS up to the LTMA 2500/3500ft boundary as is currently the case. Due to airspace constraints, a tactical climb is provided by ATC to ensure aircraft will remain inside CAS (as is the case today).	

The RNAV Hold protected area for **ROPMU** (en route hold for an LCY STAR to JACKO) is not fully contained within existing CAS. The aircraft enters the hold from the west and holds in a right hand pattern to the south. Part of the protected area lies to the north below the Southern CTA lower limit FL205. A Regulatory Requirement therefore needs to be issued to NATS to ensure traffic entering the ROPMU Hold does not leave CAS to the north (this is a technical issue and in reality is not expected to occur).

The RNAV Hold protected area for **ATPEV** contingency holds (a tactical hold on the LCY arrival transition, either left not below 4000ft, or right hand pattern not below 6000ft), whilst is fully contained within existing CAS overlaps the Shoeburyness danger area complex. A Regulatory Requirement therefore will be issued to NATS to ensure traffic entering the ATPEV Hold does not enter the danger areas to the northeast.

The RNAV Hold protected area for **OKVAP (**on the proposed Southend GEGMU STAR) is partially contained within existing CAS in the London FIR. Part of the area lies in the Paris FIR. A Regulatory Requirement therefore needs to be issued to NATS to ensure traffic entering the OKVAP Hold does not cross into the Paris FIR (this is a technical issue and in reality is not expected to occur).

The RNAV Hold protected area for GEGMU (at the end of the Southend STAR) lies outside CAS below the LTMA at 5500ft and not wholly within the newly (approved) Southend CAS. It was noted that parts of the protected area overlap the Shoeburyness danger areas, but as Southend is a danger area co-ordinating authority these issue have been dealt with in the separate Southend CAS ACOPP and hence are not covered here.

The RNAV Hold protected area for **AMDUT & ARDUN** (Gatwick TIMBA STAR en-route holds) are fully contained within existing CAS.

The RNAV hold for the Solent SAM2D is covered in Module E.

The EKNIV SIDs have a technical cap at 3000ft which has currently been applied since the DITAN Airprox some 5 years ago. This is unchanged with the RNAV replications, however, aircraft flying the EKNIV SIDs have to be tactically climbed to reach Min Stack level (MSL) by SODVU by virtue of the airspace design, and therefore this controller intervention assures these SIDs will remain inside CAS.

The proposed ATS routes providing connectivity from EKNIV to the en-route network are wholly within existing CAS.

2.17	**Have all safety buffer requirements (or mitigation of these) been identified and described satisfactorily (to be in accordance with the agreed parameters or show acceptable mitigation)? (Refer to buffer policy letter).**	Yes / TBC

The arrival procedures are in close proximity to Shoeburyness danger areas. There are a number of measures which NATS will implement to ensure aircraft do not enter these danger areas when they are active including the use of a new Proximity Indication Tool (PIT) tool. These interactions have been comprehensively covered in the Route Design and Assurance Report (RDAR) (explained below in section 2.18), and mitigations for the close proximity to Shoeburyness have been accepted by the SARG CO and the ATM Ops Inspector.

GEGMU / GODLU STARs v DANGER AREA D037

In the initial proposal (ACP and RDAR), the sponsor did not provide mitigation to address the containment issue for the STARS as they pass D037 north west and north east corners where less than 5NM from the nominal track of the STAR exists. This is being addressed. The sponsor subsequently conducted further analysis to update the final RDAR submission which was received on 15 June. The submission did not include any mitigation to overcome this issue, and was returned to the sponsor for revision.

Update 28 Jul 15: The sponsor finally addressed the issue and will ensure controllers monitor traffic on these STARs to ensure they do not enter D037.

2.18	**Do ATC procedures ensure the maintenance of prescribed separation between traffic inside a new airspace structure and traffic within existing adjacent or other new airspace structures?**	Yes

This is the first major re-development of LTMA arrival and departure procedures probably since the STARs and SIDs were introduced for LCY many years ago. Whilst the formal route spacing guidance from the European and International Civil Aviation Organisation (ICAO) sources regarding interacting PBN procedures in a TMA environment is still in development, an 'interim' CAA Route Spacing Policy guidance was introduced, for the then referred to 'PRNAV' operations, in 2007 to enable designs for the NATS Terminal Control (TC) North development project to be integrated effectively without having excessive route spacing between all interacting procedures. Whilst policy for straight line segments was fairly straight forward (allowing for cross track and along track errors in aircraft navigation), there was no formal guidance for route design to establish safe separation between turning or crossing procedures.

The interim CAA guidance issued in 2007 has been used by a number of NATS developments which, for various reasons, have not been progressed; however, following engagement with Eurocontrol, a Eurocontrol Enhanced Route Spacing Task Force has been established to determine appropriate guidance in the European fora. A number of NATS Future Airspace Strategy (FAS) trials (e.g. the Departure Enhancement Programme) have therefore been under way in the last 2 years to help inform and develop new policy for separation and route spacing between new RNAV/RNP procedures in the terminal environment.

In the meantime, NATS has progressed LAMP 1A using the guidance in the 'interim' CAA policy of 2007, and has developed the reporting analysis format used in the TC North development (project suspended following the recession of 2007/2008) into an extensive and comprehensive document known as RDAR which details new procedures which interact with other new procedures, existing conventional procedures, restricted airspace or the lateral limits of CAS. This also covers new routes which are adjacent to CAS boundaries, danger areas, and all other crossing or adjacent flight paths. The process involves identifying each interaction and recording how route spacing is shown and hence how separation is achieved. On occasions where the route spacing has been unable to meet the policy for 5NM between adjacent parallel routes in the LTMA environment where 3NM radar separation is routinely applied, then adjustments (if possible) to achieve 5NM separation have been made. The separation allows for along track and cross track errors based on the principles that RNAV 1 operations are regarding of having an accuracy of +/- 1NM track keeping accuracy (RNAV5 operations allow for 5NMm track keeping accuracy) which takes account of the total systems errors with the on board performance of aircraft navigation systems.

