LONDON AIRSPACE MANAGEMENT PROGRAMME (LAMP) PHASE 1A

CAA DECISION: PART APPLICABLE TO LAMP PHASE 1A MODULE C

CAP 1366/C

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31 August is now the revised date for the controlled airspace limits review, Portsmouth CTA re-classification review and introduction of segregated VFR operations; as specified in Module C No. 7 and 8, and Module E No. 2, 3, 4 and 5.

Amendments marked as underlined text

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LONDON CITY NETWORK CHANGES

PROPOSED BY NATIONAL AIR TRAFFIC SERVICES (NATS)

References:

A. Module C – London City Network Changes ACP Issue 2 dated March 2015.

B. London Airspace Consultation Document dated 14 October 2013.

C. London Airspace Management Programme (LAMP) – Stakeholder Organisations and General Public Final Report dated April 2014.

D. London Airspace Consultation – design report Following Consultation Feedback on Route Network (above 4000ft) over Sussex, Essex and Kent dated February 2015.

E. LAMP Phase 1A Controlled Airspace Requirements for the Thames Estuary and Kent dated 2 April 2015.

F. LAMP Phase 1A: ACP Environmental Benefits Report v 1.2 dated March 2015.

G. LAMP Phase 1A Bridging Module Issue 1 dated February 2015.

H. Route Design Assurance Report Issue 2 dated March 2015 (as amended).

I. Project Safety Assurance Report Issue 1 dated February 2015 (as amended).

J. Instrument Flight Procedure designs.

INTRODUCTION

1. In February 2015, National Air Traffic Services (NATS) submitted an Airspace Change Proposal (ACP) titled the London Airspace Management Programme (LAMP) Phase 1A proposal to the Civil Aviation Authority (CAA), to propose changes to airspace in the south-east of England including proposals to change a number of arrival and departure procedures at a number of aerodromes. LAMP Phase 1A is a major airspace change designed to deliver modifications to airspace arrangements affecting a broad swathe of south-east England from Stansted to the Isle of Wight in order to provide, primarily, capacity and efficiency benefits. There are five individual elements (referred to as Modules) of the LAMP Phase 1A proposal.

2. The justifications presented by NATS for the LAMP Phase 1A proposals are that it will modernise airspace structure, improve the operational efficiency of the airspace providing capacity for the future, minimise future delay, improve the environmental performance of the airspace, reduce average CO_2 per flight and reduce the incidence of low level overflight of populated areas.

3. It is acknowledged that of themselves, none of the Modules will increase the capacity of the airspace at this time but each of the Modules collectively contribute to a modernisation of the airspace that enables further systemisation, as and when further phases of airspace change are developed for the south-east of England and are put forward for consideration by the CAA.

4. This decision document expressly incorporates the contents of the **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E**[1] which thereby forms part of the CAA's decision in respect of the airspace change proposal in this Module. This decision document contains the information and decisions specific to the proposal outlined in LAMP Phase 1A Module C (Reference A).

[1] http://www.caa.co.uk/CAP1366.

5. This Module proposes a number of changes at London City Airport (LCY) and some procedures for adjacent airports as detailed below:

New Standard Arrival Routes (STARs) for LCY together with new Point Merge arrival 'transition' procedures.
Revised routing for LCY southerly SIDs (now RNAV-1[2]).
New RNAV-5 STARs for Southend.
Lowering of some Controlled Airspace (CAS) in the Thames Estuary to support the new procedures.
Re-routing of Stansted, Cambridge, Luton and Northolt 'Detling' departures towards Clacton before turning to the south-east.
New ATS routes within existing CAS.
RNAV-1 replications of the low altitude portions of the existing ten LCY conventional Standard Instrument Departure (SIDs) with RNAV-1 SID replications, and introduction of RNAV-1 replication arrival procedures of the LCY radar vectored arrival flight paths to intercept the Instrument Approach Procedures (IAP) for both Runway (Rwy) 09 and Rwy 27 with RNAV-1 arrival procedures; these procedures are covered in Module B.
A portion of the Runway 09 arrival 'transition' procedure will also be used by traffic inbound to Biggin Hill.
New Gatwick RNAV-5 STARs routing inbound to TIMBA from the north-east/east.
Re-sectorisation of NATS control sectors in the south and south-east.

6. This proposal has been the subject of a consultation by the sponsor which was followed by the publication of a consultation feedback report. When submitted to the CAA this proposal was accompanied and supported by the documents detailed as References above.[3]

7. The purpose of this document is to provide an overview of the proposal and the CAA's decision on it.

[2] RNAV-1 denotes a performance-based navigation (PBN) standard of area navigation for use in the design of instrument flight procedures for departures and arrivals.

[3] http://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Decisions/London-Airspace-Management-Programme-Phase-1A/.

INFORMATION THAT HAS BEEN CONSIDERED

8. In making this decision, the CAA has considered the documents set out above and set out in the **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E** and we have recorded our analysis of that material in the CAA's Operational Report, Consultation Report and Environmental Assessment.[4]

PROPOSAL OVERVIEW

9. This proposal relates to proposed changes to the structure of airspace above 4000ft AMSL. It is closely interrelated with the changes proposed in Module B which in the main affect the airspace structure only below 4000ft AMSL. The proposals in this Module relate to airspace network design. That is they relate to the part of airspace that is the interface between en-route (generally above FL195) and the lower ATS (air traffic services) airspace structure. These proposals represent a significant step change that aims to re-distribute the arrival flow of aircraft into London City Airport above 4000ft AMSL, with associated changes to Southend arrivals from the south and east, and arrivals into the Gatwick TIMBA hold from the north-east and east.

10. The main focus of the proposal is to introduce new RNAV-1 'point merge' arrival routes for London City from JACKO in the north-east and from GODLU in the south-east (see Annex A for a diagram (from the consultation feedback report) of the revised flight paths superimposed onto existing flight paths). New RNAV-5 STARs will feed traffic via JACKO and GODLU into these new arrival procedures.

[4] http://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Decisions/London-Airspace-Management-Programme-Phase-1A/.

11. Module B[5] proposes RNAV-1 departure and arrival replications – all up to 4000ft AMSL which largely follow the existing tracks over the ground. In this Module C, **new** tracks over the ground are proposed for the London City southerly departures from Rwy 27 (EKNIV1A) and Rwy 09 (EKNIV1H) as follows:

> In Module B, it is proposed that the Rwy 27 Dover/Lydd 5T SIDs are replicated by the EKNIV1A RNAV-1 SID up to LCN06, then the following **new** track routing is proposed in this Module: LCN06-LCE06-SODVU-EKNIV (termination point).
>
> Note: the change after LCN06 occurs from approximately Hornchurch (Harold Hill).
>
> In Module B, it is proposed that the Rwy 09 Dover/Lydd D5U SIDs are replicated by the EKNIV1H RNAV-1 SID up to LCE 03, then the following **new** track routing is proposed in this Module C: LCE03-LCE06-SODVU-EKNIV (termination point).
>
> Note: the change after LCE03 occurs from approximately Upminster.

12. Therefore, the tracks of the initial parts of the southerly SID procedures are portrayed in the Module B consultation document at pages 22 – 32 and largely follow the existing tracks over the ground. The new portions (the higher altitude sections) of the EKNIV SIDs proposed in this Module C, were included in the consultation for this Module C, as detailed in Reference B Part E (as referred to above).

13. A diagram to show the proposed change of the higher altitude section is shown at Annex B (extract from the consultation in Reference D).

14. Re-routing of Stansted SIDs via Detling to Dover (in Module A – see diagram at Annex C), Luton and Northolt SIDs via Detling to Dover (in Module D – see diagram at Annex D), and the re-positioning of the Gatwick STARs above 7000ft AMSL from the east, which in turn enables the revised routing of the Stansted SID switch routing (Module A), and the South Coast changes in Module E are an integral part of the route network change and enablers for changes detailed in this Module, and are covered in the those Modules proposals and decisions.[6]

15. A number of new routes within existing controlled airspace (CAS) are proposed as part of this Module and as part of the overall LAMP Phase 1A package; some routes are covered by other Modules where indicated, but for completeness are also detailed here:

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[5] CAP 1366/B http://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Decisions/London-Airspace-Management-Programme-Phase-1A/.

[6] In addition as part of re-routing, Cambridge flight planned departures currently routing via DET to Dover, will also be re-routed via CLN, then via (U)M84.

(U)M84 for the re-routed Stansted SIDs aligned from CLN to KONAN (in Module A).

M85 for the re-routed Luton and Northolt SIDs (in Module D).

M87 for connectivity for the LCY EKNIV SIDs from EKNIV to UMTUM to join L9.

M91 for connectivity for the LCY EKNIV SIDs from EKNIV to Lydd to join existing ATS routes.

(U)N16 for Bournemouth, Southampton and Farnborough departures routing Goodwood to Biggin, to join L9 to route via Dover (for traffic at FL165 and above entering Belgian Airspace – covered in Module E).

(U)N16 from Biggin to Barkway via Brookmans Park for traffic routing into aerodromes in East Anglia leaving controlled airspace (CAS) at Barkway (covered in Module E).

N20 from KUNAV to Goodwood for Farnborough, Bournemouth and Southampton arrivals (covered in Module E).

16. Minor route re-alignments for Y8 (now WAFFU direct Goodwood), and M8 (now SUBIP-ELDAX-WAFFU) are also proposed – this is part of Module E.

17. These proposals require revisions to some existing ATS route segments where new waypoints are included.[7]

18. This proposal requires new Gatwick RNAV-5 STARs with small alignment changes into the existing TIMBA hold located at the end of the STARs (the hold alignment remains the same; the changes proposed are only to the arrival tracks to the holding pattern from the north-east and east which will occur above 7000ft AMSL). It is proposed that the TIMBA Hold associated with these STARs becomes an RNAV-1 holding pattern but with no fundamental change to its location or orientation.

19. New Southend RNAV-5 STARs from the east, south and south-west are also proposed.

20. A volume of Class A controlled airspace in the Thames Estuary and over a small part of Kent has been lowered to provide airspace containment for the new London City and Southend procedures. A diagram (extract from the AIC Y076/2015), to show the proposed new airspace structure in the Thames Estuary is at Annex C.

21. It is also proposed that a new RNAV-1 arrival transition will be implemented and used by suitably approved aircraft flying into Biggin Hill; these arrivals will have a

[7] Such revisions are notified in published AIP amendments.

common flight path until a position to the south-east of London City where the transition for Biggin Hill will terminate to enable aircraft to intercept the instrument approach procedure for Biggin Hill. This point is just to the south-east of Sidcup where aircraft are currently radar vectored towards the runway extended centreline by Air Traffic Control.

22. Finally, significant re-sectorisation of NATS' control sectors in the south and south-east is proposed to accommodate the revised procedures.[8] A summary of these changes is shown in the AIC Y076/2015.

CHRONOLOGY AND CONSULTATION

23. The formal stages of this airspace change proposal commenced with a Framework Briefing between the CAA and the airspace change sponsor (NATS) on 12 February 2013.

24. NATS undertook a consultation with aviation and environmental stakeholders, and made the consultation widely available through a NATS website from 15 October 2013 to 21 January 2014 as detailed in Reference B. Additionally, the sponsor conducted a number of media events throughout the regions affected by the changes to ensure publicity. This was followed by the publication of an initial consultation feedback report detailed in Reference C.[9] Following the consultation, the proposed designs were refined. NATS then published a design feedback report (Reference D) in February 2015 prior to submitting the Module C airspace change proposal (together with the other Modules) to the CAA.

25. Following submission of the airspace change proposal to the CAA, NATS identified an additional requirement to lower the altitude of CAS (controlled airspace) in the Thames Estuary (thereby increasing the total volume of controlled airspace) to support the changes for the Southend STARs. As a result, a further aviation consultation was conducted on 2 April 2015 (by means of engagement with NATMAC[10]) to seek feedback on modifications to the volume of controlled airspace proposed in Reference B. The consultation for this modification is at Reference E.

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8 The elements of re-sectorisation are not subject to regulatory approval as this is an internal NATS re-structuring of control sectors to reflect changes in controllers' area of responsibility.

9 It should be noted that the consultation for changes in this Module was combined with proposals for changes to procedures at Gatwick Airport. Those proposals for Gatwick have **not** been taken forward; however, some minor alterations for arrivals above 7000ft AMSL inbound to the Gatwick TIMBA hold from the east and north-east have been proposed as set out above.

10 NATMAC is the National Air Traffic Management Advisory Committee which is comprised of a broad cross representative body of airspace users and air navigation service providers, including NATS and the MOD.

26. We conducted an assessment of the consultation based on the criteria set out in the **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E** incorporated into this decision document. We concluded that the consultation was adequate and met CAA requirements. The consultation feedback reports were of a good quality and met CAA requirements. We concluded that NATS had properly taken the results of the consultation into account. We reached this conclusion by undertaking an analysis of the sponsor's consultation feedback and conclusions in comparison with the original consultation responses from stakeholders. Of the stakeholders identified, 62 aviation stakeholders responded to the consultation together with 137 non-aviation stakeholders. In addition, 883 members of the public provided responses to the sponsor. The sponsor had correctly identified the points raised and had responded to those issues adequately. Our full analysis in this regard is set out in the CAA's Module C Consultation Assessment.[11] We reached this conclusion for the following reasons.

27. We took into account the significant amount of publicity NATS generated to highlight the consultation was on-going. We are satisfied that NATS took all reasonable steps needed to bring the consultation to the attention of stakeholders that would want to consider the impact of the changes proposed and comment on them.

28. The consultation was conducted by the use of a swathe methodology. This means that rather than the nominal track of the proposed routes being plotted on a map, stakeholders were asked to consider that a new flight path could be anywhere within a defined swathe and comment on the factors affecting their location. The swathes were shown on the consultation map, along with information that once final design work was complete the nominal track of the proposed route could be anywhere within that swathe. This was the first time this method had been employed in an airspace change consultation. The advantage of this methodology over the line method is that it reduces the possibility that the consultation fails to identify or put on notice people in those locations that could potentially be affected by the proposed change. It could be argued that the disadvantage is that the while the sponsor had not yet narrowed down the precise location of the new routes it would propose, no-one including the consultees knew exactly where the nominal track of the proposed routes would eventually be.

29. This methodology was tested with The Consultation Institute who considered that, provided that swathes were not excessively wide, the methodology was valid. In their view, this method could provide valuable information which could

[11] http://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Decisions/London-Airspace-Management-Programme-Phase-1A/.

constructively influence the final design. It was therefore decided upon at an early stage following CAA discussion with The Consultation Institute that the swathe methodology covered any route subsequently established in the area of the swathe. Therefore, as the routes that are the subject of this proposal were included in the swathes consulted upon, the CAA has concluded that the routes eventually decided upon, and set out in the airspace change proposal, were consulted upon. Stakeholders were asked to assume that the 'line' could be anywhere within the swathe and comment accordingly.