To take account of non straight line segments which are very much in the predominance in the LTMA (i.e. crossing traffic or aircraft flight paths turning towards other turning procedures), the RDAR provides scope for the sponsor to demonstrate how separations are achieved, and may use historical evidence to help to assure route spacing, or in a number of occasions, the resolution of a procedure may have to involve controller intervention to assure safe separation. The latter (not an unusual situation given the close proximity of all the 'Big 5' London airports), may ultimately result in a requirement for the controller to radar monitor the relevant procedures in order that radar vectoring may be provided to assure the separation from either other aircraft, restricted airspace or other adjacent airspace structures.

For LAMP1A, NATS has therefore produced an extensive RDAR extending beyond 180 pages to document all interactions with the new or revised existing procedures. Procedures have been documented to show how route spacing is achieved. This results in NATS identifying certain safety requirements which will involve training to illustrate to controllers, particular scenarios which may require controller intervention. For example, there is a requirement for Thames Radar to climb the LCY EKNIV SIDs to reach Min Stack Level (MSL) by SODVU to ensure that these departures are retained in existing CAS, climb above the newly established Southend CAS and are climbed above the crossing flightpath of the LCY/Biggin Hill arrivals using the new arrival transition procedures.

Some of the mitigating procedures will involve procedures being included in the relevant Manual of Air Traffic Services (MATS) Pt 2 entries.

One of the critical elements of the LAMP1A design is that it is not a total 3D systemised design in that RNAV procedures cannot be designed to achieve safe separations based on design vertical profiles being coded up into the aircraft FMS. This is primarily due to the constraints of the airspace around LCY. A critical element is that all LCY SIDs will remain capped at 3000ft without any step climb profiles being adopted into the departure profile. This arose as a safety requirement following the DITAN Airprox some 5 years ago where the Aircraft Accident and Investigation Branch (AAIB) recommended that step climb procedures were removed due to the interaction with Heathrow arrivals. This therefore means that controllers have to initiate the climb of the LCY SIDs above 3000ft, and likewise, will provide the descent of the LCY arrivals to ensure both departure and arrival flight paths are safely separated. This means that the airspace design is a 2D design although levels will be coded up into the navigation coded databases and the charts will have warnings on them to advise pilots that descent clearance will be allocated by ATC.

Therefore, whilst not a fully 3D systemised and integrated design, there are still benefits to be realised as the need for radar vectoring is reduced by virtue of the fact that the aircrafts' FMS will ensure that the aircraft will follow the required lateral flight path.
The CAA has provided advice and guidance throughout the development process on certain interactions to ensure the sponsor recognises particular areas where appropriate supporting evidence is required in order to assure appropriate route spacing.

	On submission of the ACP, the SARG CO and SARG ATM Ops inspectors have assessed the NATS RDAR submission Issues 1, 2, 3 &3A. The initial proposal required a number of clarifying comments to be added along with a number of additional mitigations to assure that the route spacing would be acceptable. For example, it was necessary to provide historical track dispersion for a number of Heathrow departures to illustrate how close the flight profiles are to the LCY departures and arrivals. Initial CAA comments have been addressed, and a Draft Issue 3 was presented on 26 May for CAA review. A number of further refinements to the mitigations were required. Historical data has since been provided to SARG; ATM Ops and the SARG CO are content that these interactions have now been supported with historical data and that the traffic downwind for LCY Rwy 09 against Heathrow departures result in no reductions in separation standards. Similarly, the LCY Rwy 27 departures interacting with Heathrow Rwy 09 departures result in no reduction in separation standards. Nevertheless, in the absence of formal policy for route spacing against turning procedures, SARG has elected to issue the sponsor with regulatory requirements for the Thames Radar controller to provide radar monitoring of the LCY traffic as appropriate. A summary of all regulatory requirements to be issued to the sponsors is at the concluding comments section, and will be incorporated into a consolidated list of requirements together with any others from the Modules A, B, D & E, and any requirements if they arise from the SARG Exec review of the proposals (subject to ACP approval this may then be used to send to the sponsor). At time of submission to the SARG Exec, the consolidated list is at Op Report Appendix 3 and is subject to updates as required following SARG Exec review, ACP decision and approval.	
2.19	**Is the airspace structure designed to ensure that adequate and appropriate terrain clearance can be readily applied within and adjacent to the proposed airspace?**	YES
	SIDs from LCY have the appropriate obstacle clearance. STARs are all above the relevant safety altitudes. New ATS routes are at FL 85 and above.	
2.20	**If the new structure lies close to another airspace structure or overlaps an associated airspace structure, have appropriate operating arrangements been agreed?**	Ongoing
	The EKNIV SIDs are adjacent to and run through Southend CAS in the lateral sense; however, in practice they have to be climbed to MSL by SODVU. Arrangements between Southend and LTC were established for the new Southend CAS established in April 2015. These procedures need to be revisited and modified if required to cover the LAMP1A design. At time of writing the report, procedures between units have yet to be agreed between the units and will be updated if required.	

2.21	**Where terminal and en-route structures adjoin, is the effective integration of departure and arrival routes achieved?**	YES
	The integration of the PBN Replicated SIDs into the ATS en-route network is unchanged except for the new RNAV1 SIDs for Rwy 09 and 27 via EKNIV. These SIDs will be integrated into the ATS en-route network at EKNIV where they will join a new ATS route. The replicated arrival flight paths are based on RNAV1 Transitions from a new arrival Point Merge procedure to the relevant IAPs.	
3.	**Supporting Resources and CNS Infrastructure**	**Status**
3.1	**Is the evidence of supporting CNS infrastructure together with availability and contingency procedures complete and acceptable? The following are to be satisfied:**	
	▪ **Communication**: Is the evidence of communications infrastructure including RT coverage together with availability and contingency procedures complete and acceptable? Has this frequency been agreed with S&S Section?	Yes
	There are some minor changes to frequency utilisation within NATS sectors.	
	▪ **Navigation**: Is there sufficient accurate navigational guidance based on in-line VOR 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? Eg. Navaids – has coverage assessment been made eg. a DEMETER report, and if so, is it satisfactory?	Yes
	There is one critical NAVAID which is the CLN VOR – this is covered in Module B.	
	▪ **Surveillance:** Radar Provision – have radar diagrams been provided, and do they show that the ATS route / airspace structure can be supported?	YES
	Radar coverage is available in all new areas of CAS.	
3.2	**Where appropriate, are there any indications of the resources to be applied, or a commitment to provide them, in line with current forecast traffic growth acceptable?**	N/A
	Within the scope of this proposal, this is not relevant.	
4.	**Maps/Charts/Diagrams**	**Status**