30. A number of Local Authorities suggested that a further round of consultation should be undertaken once final flight paths were decided upon. This did not occur. Having taken into account the early discussion we had with The Consultation Institute (set out above) we have concluded that the use of swathes as described above has not hindered the ability of participants in the consultation to understand the effect of the proposed changes on them or caused participants to underestimate who may be affected by the changes proposed. On the contrary, in our view the consultation methodology caused more people rather than less to consider, at the time the consultation was taking place, that they may be affected or impacted by the proposed changes.

31. We have therefore concluded that the consultation's contents and methodology, and the Consultation Feedback Report met out our requirements as set out in CAPs 724 and 725.[12] This was a competent and satisfactory consultation and the sponsor demonstrated a willingness to engage with various stakeholders. Further detail of the CAA's assessment of the consultation is set out in the CAA Module C Consultation Assessment.[13]

STATUTORY DUTIES

32. As set out in the **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E**, the CAA's statutory duties and functions are contained in section 70 of the Transport Act 2000 (the Transport Act), the CAA (Air Navigation) Directions 2001, as varied in 2004 (the 2001 Directions), and the 2014 Guidance to the CAA on Environmental Objectives relating to the exercise of its air navigation functions (the 2014 Guidance).[14]

[12] CAP 724 https://www.caa.co.uk/CAP724 and CAP 725 https://www.caa.co.uk/CAP725.

[13] http://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Decisions/London-Airspace-Management-Programme-Phase-1A/.

[14] Revised in 2014 by the Department for Transport https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/269527/air-navigation-guidance.pdf.

33. In summary, the CAA's primary duty under section 70(1) of the Transport Act requires that the CAA exercises its air navigation functions so as to maintain a high standard of safety in the provision of air traffic services. This duty takes priority over the material considerations set out in section 70(2). Where an airspace change proposal satisfies all of the material considerations identified in section 70(2) and where there is no conflict between those material considerations, the CAA will, subject to exceptional circumstances, approve the airspace change proposal. Where an airspace change proposal satisfies some of the material considerations in section 70(2) but not others, this is referred to as a conflict within the meaning of section 70(3). In the event of a conflict, the CAA will apply the material considerations in the manner it thinks is reasonable having regard to them as a whole. The CAA will give greater weight to material considerations that require it to "secure" something than to those that require it to "satisfy" or "facilitate". The CAA regards the term to "take account of" as meaning that the material considerations in question may or may not be applicable in a particular case and the weight the CAA will place on such material considerations will depend heavily on the circumstances of the individual case. The analysis of the application of the CAA's statutory duties in this airspace change proposal is set out below.

Safety

34. The CAA's primary duty is to maintain a high standard of safety in the provision of air traffic services and this takes priority over all other duties.[15] In addition to the conclusions in respect of safety set out in the **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E** the CAA has made the following conclusions with respect to safety.

35. The CAA's Safety and Airspace Regulation Group's Instrument Flight Procedure (SARG IFP) regulators reached the view that all designs, in the final form proposed, were compliant with extant regulations or where not, acceptable mitigations had been proposed. The final outcome of the various design submissions following SARG IFP regulatory approvals are now published in the UK AIP.

36. With regard to the airspace design of the new RNAV-1 SIDs, and the new RNAV-1 arrival transitions, a full route spacing assurance report has been completed by NATS. After analysis by the CAA, in order for us to be satisfied that the changes proposed maintain a high level of safety, and as a condition of approval of this proposal, a number of regulatory requirements have been placed on NATS to monitor departures and arrivals in certain phases of the departure and arrival sequence to ensure appropriate separation is assured. These are set out in detail in Annex D.

[15] Transport Act 2000, section 70(1).

37. As an enhancement to NATS' safety management tools, additional system functionality has also been developed by NATS to alert controllers to the possibility of aircraft deviating off the intended track when passing close to other airspace structures, thus enabling controllers to intervene in a timely manner. This is a positive step that, in our view, contributes to maintaining a high level of safety (and we understand and note that there is scope to develop the use of these tools in other areas).

38. The CAA has therefore concluded that all RNAV-1 SIDs and arrival procedures proposed in Module C have been designed in accordance with the International Civil Aviation Organisation (ICAO) procedure design criteria, have been subjected to appropriate flyability checks, and that the new RNAV-1 procedures have been assessed for compliance with the design criteria and subsequently approved for operational use by the SARG IFP regulators.

39. The CAA has also concluded that a robust assessment of separation standards with other procedures and adjacent airspace structures has been conducted and that appropriate arrangements are in place to ensure separation with other traffic. As a condition of the CAA's approval of the proposals in Module C, a number of regulatory requirements have been placed on the sponsor to cover specific interactions with other procedures, and to ensure adjacent Danger Area airspace is avoided. These are set out in detail in Annex D.

40. It is the CAA's view that the reduction in workload for the Thames Radar air traffic controllers anticipated as a consequence of this proposal (as aircraft will now be flying a more systemised[16] route structure, thereby reducing the requirement for controllers to radar vector arriving and departing traffic) is a further safety improvement that the CAA should take into account when considering whether to approve this proposal. Workload on the flight deck will also be reduced; these two factors, combined with a reduction in RT (radio transmissions) workload for both crews and air traffic controllers are significant improvements in flight safety compared with the current system of higher workload radar created by the use of radar vectoring techniques currently employed by Thames Radar controllers.

41. Whilst the existing control techniques of using tactical intervention by air traffic controllers mitigates many of the deficiencies of the current design of the airspace in this portion of the London Terminal Manoeuvring Area or LTMA , those techniques have their limits. An individual controller can only safely and effectively manage a finite number of aircraft within a given block of airspace at

[16] Systemisation is the process of reducing the need for human intervention in the air traffic control system, primarily by utilising improved navigation capabilities to develop a network of routes that are safely separated from one another so that aircraft are guaranteed to be kept apart without the need for air traffic control to intervene (NATS' definition).

any one time. As the number of aircraft increases beyond what a controller can manage there are two options; constrain traffic numbers or increase controller capacity. Traditionally, the capacity increase was realised by breaking the airspace down into smaller and smaller blocks each with its own controller resource; but this cannot continue ad-infinitum. The better and "fit for the future" option, in our view, is to redesign the airspace, systemising some or all of areas of it by having pre-determined routes that are separated by design without the need for tactical intervention by controllers, other than in abnormal circumstances. This reduces workload, increasing both safety margins and potential for capacity increases in the future. This is a fundamental cornerstone of the CAA's Future Airspace Strategy for UK airspace. See http://www.caa.co.uk/docs/2065/20110630FAS.pdf.

42. In the broader context, LAMP Phase 1A does not increase the capacity of the airspace at this time but each of the Modules collectively contribute to a modernisation of the airspace, that enables further systemisation to be contemplated in the future. The LAMP Phase 1A package of proposals aims to start the process of systemising the LTMA.[17] Systemisation means that further growth can be managed safely. (Systemisation also helps to avoid any excessive delays caused by constraining traffic numbers to keep airspace safe which is a material consideration for the CAA when considering the effect of the proposed change on the interests of operators and owners of aircraft – see below).

43. Taken together, all the proposals in LAMP Phase 1A address some of the current LTMA's tactical intervention and legacy design hotspots. In particular, the proposal contributes to a significant reduction in complexity through the systemised de-confliction of routes.[18] Consequently, safety in the region now and in the future would, in our view, be enhanced by the changes proposed in Module C.

44. Therefore we are satisfied that the proposals in this Module will ensure that a high standard of safety is maintained in the provision of air traffic services in the airspace relevant to this Module.

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[17] Systemisation – see Footnote 15.