4.1	**Is a diagram of the proposed airspace included in the proposal, clearly showing the dimensions and WGS84 co-ordinates?** **(We would expect sponsors to include clear maps and diagrams of the proposed airspace structure(s) – they do not have to accord with AC&D aeronautical cartographical standards (see CAP725), rather they should be clear and unambiguous and reflect precisely the narrative descriptions of the proposals. AC&D work would relate to regulatory consultation charts only).**	Yes

The formal IFP design charts from the NATS PDG design organisation were reviewed by the SARG IFP regulators. Comments will be fed back to NATS PDG and the sponsor for onwards transmission to NATS AIS. All charts will be subsequently checked for regulatory approval prior to promulgation in the AIP subject to ACP approval.
The charts provided to demonstrate the impact of the replications are the charts as presented in the RNAV replication consultation document. All maps can be electronically zoomed for greater magnification. As there is a slight overlap with the LCY Module B, the following is replicated here:

Module B consultation Page 14 & 15 Figs 1&2 – illustrate current flight paths for arrivals and departures showing a swathe which has a colour key to indicate the number of flights per day. The supporting textual material to explain the charts clearly signposted the purpose of these charts to show where aircraft currently fly.

Module B consultation Page 15 & 16 Figs 3&4 - illustrate indicative altitudes.
In the following figures, diagrams show current flight path swathes with superimposed dotted lines to illustrate the area where most flights would be concentrated which are based on predicted flight paths derived from a Eurocontrol RNAV Validation Tool (RVT) which are shown alongside the swathe diagrams:
Page 22 Fig 5/6 - Rwy 27 DVR/LYD
Page 23 Fig 7/8 - Rwy 09 DVR/LYD
Page 24 Fig 9/10 - Rwy 09 CLN and Page 25 Fig 11/12 - Rwy 09 CLN - RVT zoomed out view
Page 26 Fig 13/14 - Rwy 27 CLN and Page 27 Fig 15 - Rwy 27 CLN - RVT zoomed out view
Page 28 Fig 16/17 - Rwy 09 CPT/BPK and Page 29 Fig 18 – Rwy 09 CPT/BPK – RVT zoomed out view
Page 30 Fig 19/20 - Rwy 27 CPT/BPK and Page 31 – Fig 21 – Rwy 27 CPT/BPK – RVT zoomed out view
Page 33 Fig 23 - Rwy 09 Arrivals and Page 34 Fig 24 – Rwy 09 Arrivals –RVT
Page 35 Fig 25 - Rwy 27 Arrivals.

Charts to illustrate the airspace design were provided in a number of different formats: a design chart showing all the existing and proposed procedures. A chart of the airspace design superimposed onto the 2014 version of the ICAO Southern England 1:500,000 VFR chart. This was extremely helpful but had to be updated mid way through the case study due to the additional CAS required for the ATSAP STAR.

Many extracted charts were shown in the ACP documents to show the proposals, and there was much reference back to consultation material and associated feedback reports.

4.2	**Do the charts clearly indicate the proposed airspace change?**	Yes
	The charts provided in the ACP at page 11 Fig 5.2, page 15 Fig 5 and page 16 Fig 6 showed the flight paths of the arrival transitions, the ATS routes and the proposed CAS. An additional consultation clearly showed the extra CAS for the Southend STAR at ATSAP. On page 18 at Fig 7, the sponsor demonstrated typical trajectories from ATC real time simulation. Large scale charts with selectable layers were available to produce AO size charts for ACP analysis which proved extremely helpful.	
4.3	**Has the Change Sponsor identified AIP pages affected by the Change Proposal and provided a draft amendment?**	Yes
	The new STARs, SIDs and arrival routes will be portrayed in IFP charts and associated RNAV database coding tables to be included into the UK AIP once SARG IFP approvals have been issued. A comprehensive list of all AIP amendments was provided with the ACP reference documentation in order to identify all Aerodrome entries, en-route entries, as well as extensive lists of other information and charts which are published in the AIP. A list of ATS route amendments was provided within the validation spreadsheets which were subjected to checking and approval by the SARG mapping specialist before being submitted with the AIR Change Request submissions. Lower limits of ATS routes were checked; a few anomalies arose and were rectified by the sponsor. Given the enormity of change, AIS amendments were scheduled to be submitted to AIS 3 weeks ahead of the normal schedule. As the implementation date has slipped, all AIP change requests will still be submitted early to enable a smooth amendment process by AIS. Details will be checked and co-ordinated for promulgation by the SARG CO subject to ACP approval. As part of the AIP ICAO compliancy review, at the same time, an opportunity was taken to examine any ATS routes which had base level change points which were not identified by 5 Letter Name Codes (5LNCs). Whilst is was not possible to change all segments subject to change in the LAMP 1a proposal, other ATS routes have been examined and a number can be changed before LAMP1A implementation. Changes not possible with LAMP1A will be identified for later change – this is purely an issue with NATS mapping and adaptation and the ability to absorb the change given that training material has to be prepared well in advance before change requests are submitted to AIS. Note: 'train the trainers' programme commences Friday 26 June.	
5.	**Operational Impact**	**Status**
5.1	**Is the Change Sponsor's analysis of the impact of the change on all airspace users, airfields and traffic levels, and evidence of mitigation of the effects of the change on any of these, complete and satisfactory?** **Consideration should be given to:** **a) Impact on IFR GAT, on OAT or on VFR general aviation traffic flow in or through the area.**	Yes

Where Class A is lowered mainly over the sea in the Thames Estuary in: CLN CTA 8 – FL 85 to 5500ft and FL 65, WOR CTA 1 – FL65 to 5500ft, WOR CTA FL85-FL65, this precludes General Aviation (GA) activity in the proposed airspace. From feedback received in consultation this affects few GA operators as little feedback was received concerning detailed impacts on GA operations. Some feedback indicated concerns of funnelling, lowering limits of CAS and restricted access given the lowering of some lower limits of Class A over the sea, although a small part of the lowered CAS from FL 65 to 5500ft is overland on the northeast corner of Kent south of Maypole aerodrome. With pressure settings taken into account, on low pressure days the actual lowering will effectively be less than 1000ft. In the area over the sea where the CLN CTA drops from FL 85 to 5500ft this is a greater change, but again, there have been no overwhelming objections with supporting rationale to indicate a significant impact to GA operations over the sea. One concern also concentrated on airspace classification and VFR access for GA.