[18] LAMP 1A addresses some of the current LTMA's tactical intervention and legacy design hotspots. In the Goodwood (GWC) area (detailed in the Module E proposal), and the Lambourne (LAM) to Detling regions (covered by Modules A, B, C & D), there is a significant reduction in complexity through the systemised de-confliction of routes. In the region of north-west Kent and south-east London the 'washing machine' vectoring practices (as shown in the consultation documents), deployed by the Thames Radar controllers to manage London City arriving and departing traffic and provide the tactical delaying action, are no longer needed; reducing complexity. Consequently, in our view high standards of safety will be maintained in the region by these proposals.

The most efficient use of airspace

45. The CAA is required to secure the most efficient use of the airspace consistent with the safe operation of aircraft and the expeditious flow of air traffic.[19]

46. The CAA considers that the most efficient use of airspace means the use of airspace that secures the greatest number of movements of aircraft through a specific volume of airspace over a period of time so that the best use is made of the limited resource of UK airspace. It is therefore concerned with the operation of the airspace system as a whole.

47. The CAA considers the expeditious flow of air traffic to involve each aircraft taking the shortest amount of time for its flight. It is concerned with individual flights.

48. In this respect, the CAA is satisfied that the proposed new RNAV-1 arrival and departure procedures will provide a significant improvement in the efficiency of integrating traffic through the busy controlled airspace in the south-east of England, in particular, through the very busy and congested area in the vicinity of and above Detling. It is also our view that the proposed repositioning of the existing London City SIDs to the south and the proposed re-route to EKNIV will enable better climb profiles for London City departures, (because the London City departures will now have more airspace available to gain height to climb above the revised London City arrival procedures) which will, in our view, increase the efficiency of the use of airspace.

49. In our view, the proposed arrival procedures, which will provide a semi-systemised procedure, will result in reduced air traffic controller workload which will in turn facilitate in the future the more efficient use of airspace. The issues with the existing system and the impact these were having on the efficient use of airspace were clearly demonstrated in the consultation. In our view the proposal offers a significant benefit to both air traffic controllers and flight deck crews via the introduction of the new linear holding techniques which are enabled by the introduction of a new 'point merge' arrival procedure. This was described in detail in the consultation regarding how delay is managed in point merge arcs compared with the traditional holding patterns which are common to this area today. In our view, the introduction of this point merge system for London City will be particularly beneficial as the opportunity for controllers to delay traffic in the existing ALKIN and SPEAR holding patterns was extremely limited due to airspace constraints. In addition to holding the traffic in these holds, controllers also had the option to vector traffic in a variety of *ad hoc* holding patterns, invariably at relatively low altitudes, in order to delay traffic. This led to high workload and was an inefficient use of airspace, and at times resulted in an

[19] Transport Act 2000, section 70(2)(a).

unpredictable period of holding time for the arriving traffic impacting on operators' schedules. The issues with the existing system were clearly demonstrated in the consultation.

50. The revised route network for London City in the LAMP Phase 1A design package, combined with the improved climb profiles for Stansted, Luton and Northolt, produces an overall more efficient route network for traffic departing from Stansted via Clacton (outlined in Module A), for Luton and Northolt departures to the south-east (proposed in Module D), and the new network departure and arrival system for London City as proposed in this Module C.

Requirements of aircraft operators and owners

51. The CAA is required to satisfy the requirements of operators and owners of all classes of aircraft.[20]

Volume of controlled airspace

52. In this respect, we have taken into consideration the impact on aircraft operators and owners of the increase in the volume of controlled airspace. As set out above, the altitude of the lower level of controlled airspace has been reduced over the sea and over a small portion of airspace over Kent to accommodate the proposed changes in this Module. Consequently, an increase in controlled airspace was proposed which will impact on some Class G airspace users. The CAA has taken into account there were some objections from stakeholders in response to this relating to access and airspace classification. However, no quantifiable impact assessment regarding the number of flights affected was provided in the consultation feedback from stakeholders to the sponsor or direct to CAA. We have also noted that the proposals to lower controlled airspace are mainly over the sea where we believe General Aviation (GA) activity is extremely limited above 5500ft AMSL. In conclusion the CAA considers that the changes to controlled airspace proposed in this Module will have an identifiable but negligible operational impact on Class G users.

53. Notwithstanding this, and cognisant of the fact that the sponsor has raised part of the Worthing Control Area (CTA) just off the south-east coast of Kent from FL65 to FL75, the CAA reviewed the area of controlled airspace where the majority of changes proposed would take place. A number of areas were identified[21] where it was considered that there may be scope to review the lower limits of controlled airspace with a view to raising these lower limits. As a condition of our approval of these proposals a requirement has been placed on NATS to conduct a review which will necessitate examination of the lower altitude profiles of arrivals and departures into the London Terminal Control Area (LTMA) and identify options

[20] Transport Act 2000, section 70(2)(b).

[21] 15 in total from the north-east tip of Kent and along the English Channel to the Isle of Wight.

for raising the base of controlled airspace (thereby reducing the overall volume of controlled airspace).[22] Those conditions are set out in more detail in Annex D.

54. During our consideration of this proposal the CAA has also identified two blocks of airspace over the land where we consider reductions in the size of or modifications to the shape of controlled airspace should be examined to determine whether raising the lower limits is possible and could be safely accommodated. These are the LTMA Sector 3 located to the east of Gatwick and LTMA 8 from the north coast of Kent south-west to the boundary of the LTMA Sector 21/N859 eastern extremity. It is further a condition of the CAA's approval of this proposal that NATS carry out an investigation and review these possibilities within six months of the implementation of these proposals (i.e. within six months of February 2016[23]) with a view to making the possible changes in March 2017. Those conditions are set out in more detail in Annex D.

Operational Impacts

55. The new RNAV-1 procedures provide a benefit to those operators whose crews and aircraft flying into London City are approved and certified to fly RNAV-1 procedures; currently, the estimates are that on implementation, this equates to 70% of all operators. Until such time when a UK mandate for RNAV-1 operations becomes effective (currently November 2017), non-RNAV-1 operators will be able to fly the existing conventional SIDs. The non-RNAV-1 southerly departures will receive radar vectoring to follow the departure track of the RNAV-1 SIDs to gain height to cross above the inbound traffic, and the non-RNAV-1 inbound traffic will continue to be radar vectored into the arrival sequence.

56. Traffic inbound to Southend will also see revised routings via the GEGMU STARs from the east, south and south-west. The airspace design ensures that this traffic is safely separated from the London City routes, and a more predictable flight path provides certainty to crews regarding their routing, although there will be some increased track mileage with the new STARs. Compared with the current techniques used due to 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 Flight Management System (FMS).

Fuel Burn/Costs

57. We have concluded that overall these proposals will achieve a net benefit in terms of fuel savings (and less CO_2 emissions) for aircraft using London City.

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[22] Given that such changes will need to be properly co-ordinated with a production of the ICAO 1:500,000 chart cycle, it is unlikely any such potential changes that are identified could be effected until March 2017.

[23] Later revised to 31 August 2016.

We do note that aircraft operating specifically from London City to and from airports in the north of the UK will fly extra track miles due to the revised inbound route from the north. In our view however, this is more than offset by the benefits achieved by improved climb profiles for all aircraft using London City and the higher and re-profiled arrival flight paths which burn less fuel and will result in less holding at low altitudes. The CAA's Module C Operational Assessment and Environmental Assessment provides the relevant data.[24]

58. A summary of the anticipated impacts on CO_2 emissions from the LAMP Phase 1A Modules is attached at Appendix 1 to the Environmental Assessment submitted by NATS to the CAA along with the LAMP Phase 1A airspace change proposals Modules A – E.[25]

59. The CAA's operational analysis is set out in CAA's Module C Operational Assessment.[26]

Interests of any other person

60. The CAA considers the words "any person (other than an operator or owner of an aircraft)" to include airport operators, air navigation service providers, members of the public on the ground, owners of cargo being transported by air, and anyone else potentially affected by an airspace proposal.