As an independent exercise as part of the ACP review process, with due regard to the GA Red Tape challenge, the SARG CO commenced some analysis into potential options where it was thought that the raising of some lower limits of Class A could be considered, This very much depended on utilisation of the lower limits of ATS routes and climb profiles of some LTMA departure, and the re-designed LCY and Southend arrival profiles. The areas considered were primarily over the sea where it was considered GAT would not be potentially flying through considering the re-design of the LCY SIDs and re-routed STARS. A number of options for raising lower limits were therefore presented to NATS. For a number of reasons for example: adaption, mapping, production of AIP amendments and training material (training commences 26 June), the initial NATS view was that it was unlikely all options could be properly considered and implemented at the same time as LAMP1A. NATS response was that whilst the options were probably not feasible with LAMP1A implementation, they could potentially be incorporated at the next appropriate ICAO 1:500,000 Southern England chart cycle. It may even be the case that the next cycle after LAMP1A will need to be brought forward to co-incide with the potential Farnborough ACP (implementation date yet TBD by the sponsor).

At the earliest opportunity, the SARG CO will re-engage the sponsor to seek progress on options to determine whether there are any further opportunities for CAS refinement, or indeed if the sponsor is able to consider any further refinements.

b) Impact on VFR Routes.	N/A
VFR routes were not promulgated over the sea where CAS change is proposed; however, with lowering of CAS, VFR operations are slightly restricted, except where CAS is proposed to be raised (WOR CTA 1 FL65 up to FL 75.	
c) Consequential effects on procedures and capacity, ie on SIDS, STARS, holds. Details of existing or planned routes and holds.	Yes
The departure and arrival procedures are contained within existing CAS and the newly proposed CAS, except for the GEGMU and GODLU STARs as they pass close to D037 (resolution yet to be confirmed). This should not affect capacity in any way. Holds and en-route holds have been designed to cope with contingency arrangements. The design of point merge and the contingency holding arrangements, along with the linear holding potential along the point merge arcs, all provide for a more efficient airspace design. Therefore the design has capacity to cope with additional traffic should there be an overall increase in the years to come. **Update 28 Jul 15:** Regarding D037, NATS has proposed that controllers will radar monitor traffic on these STARs which will pass close to D037 and ensure traffic does not enter the danger area. This has been accepted in the RDAR analysis.	

d) Impact on Airfields and other specific activities within or adjacent to the proposed airspace.	Yes
The existing conventional southbound SIDs route through the newly established Southend CAS (Southend CTA1 1500-3500ft). When this CAS was established in April 2015, agreements were established between NATS LTC and Southend to ensure that the LCY traffic was climbed above the Southend CAS. In the existing airspace structure, as has been the case since the LCY SIDs were introduced, the LCY SIDs still have to be climbed above by LTC above 4000ft before they cross the LTMA bdy at 3500 ft just before the LON VOR Distance (D) 30. This still remains the case with the proposed EKNIV SIDs, although the new SIDs will be re-routed further east to ensure ample airspace is available for these departures to be climbed to reach MSL by SODVU. This is a requirement of the new airspace design which enables the departures to be climbed above the arrivals flying westbound along the Thames estuary. This therefore ensures that the LCY departures will be safely integrated with the Southend traffic. All Southend departures are subject to a release from Thames Radar so both departures are de-conflicted by the Thames controller before the Southend departures are cleared for take-off. Southerly Southend departures will remain below the LCY arrivals until they are clear of the arrival track. The impact of the RNAV arrivals and departures against adjacent Heathrow departures and arrivals is not expected to change. Interactions have been covered by the Route Design Analysis Report (RDAR) and have been assessed by SARG Air Traffic Management (ATM) Ops inspectors and the SARG AR CO. Specific details of this assessment have been covered in this report and the Module B Op report together with any mitigations required to assure separation of the RNAV 1 procedures against other interacting procedures. The NATS analysis is an extensive document of 180+ pages and is available on electronic folders if required for scrutiny.	
e) Any flight planning restrictions and/or route requirements.	Yes
RNAV 1 procedures are only available for certified and approved aircraft and appropriately trained crews. Aircraft will be given clearance to fly the appropriate RNAV SID with their pre-departure clearance, or for STARs, the appropriate STAR when arrival route clearance is confirmed. Aircraft not equipped, and crews not approved will continue to be able to use conventional SIDs as described earlier. These departures will be tactically vectored once airborne, to follow any RNAV1 departures which have departed ahead, as the Thames controller will have to ensure that these conventional SIDs have adequate airspace to reach MSL before crossing the arrival traffic in the estuary. Non RNAV1 arrivals will be vectored from the end of the RNAV5 STAR into the arrival sequence of any RNAV1 arrivals ahead.	

5.2	**Does the Change Sponsor Consultation letter reflect the likely operational impact of the change?**	TBC
	The sponsor believes that GA operations will not have any specific impact on GA activity other than a general reduction in Class G airspace. NATS stated that GA organisations consulted through the NATMAC membership have either supported the change or made no objection; although there was an objection from [redacted] on airspace classification (covered in Section 2.7). The design report following consultation feedback has highlighted the design of the proposed point merge system for LCY and has clearly shown this on page 8 Fig 2. It provides a good illustration of how the STARs lead into the arcs where the RNAV transition flight paths to final approach are clearly shown. The feedback report has described how the system will work for LCY and Biggin Hill. Options for LCY STARs from the north are shown on page 12 Fig 3. The proposed departure profiles for LCY are shown on page15 Fig 4. The proposed Gatwick TIMBA STAR re-alignments from the north east are shown on page 16 Fig 5. The operational impact to GAT operators has been covered in consultation with the results indicated in the feedback report. There are some disbenefits to operators using the LCY northerly city pairs due to the increase track miles flown but the higher arrival profiles from the north with a later descent help to offset this situation. NATS believe the improved climb profile of the EKNIV SIDs help to offset the slightly extra track miles for arrivals, but one of the main operational benefits will be achieved through a semi-systemised design with more predictability and more significantly, the avoidance of having to hold at low level over Kent on a ad hoc basis. Having the pre-determined arrival flight paths, crews are much better placed to plan for the linear holding knowing that in the worst case when the last waypoint of the arc they will be turned in to the merge point if not before. The NATS environmental analysis covering the changes to track mileage, fuel burn and CO2 emissions is detailed in Ref LAMP G (Attachment 1 to the Bridging Module ACP. The CAA analysis of the full proposal will be in the ERCD Environmental report.	
6.	**Economic Impact**	**Status**
6.1	**Is a provisional economic impact assessment to all categories of operations and users likely to be affected by the change included and acceptable?** **(This may include any forecast capacity gains and the cost of any resultant additional track mileage).**	No
	Not required.	

Case Study Conclusions – To be completed by DAP Project Leader	Yes/No
Has the Change Sponsor met the DAP Airspace Change Proposal requirements and Airspace Regulatory requirements above?	Yes

The requirements for IFP design have generally been met although there are a number of outstanding items (nothing major) to be completed before the formal change request submission may be submitted to AIS for publication (subject to ACP regulatory approval).

The airspace regulatory requirements have been met although some regulatory requirements will be issued to the sponsor to mitigate certain route interactions or to overcome particular airspace containment requirements (in the main, the majority of containment issues are those of technicality rather than reality, where the hold protected areas overlap other airspace structures where it is unlikely that the aircraft joining the hold would fly.

The provision of the RDAR and the analysis in the document has been a useful vehicle to address route interactions and a number of procedures which are in close proximity to danger area airspace.

Whilst some CAS will be lowered over the sea, this does not appear to affect too many class G airspace users although there have been some aviation objections to the proposals. As a result of the consultation feedback, and the final procedure designs being confirmed, the sponsor has proposed to raise part of the Worthing CTA from FL65 to FL75. Following evaluation of further potential options to consider raising additional areas of CAS lower limits over the sea, further refinements may be possible in due course either with or following LAMP1A implementation.

Since the report was first compiled a policy statement for Point Merge procedures has been published by the CAA regarding fuel planning, linear holding and RCF procedures.

28 Jul 15 Update: Due to ongoing training developments which have since come to light since the Op Report was initially submitted to Mgr AR, prior to a formal ACP decision notification to NATS, the SARG CO will check with ATM Ops to ensure there are no training issues at that point which would preclude implementation.

Outstanding issues at the time of original report submission were mainly minor and are detailed below. There was nothing to suggest that any of these issues could not be resolved prior to AIS deadlines and implementation as appropriate.
Update 17 Sep 15 for Head AAA. Most of the following issues have now been resolved. The remaining issues will be addressed in due course prior to implementation.

Outstanding Issues

Serial	Issue	Action Required
1	**19 Jun 15.** RDAR route spacing mitigations.	Issue 3A examined. GEGMU/GODLU STARs in vicinity of D037 are to be re-examined by NATS in order to mitigate the 5NM containment issue against D037. Update 17 Sep 15 – now resolved – radar monitoring required.
2	**15 Jun 15.** Gatwick TIMBA STAR - AMDUT & ARDUT Hold flyability	Flyability checks to be completed.
3	**15 Jun 15.** Gatwick TIMBA STAR and AMDUT and ARNUN Hold designs yet to be approved by SARG IFP.	Waiting for updated data to be approved by SARG IFP. Update 17 Sep 15 – now completed.
4	**15 Jun 15.** Minor issues on LCY IFP designs.	Waiting for updated data to be approved by SARG IFP. Update 17 Sep 15 – now resolved.
5	**15 Jun 15.** STAR co-ordinate queries.	To be checked by SARG IFP. Update 17 Sep 15 – now completed.
6	**15 Jun 15.** Charting for point merge fuelling procedures.	Policy yet TBD by SARG IPF/SARG Flt Ops/SARG IFP. Update 17 Sep 15 - Policy issued. Charting resolved – one chart for the complete procedure to be published.
7	**15 Jun 15.** RCF procedures for point merge TBD.	Policy yet TBD by SARG IPF/SARG Flt Ops/SARG IFP. Update 17 Sep 15 - Policy issued, and Draft RCF revised to reflect the policy. Charting resolved – one chart for the complete procedure to be published.
8	**15 Jun 15.** Charting	Charting format to be confirmed for new RNAV Transitions by SARG IFP. Update 17 Sep 15 – now completed.
9	**16 Jun 15.** Response from NATS regarding Dedham Vale on request.	NATS to provide confirmation that requirements arising from the CLN JR have been considered. Update 17 Sep 15 - Details provided to Head AAA and position agreed with OGC. Issue resolved.

10	**15 Jun 15.** All LoA revisions.	To be agreed with other parties before implementation and provide to the CAA (early drafts already received).
11	**15 Jun 15.** Southend MoU	To be reviewed by NATS and Southend and revisions agreed as appropriate before implementation. Copy to be provided to SARG prior to implementation.
12	**Training Plan** (Note: Train the Trainers commenced 26 Jun 15)	Training Implementation Plan to be provided to SARG ATM Ops for CAA review. SARG CO to check Training issues with ATM Ops and advise Gp Dir SARG prior to implementation notification decision to NATS.
13	Overnight implementation plan.	To be provided to SARG ATM Ops for CAA review. Provided – issue closed.

Additional Compliance Requirements (to be satisfied by Change Sponsor)

Serial	Requirement
	Regulatory Requirements to be issued by the CAA:
1	The GEGMU and GODLU RNAV5 STARs do not have the required protection in accordance with the SARG AR Airspace containment policy (i.e. 5NM either side of the nominal track as they pass close to the northwest and north east corners of D037. NATS to ensure controllers monitor traffic to ensure aircraft do not enter D037.
2	NATS to ensure traffic entering the GODLU Hold does not cross into the Paris FIR (this is a technical issue and in reality is not expected to occur).
3	NATS to ensure traffic entering the ROPMU Hold does not leave CAS to the north (this is a technical issue and in reality is not expected to occur).
4	NATS to ensure traffic entering the ATPEV Hold does not enter the danger areas to the northeast.