61. The CAA is required to take account of the interests of any person (other than an operator or owner of an aircraft) in relation to the use of any particular airspace or the use of airspace generally. The CAA examined a number of anticipated impacts, some of which attracted feedback during the consultation process outlined above.

62. This decision document deals with consideration of the anticipated environmental impact on the public on the ground in the paragraphs relating to the environmental impact of the proposed change.

63. This decision document deals with the impact on air traffic service providers, air traffic controllers, in relation to controller workload, as set out above.

64. We have concluded that the changes proposed in this Module are likely to benefit air navigation service providers as it is anticipated that air traffic control workload will reduce as a consequence of this change and the changes in the other Modules. This will provide both safety and capacity benefits.

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[24] http://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Decisions/London-Airspace-Management-Programme-Phase-1A/.

[25] http://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Decisions/London-Airspace-Management-Programme-Phase-1A/.

[26] http://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Decisions/London-Airspace-Management-Programme-Phase-1A/.

Guidance on environmental objectives

65. In performing the CAA's statutory duties, we are obliged to take account of the 2014 Guidance provided by the Secretary of State,[27] to the CAA on Environmental Objectives. In addition to the conclusions in respect of the environment set out in the **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E** the CAA has reached the following conclusions with respect to the anticipated environmental impact of the proposal.

66. The CAA's Environmental Research and Consultancy Department (ERCD) has undertaken an assessment of the environmental impact of this change. [28]

67. Regarding CO_2 emissions, we have concluded that we anticipate that the changes within this Module will facilitate a reduction in CO_2 (e.g. estimated as ranging from 10,100 - 20,200 tonnes for 2016). However, overall, the LAMP Phase 1A package of proposals is anticipated by NATS to provide an estimated 34,900 tonnes of CO_2 savings in 2016. Fuel savings are predicated on a number of factors and have been calculated for a series of scenarios for 2016 and 2020 timelines. Taking a more conservative assessment, for the purpose of making this decision, we have concluded that we anticipate that the LAMP Phase 1A changes overall (if all Modules are implemented and result in the anticipated impacts) would deliver a reduction of approximately 17,400 tonnes of CO_2 in 2016 and 20,800 tonnes in 2020.

68. Since this proposal and the other airspace changes within LAMP Phase 1A require no changes to ground infrastructure, we anticipate that there will be no effects on land-take and biodiversity.

69. Since the proposed change does not alter operations below 1000ft AMSL we anticipate there will be no effect on local air quality.

70. We have assessed the anticipated impact of noise emissions on the changes proposed. When doing so we have had regard to the altitude based priorities as given to the CAA by the Secretary of State in the 2014 Guidance to CAA on Environmental Objectives (set out in Annex A to the **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E**.

71. We have further had regard to the 2014 Guidance which addresses the impact of new technology of the type that is the subject of this proposal as follows:

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[27] Transport Act 2000, section 70(2)(d).

[28] http://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Decisions/London-Airspace-Management-Programme-Phase-1A/.

"*With PBN, the overall level of aircraft track-keeping is greatly improved for both approach and departure tracks, meaning aircraft will be more concentrated around the published route. This will mean noise impacts are concentrated on a smaller area, thereby exposing fewer people to noise than occurs with equivalent conventional procedures.*

…Concentration as a result of PBN is likely to minimise the number of people overflown, but is also likely to increase the noise impact for those directly beneath the track as they will be overflown with greater frequency than if the aircraft were more dispersed.

…The move to PBN will require the updating of existing route structures such as Standard Instrument Departures (SIDs), Standard Terminal Arrival Routes (STARS) and Initial Approach Procedures (IAPs). Updating individual routes in terminal areas can fall into one of two categories: "replication" where the existing route alignment is preserved as much as possible whilst catering for the greater navigational accuracy of PBN, or "redesign" where seeking to optimise the introduction of PBN will require consideration of a different alignment.

…For replication, the requirement is to preserve the existing route alignments as far as possible"

72. We have concluded that we do not anticipate there will be a significant impact on noise emissions (within the meaning of Paragraph 9 of the Secretary of State's 2001 Directions to the CAA). See the incorporated **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E**, Annex A for an explanation of the CAA's policy in this regard. As set out in the CAA Environmental Assessment this is because the proposed changes to both departure routes and arrival routes will have no anticipated impact upon the airport's L_{eq} noise contours.[29]

73. We note this proposal contains changes that will result in new tracks over the ground although this will occur for aircraft that will be above 4000ft AMSL. Notwithstanding that we do not anticipate a significant noise impact we do consider that there is still likely to be a noise impact of the proposal. Experience of implementation of RNAV-1 departures and procedures at other airports leads us to conclude that aircraft will more accurately fly the nominal track of the RNAV-1 route and will consequently exhibit more concentrated tracks over the ground than aircraft flying the existing conventional departures.

[29] Leq contours are a method of portraying averaged noise levels, overlaid on a map so that locations can be easily identified. More detailed information about Leq noise contours can be found at the CAA's website http://www.caa.co.uk/Environment/Environmental-information/Information-by-environmental-impact/Noise/Measuring-and-modelling-aviation-noise/Measuring-the-impact-of-continuous-noise/.

74. Our experience of the implementation of RNAV-1 Departures at Gatwick Airport in November 2013 (and its post implementation review in 2015) also leads us to anticipate that aircraft will remain concentrated on the nominal track of the RNAV-1 SID longer than appeared to be the case when all aircraft were flying conventional SIDs, even above 4000ft AMSL. We also anticipate that the RNAV-1 arrivals for London City and Biggin Hill will be more concentrated than is currently the case.

75. For both departure and arrival traffic, on implementation of this proposed change, only 70% of flights would be approved for RNAV-1 operations. The other 30% of traffic would be likely to continue to exhibit the existing dispersion of non–RNAV-1 traffic. Therefore we would anticipate some variance from the expected amount of concentration until full RNAV-1 compliance is achieved.

76. We have taken into account that that the impact of this anticipated concentration will relate to aircraft flying at 4000ft AMSL and above. We have had regard to the Secretary of State's altitude-based priorities as regards the environmental impact of proposed airspace changes. (See Annexe A of **CAA Decision: Part applicable to each LAMP Phase 1A Modules A - E**).

77. We have taken into account that, in our view, some residents currently experiencing aircraft noise are likely to experience less noise because the proposed changes in this Module are anticipated to enable aircraft to climb higher, sooner, whereas the current airspace design requires aircraft to be kept lower for a longer period.

78. We have concluded that this proposal may have an effect upon tranquillity and visual intrusion over Areas of Outstanding Natural Beauty (AONBs).

79. We have concluded that we anticipate that the two AONBs in the Kent Downs area are likely to experience an improvement in tranquillity and visual intrusion impacts. The changes proposed in this Module and in the LAMP Phase 1A proposals overall will typically result in aircraft being at greater heights over the Kent Downs area than is currently the case. The proposed re-routing of London City inbound traffic further to the east, which is now proposed to overfly Dover at 10000ft AMSL, will impact a smaller area due to the displacement of aircraft to the east. At worst, there is unlikely to be an increase in the existing impacts over the AONBs in this area. If anything, there may be an improvement because aircraft will be higher overland as they cross this area.

80. In comparison we have concluded that there may be an impact upon tranquillity and visual intrusion for the Dedham Vale and Suffolk Coast & Heath AONBs arising from the proposal due to additional aircraft above this area. NATS concluded this will be an average of two extra aircraft per hour at heights of typically 12000ft AMSL and no less than 8000ft AMSL, and we agree this is a reasonable conclusion. On that basis, we conclude that any impacts on

tranquillity and visual intrusion for these areas are likely to be minor, if at all. When taking this impact into consideration we have had regard to the Secretary of State's altitude-based priorities set out in the 2014 Guidance to CAA on Environmental Objectives (set out in Annex A to the **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E)**.[30]

81. Having carefully considered this information we have concluded that overall the proposals in Module C contribute and enable the environmental benefits anticipated as a consequence of the package of proposals in this Module and in all the LAMP Phase 1A Modules considered together. We acknowledge that some new areas will be overflown, above 4000ft AMSL and may experience the noise impact of concentration that is a consequence of RNAV-1 procedures, and the possible impact on some AONBs, described above.

Integrated operation of ATS

82. The CAA is required to facilitate the integrated operation of air traffic services provided by or on behalf of the armed forces of the Crown and other air traffic services.[31]

83. This proposal includes some impact on interface arrangements with air traffic services at Southend Airport as the new London City procedures are adjacent to the Southend controlled airspace. However, we are satisfied that these impacts will be mitigated by the fact that NATS has ensured that their controllers at the London Terminal Control Centre will keep the London City arrivals and departures clear of Southend controlled airspace.[32] However, the existing interface and co-ordination arrangements and use of buffers between the two air traffic services providers has been subject to review and will be updated to the extent that the new procedures for the London City arrivals and departures can be safely managed without compromising flight safety. Other than the addition to the extant arrangements for the Flexible Use of Airspace with Shoeburyness Danger Area to accommodate the re-routed traffic using ATS route M84, there are no other impacts to air traffic services providers in this Module.

[30] Which states that where practicable, and without a significant detrimental impact on efficient aircraft operations or noise impact on populated areas, airspace routes below 7000ft AMSL should, where possible, be avoided over Areas of Outstanding Natural Beauty and National Parks as per Chapter 8.1 of the 2014 Guidance.

[31] Transport Act 2000, section 70(2)(e).

[32] Procedures are published in the NATS Manual of Air Traffic Services Part 2.

Interests of national security

84. The CAA is required to take into account the impact any airspace change may have upon matters of national security.[33]

85. There are no impacts for national security as arrangements for the Flexible Use of Airspace are already in use and we are satisfied can be extended to cater for the traffic re-routed onto ATS route M85. The Ministry of Defence has not objected to this (or any other of the Modules in the LAMP Phase 1A) proposal.

International obligations

86. The CAA is required to take into account any international obligations entered into by the UK and notified by the Secretary of State.[34] The UK's international obligations that relate to the introduction of RNAV-1 or performance-based navigation are set out in Annex E. With regard to replication procedures, all foreign operators will be able to fly the new procedures providing the crews and aircraft are certified and approved to fly RNAV-1 procedures in accordance with their own States' national regulations. Non-RNAV-1 approved operators can still use London City Airport until such time as the CAA mandate (see Annex E) becomes effective.

87. New ATS routes and controlled airspace over the High Seas will be notified to ICAO.

REGULATORY DECISION

88. The CAA has decided that the proposed airspace design is safe, which satisfies the CAA's primary statutory duty. It is also the CAA's duty to consider the anticipated impact on each of the other material considerations identified in section 70(2) of the Transport Act. In accordance with section 70(3) of the Transport Act, and the CAA published policy, the CAA is required to consider whether the airspace change proposal produces any conflicts between the material considerations identified in section 70(2).

89. We have identified the possible environmental noise impact of concentration of aircraft tracks that we anticipate will result from the introduction of RNAV-1 technology and procedures. We have identified the possible impact on AONBs described above.

[33] Transport Act 2000, section 70(2)(f).

[34] Transport Act 2000, section 70(2)(g).

90. However we have also taken into account that we consider there are significant flight- safety, efficiency and other environmental benefits from this proposal and from the overall proposals benefits of LAMP Phase 1A (of which this is part) set out in the **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E.** The overall LAMP Phase 1A package will deliver network wide changes that have safety benefits through greater use of systemisation, removal of airspace hotspots and by ensuring that sequencing of London City arrivals occurs earlier in the arrival phase, leaving less risk of Thames Radar controllers becoming overloaded. Overall, a more efficient use of airspace will be achieved as a result of capacity benefits becoming possible through the de-confliction of arrival and departure routes.

91. We have decided that in order to achieve the anticipated benefits consequential on the airspace change proposed in this Module, the CAA will approve this change.

92. Our decision to approve this change is subject to a number of conditions which are attached at Annex D.

93. As set out in **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E**[35] this change will be the subject of a Post Implementation Review (PIR). In order to collect the data the CAA is already aware will be needed as part of that PIR, it is a condition of this decision that NATS collect data sufficient to:

- Re-assess the impact on both L_{eq} noise contours and SEL noise footprints to determine if the impact is different to that now anticipated.
- Compare the routes and traffic patterns after implementation with the noise impact portrayed in both the consultation and airspace change proposal documents. This includes a comparison with the swathes, altitude bands, anticipated noise levels and frequency of flights that were used to portray the expected noise impact.
- Re-assess the annual CO_2 emissions impact based on actual traffic behaviour following implementation, including an appraisal of those assumptions that were based upon controller expertise, and the proportion of tactical vectoring in comparison to flight-planned (“enabled”) fuel burn and emissions.

94. Further specific CAA requirements for the PIR will be advised in due course prior to commencement of the PIR anticipated to be 4 February 2017.

[35] http://www.caa.co.uk/CAP1366.

95. The revised airspace will become effective from 4 February 2016 (AIRAC 2/2016) and was promulgated via a double AIRAC cycle. The Part 1 of the AIRAC data for this and other LAMP Phase 1A Modules was distributed by AIS on 26 November 2015. In addition, an Aeronautical Information Circular (AIC) Y076/2015 was also distributed on 26 November 2015 to provide a full breakdown of the changes proposed in LAMP Phase 1A.

96. In line with our standard procedures, as set out above, the implications of the change will be reviewed after one full year of operation, at which point, the CAA will obtain feedback and data to contribute to the analysis.

Civil Aviation Authority

22 December 2015

ANNEX A

Proposed network route system for London City and Biggin Hill arrivals overlaid on today's London City and Biggin Hill flight paths