5	NATS to ensure traffic entering the GODLU Hold does not cross into the Paris FIR (this is a technical issue and in reality is not expected to occur).
6	NATS is to monitor the performance of arrivals between: JACKO and NONVA and NONVA-BABKU, ERKEX-OKVAP, NEVIL-OSPOL and provide feedback to SARG IFP.

Recommendations	**Yes/No**
Is the approval of the SoS for Transport required in respect of the Environmental Impact of the airspace change?	No
[Comments]	
Is the approval of the MoD required in respect of National Security issues surrounding the airspace change?	Yes
The DAATM representing Ministry of Defence (MOD) was asked to confirm their acceptance of this proposal. A confirmatory acceptance was received on 9 Jun 15.	

General Summary

This ACP has been a complex and comprehensive proposal comprising a huge amount of detail to meet all regulatory requirements of the change process. Given the majority of change to CAS lower limits is over the sea, there does not appear to be any significant issues raised by Class G users to warrant modification to the proposals, but AR will pursue the review of certain base levels. Although there is some increase in track miles for certain profiles, the airspace design has been carefully considered to cause the least environmental impact (subject to the ERCD assessment) and there is no doubt that the arrival flight paths provide a more predictable flight plannable routes for the operators into LCY. The improved LCY climb profiles will also provide environmental benefits. Both these factors will offset the extra track mileage with a net reduction in fuel burn and CO2 emissions (subject to ERCD assessment).

The airspace re-design using the point merge system has been carefully designed to maximise the airspace available over the sea and the Thames estuary. This will result in the arrivals to LCY not having to spend as much time flying at low altitude over land compared with the existing arrival profiles. The LCY departures to the south will have a much improved climb profile given that the Luton, Northolt and Stansted SIDs via Detling will now be re-routed to the east towards Clacton. The Gatwick TIMBA STARs from the north east have been slightly re-aligned to integrate with the LCY arrival departure profiles and the revised outbound routeings of the Luton, Northolt and Stansted SIDs which have been re-routed to the east. The Southend GEGMU STARs from the south have also been effectively integrated into the design with the routeing around Shoeburyness to the east. The NATS internal re-sectorisation will enable the revised profiles to be handled safely, and the Thames Radar controllers should see a significant reduction in controller workload, and will benefit from the introduction of the [redacted]

Overall, a comprehensive ACP package which has included a detailed RDAR analysis to assure the safety of the final airspace design. The point merge proposal is the first of its kind in UK airspace and is ideally suited for the operation into LCY given its location and how the LCY arrival flight paths have to be integrated into the extremely busy LTMA airspace. Whilst some routes may have slightly longer track miles to fly, this is offset by the environmental benefits achieved by improved climb profiles and the higher and re-profiled arrival flight paths which will result in less overflight and holding at low levels over land. The designs have been welcomed by operators using LCY who have supported the change

From an ATC viewpoint, the operation for Thames Radar will significantly improve with [redacted]

From a flight deck perspective, RNAV1 operations will provide for a smoother operation for both arrival and departure profiles for LCY and will result in reduced radar vectoring, thus achieving a reduced workload for both crews and controllers alike. This proposal therefore enables a significant improvement regarding a reduction in risk to the Thames Radar operation and will enhance flight safety all round.

The implementation of this, and all associated LAMP1A modules is therefore highly recommended.

Comments

Observations

Operational Assessment Sign-off/Approvals			
	Name	**Signature**	**Date**
Operational Assessment completed by (SARG Project Leader)			22 Jun 15 28 Jul 15 (update) 17 Sep 15 (update)
Operational Assessment approved by (Head of Section)			24/07/2015

Case Study Sign-off/Approvals			
	Name	**Signature**	**Date**
Case Study Assessment Conclusions approved by (Head AAA)			

SARG Group Director Comment/Approval

Approval subject to agreed conditions

Name M SWAN	Signature	Date 21/06/15

APPENDIX 1 TO OPERATIONAL REPORT

From: [redacted] **Behalf Of** Airspace Consultation
Sent: 02 April 2015 17:12
Subject: LAMP Phase 1A Controlled Airspace requirements for the Thames Estuary and Kent Coast

Dear Stakeholder

As part of the LAMP airspace change proposal we consulted on new routes and associated Controlled Airspace (CAS) in the vicinity of the Thames Estuary and Kent Coast. This consultation closed in January 2014 but remains available at londonairspaceconsultation.co.uk. This site also provides the design feedback report describing the routes we have developed since consultation. The primary change is the introduction of an RNAV1 point merge system for London City and Biggin Hill arrivals over the Thames Estuary; these flights are currently vectored at low levels over large parts of East London, Kent and Essex. RNAV5 Standard Arrival Routes (STARs) from the south and east are also proposed for Southend arrivals.

Changes to the extent of CAS are required to protect the RNAV arrival routes proposed for London City, Biggin Hill and Southend Airports.

The designs were in their infancy when we consulted and so neither the route structure nor the final CAS requirements were fixed. We have since finalised the proposed design and submitted it to the CAA. In finalising the design we have identified:

- an area of existing CAS that can be released to Class G, and
- an extra area of Class A CAS required to protect the new RNAV 5 STAR for Southend from the South

The attached document has a Figure showing the areas consulted on (labelled Areas A-D), the new area of released CAS (Area E) and the new area of additional CAS (Area F). The attached document also describes the level and purpose for all the CAS changes (Table 1), and the lat longs for the two new areas listed above (Table 2).

Aviation stakeholders are being offered a chance to provide further comment on Areas E and F to feed into the CAA assessment process because they were not covered in the original consultation. You have been sent this notification either because you are a member of the National Air Traffic Management Advisory Committee, or because your organisation provided a response to the CAS related question in the original consultation.

Please provide any comments that you have regarding the additional areas by return email by 7th May.

This email is specifically for use for Reponses in relation to the CAS proposals described above. Correspondence on any other subject will not be entered into. This email address will cease to be monitored after May 7th.

For general enquires please go to www.nats.aero.

Kind Regards

LAMP Airspace Consultation Team

LAMP Phase 1A Controlled Airspace requirements for the Thames Estuary and Kent

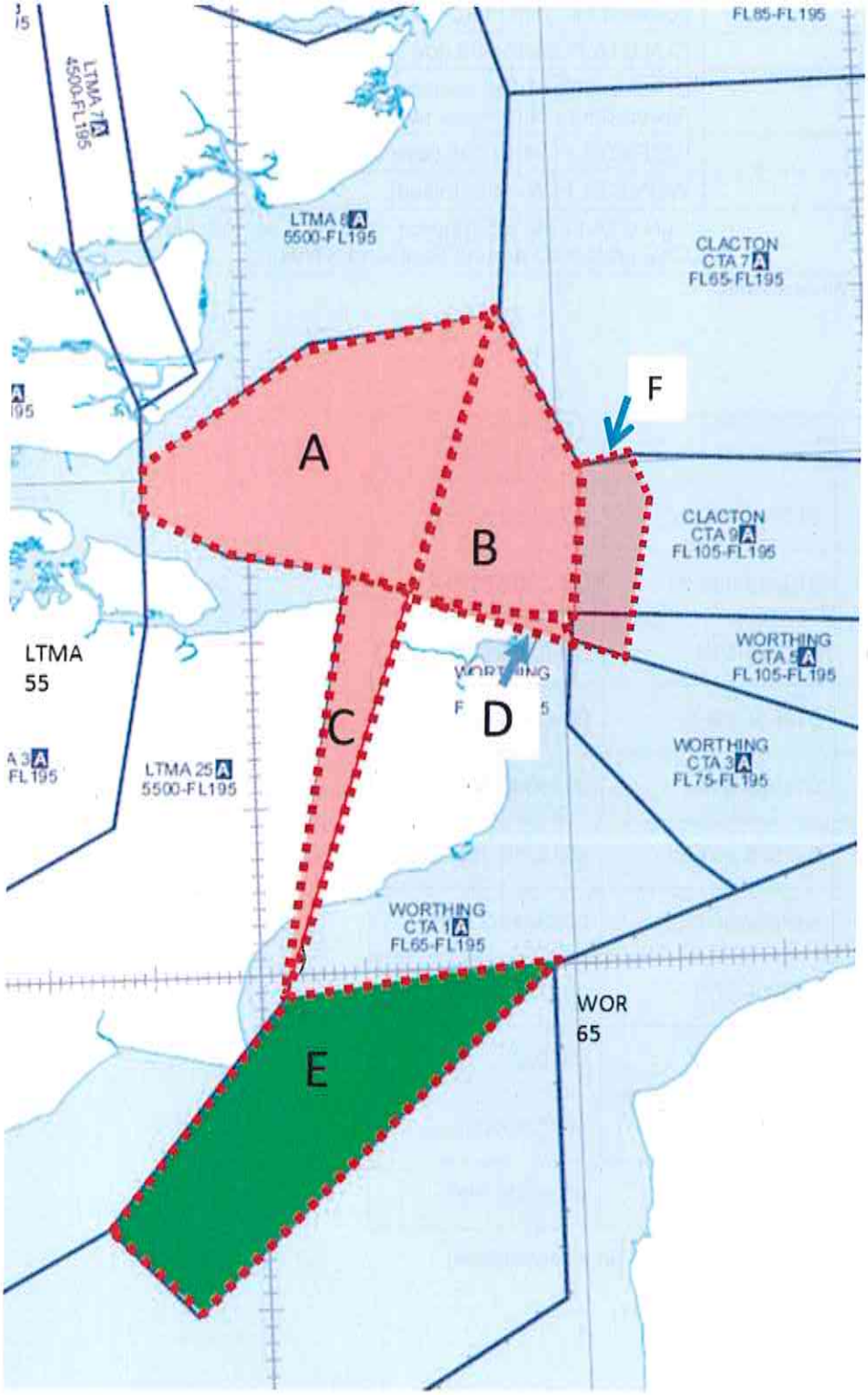

Figure 1: Proposed changes to CAS bases

Area	Current Base-Ceiling	Proposed
A	CLN CTA FL85-195	LTMA 5500ft-FL195 becomes part of LTMA 8 (lowered for point merge routes)
B	CLN CTA FL85-195	CLN CTA FL65-FL195 (lowered for point merge routes)
C	WOR CTA FL65-195	LTMA 5500ft-FL195 becomes part of LTMA 8 (lowered for point merge routes)
D	WOR CTA FL85-195	WOR CTA FL65-FL195 (lowered for point emerge routes)
E	WOR CTA FL65-195	WOR CTA FL75-195 (raised)
F	WOR CTA FL105-195	CLN CTA FL65-195 (approx. 4nm wide segment lowered for CAS protection around Southend STAR)

Table 1 Proposed Changes to Airspace Bases

Area	Data source	Lat	Long
Area F - Point 1	Calculated	512708.0652N	0013825.5238E
Area F - Point 2	Calculated	513023.9096N	0013732.6771E
Area F - Point 2A	AIP Published	513025.15N	0013704.68E
Area F - Point 3	AIP Published	512954.09N	0013155.85E
Area F - Point 4	AIP Published	511929.00N	0013040.00E
Area F - Point 5	Calculated	511826.4817N	0013519.1946E
Area F - Point 6	Calculated	512052.5025N	0013611.2368E
Area E - Point 1	AIP Published	510000.00N	0012800.00E
Area E - Point 2	AIP Published	505842.00N	0010226.77E
Area E - Point 3	AIP Published	503943.00N	0005308.00E
Area E - Point 4	AIP Published	504507.00N	0004500.00E

Table 2: Lat Longs for Area F and Area E (changes since consultation)