Extract from NATS Consultation Feedback Report

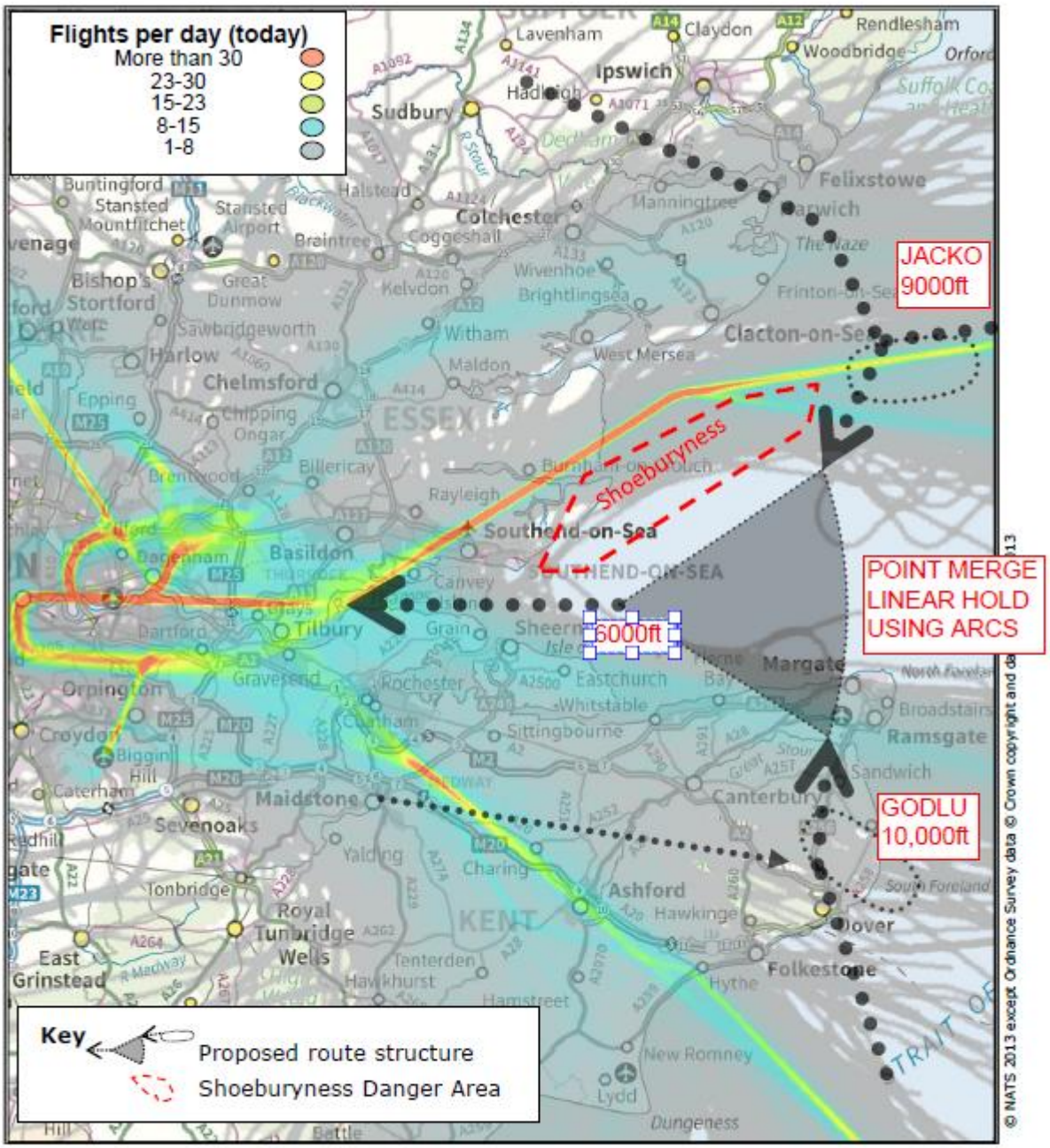


Figure 2: Proposed Network Route System for London City and Biggin Hill Arrivals Overlaid on Today's London City and Biggin Hill Flight Paths

ANNEX B

Proposed London City departures to the south above 4000ft AMSL, overlaying today's London City and Biggin Hill flight paths

Extract from NATS Consultation Feedback Report

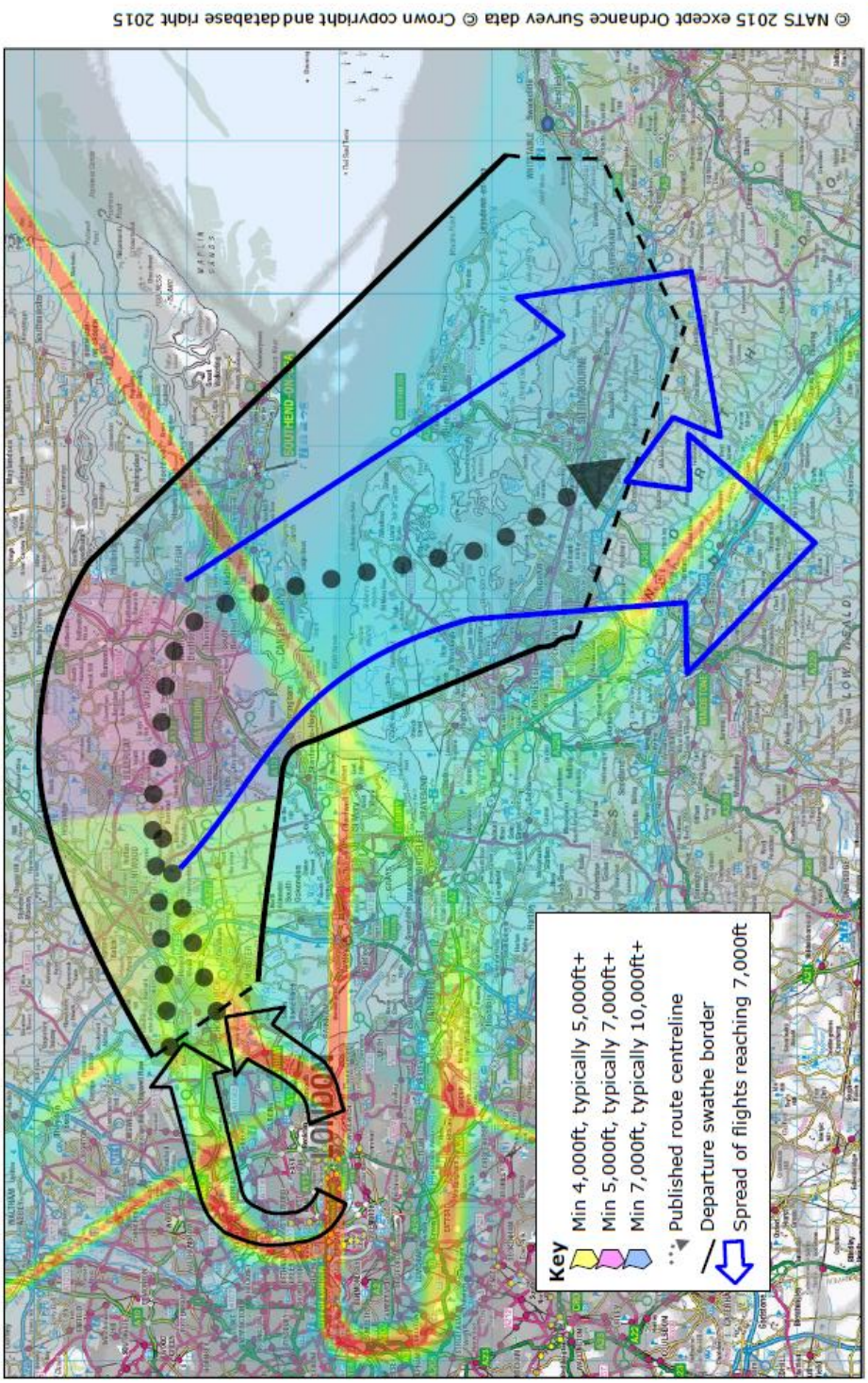


Figure 4: Proposed London City Departures to the South above 4,000ft, overlaying today's London City and Biggin Hill flight paths