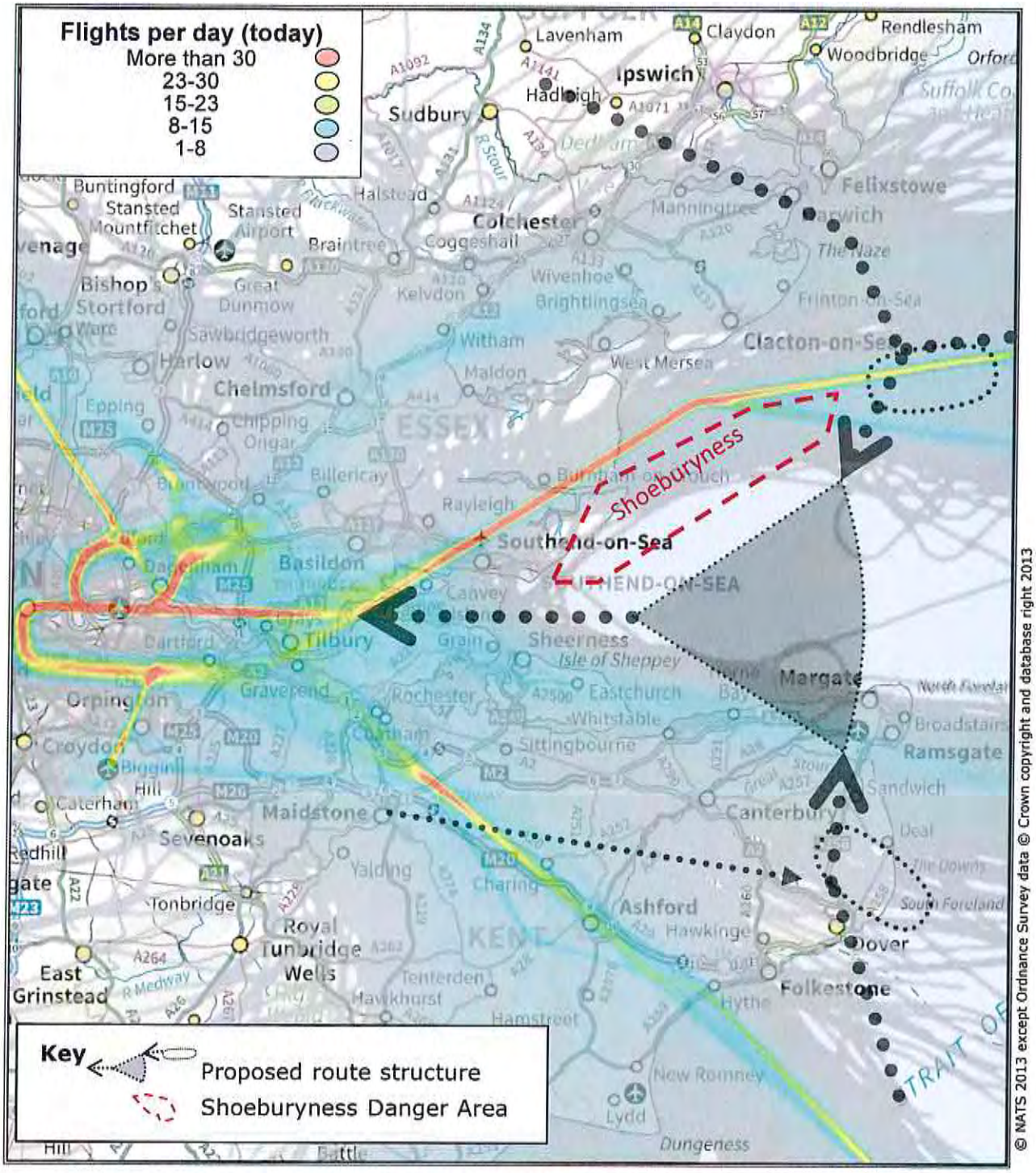

Figure 2: Proposed Network Route System for London City and Biggin Hill Arrivals Overlaid on Today's London City and Biggin Hill Flight Paths

APPENDIX 3 TO OPERATIONAL REPORT

LAMP 1A – CONSOLIDATED REGULATORY REQUIRMENTS – MODULES A TO E – V2

Additional Compliance Requirements (to be satisfied by Change Sponsor)	
Serial	**Requirement**
	MODULE A
1	NERL is to ensure that Radar Monitoring requirements for (UM)84 against D138A and that aircraft are kept on or east of the centreline of (U)M84 if D138A is active above FL105 are detailed in the appropriate sections of the TC and LAC MATS Part 2.
	MODULE B
1	Thames Radar controller to ensure that traffic entering the ATPEV Hold does not enter the Shoeburyness danger areas to the northeast.
2	The TC South Radar controller will monitor the vertical profile of the Heathrow Rwy 09 DET SIDs and take appropriate action to achieve separation between the Heathrow DET SID and the London City Rwy 09 arrivals if the controller considers separation could be eroded.
3	The TC North Radar controller will monitor the vertical profile of the Heathrow Rwy 09 BPK SIDs and take appropriate action to achieve separation between the London City Rwy 27 SIDs if the controller considers separation could be eroded.
4	The TC North Radar controller will monitor the vertical profile of the Heathrow Rwy 09 BUZAD SIDs and take appropriate action to achieve separation between the London City Rwy 27 SIDs if the controller considers separation could be eroded.

	MODULE C
1	The GEGMU and GODLU RNAV5 STARs do not have the required protection in accordance with the SARG AR Airspace containment policy (i.e. 5NM either side of the nominal track as they pass close to the northwest and north east corners of D037. NATS to ensure controllers monitor traffic to ensure aircraft do not enter D037.
2	NATS to ensure traffic entering the GODLU Hold does not cross into the Paris FIR (this is a technical issue and in reality is not expected to occur).
3	NATS to ensure traffic entering the ROPMU Hold does not leave CAS to the north (this is a technical issue and in reality is not expected to occur).
4	NATS to ensure traffic entering the ATPEV Hold does not enter the danger areas to the northeast.
5	NATS to ensure traffic entering the GODLU Hold does not cross into the Paris FIR (this is a technical issue and in reality is not expected to occur).
6	NATS is to monitor the performance of arrivals between: JACKO and NONVA and NONVA-BABKU, ERKEX-OKVAP, NEVIL-OSPOL and provide feedback to SARG IFP.
	MODULE D

1	NERL is to ensure that Radar Monitoring requirements for (UM)84 are detailed in the appropriate sections of the London Terminal Control and London Area Control MATS Part 2 (as per Module A).
	MODULE E
1	Safety requirement for radar monitoring of the RUDMO Hold already identified by NATS.
2	The utilisation of controlled airspace regarding climb and descent profiles following LAMP Phase 1A implementation is to be reviewed by NATS in order to address the CAA's list of possible options for raising lower limits of controlled airspace following implementation of LAMP Phase 1A which were discussed with NATS on 21 May 2015. NATS is to advise the CAA within 4 months of implementation regarding what revisions to the lower limits of controlled airspace are feasible and if appropriate, advise the CAA which options are not feasible.