ANNEX C

New controlled airspace in the Thames Estuary

Extract from AIC Y076/2015

2 Changes to Controlled Airspace in the Thames Estuary

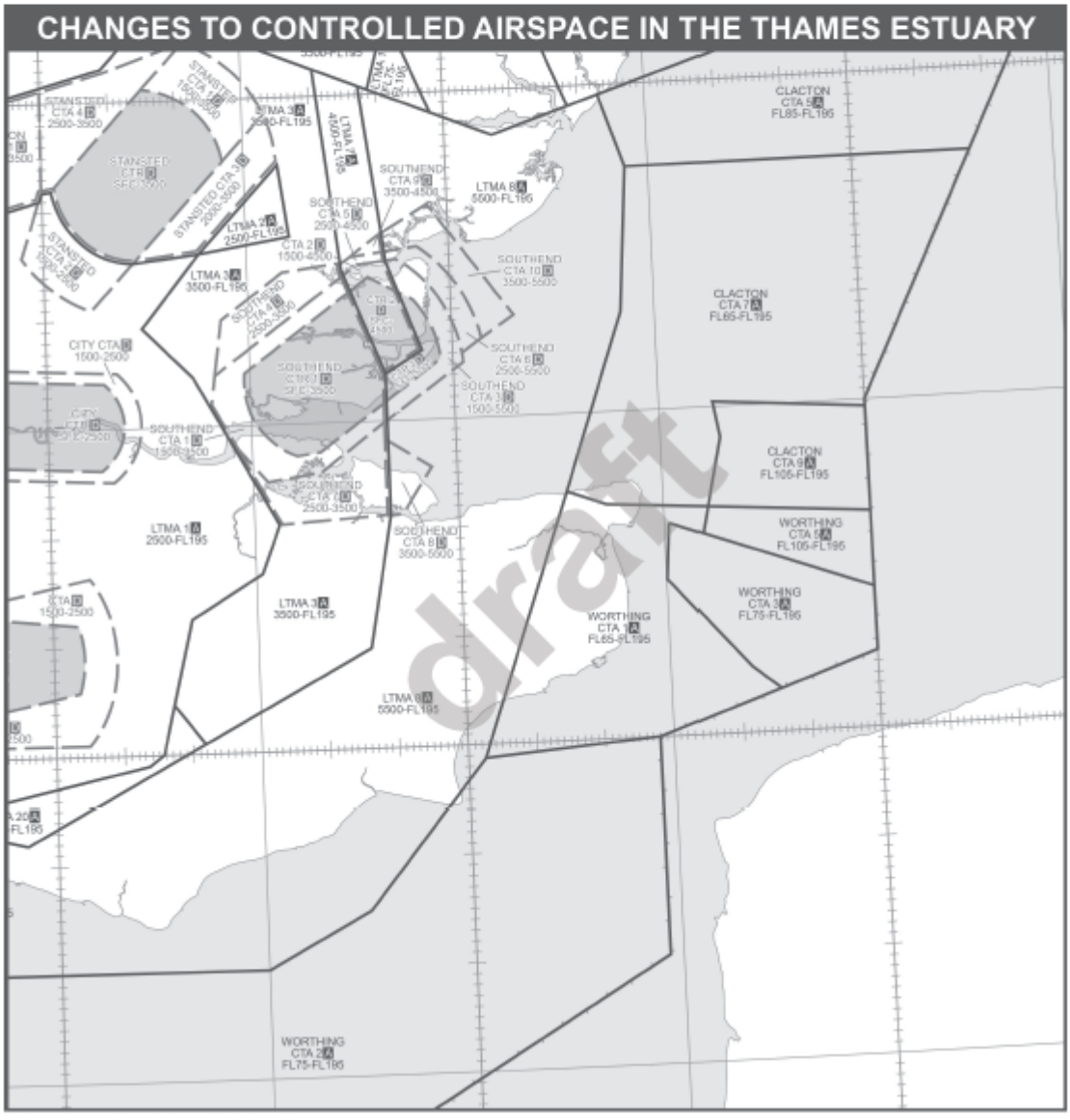
2.1 A map showing the revised controlled airspace is shown below.

Parts of the existing Clacton Control Area 8 and Worthing Control Area 1 are lowered to 5500 ft and these areas, along with LTMA Area 15 (lower limit 5500 ft) not shown below but located southwest of Gatwick, and Area 25 (lower limit 5500 ft), become part of the new LTMA Area 8.

The remainder of the existing Clacton Control Area 8 and part of Clacton Control Area 9 are lowered to FL 65 and become part of Clacton Control Area 7.

Worthing Control Area 4 and Part of Worthing Control Area 5 are lowered to FL 65 and become part of Worthing Control Area 1.

Part of Worthing Control Area 1 is raised to FL 75 and becomes part of Worthing Control Area 2.



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ANNEX D

Conditions of the CAA's decision to approve the Module C proposal

In addition to the Conditions that attach to the CAA's decision to approve the proposals in each of the Modules A – E in the LAMP Phase 1A ACPs, set out in **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E**, it is a condition of the CAA's approval of the proposal in Module C that

1	The GEGMU and GODLU RNAV-5 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 north-west and north-east corners of Danger Area D037. NATS are 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 north-east.
5	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).
6	NATS is to monitor the performance of arrivals between: JACKO-NONVA and NONVA-BABKU, ERKEX-OKVAP, NEVIL-OSPOL and provide feedback to SARG IFP if there is evidence of any operational issues.

7	The utilisation of controlled airspace regarding climb and descent profiles following LAMP Phase 1A implementation is to be reviewed by NATS by 31 August 2016 in order to address the CAA's list of possible options for raising the 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 by 31 August 2016 regarding what revisions to the lower limits of controlled airspace are feasible and, if appropriate, advise the CAA which options are not feasible. Note: This is in conjunction with Module E. If changes are possible, these will be co-ordinated by the CAA for implementation at the next available ICAO Southern England and Wales 1:500,000 chart update.
8	By 31 August 2016, in conjunction with the above, determine whether the lower limits of the LTMA may be raised in LTMA Sectors 3 and 8 as follows: -- LTMA Sector 3 (3500-FL195) situated south of the Southend CTA 7 and, -- the revised LTMA Sector 8 from the north coast of Kent to the boundary of the LTMA Sector 21/N859 eastern extremity taking due consideration of the new southern arrival segment of the London City arrival transition procedure. NATS is to advise the CAA by 31 August 2016 regarding what revisions to the lower limits of controlled airspace are feasible and if appropriate, advise the CAA which options are not feasible. If changes are possible, these will be co-ordinated by the CAA for implementation at the next available ICAO Southern England and Wales 1:500,000 chart update. Note: This is in conjunction with Module E.

ANNEX E

UK's International Obligations relating to Performance-Based Navigation

E1. In 2010, the International Civil Aviation Organisation (ICAO) Assembly agreed Resolution A37-11 on PBN Global Goals. The Assembly Resolution requires States to complete a PBN implementation plan to achieve:

- the implementation of RNAV-1 and RNP operations (where required) for en-route and terminal areas according to established timelines and intermediate milestones; and
- the implementation of approach procedures with vertical guidance for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016.

E2. The Assembly Resolution is not a mandate and the UK has agreed with the ICAO that whilst making every effort to meet the 2016 date, the implementation of approach procedures at all instrument runway ends may take longer.

E3. The European Commission Implementing Regulation (EU) No 716/2014 on the Establishment of the Pilot Common Project supporting the implementation of the European Air Traffic Management Master Plan sets out six air traffic management functionalities to be deployed in pursuance of the Single European Air Traffic Management Research programme. In the UK, the RNP 1 PBN specification is mandated for terminal airspace and the RNP APCH PBN specification for approaches at Heathrow, Gatwick, Stansted and Manchester Airports from 1 January 2024. This implementation must be co-ordinated and synchronised to ensure that the international performance objectives are met.

E4. The European Commission, through the European Aviation Safety Agency (EASA), is also proposing PBN-related legislation for much earlier implementation. EASA Notice of Proposed Amendment 2015-01 (consulted on from January to February 2015) proposes implementation of PBN across the European Air Traffic Management Network with application in terminal airspace and en-route airspace from December 2018 and in approach operations by January 2024. The specification of PBN to be applied is RNP 1 in terminal airspace and Advanced RNP in the en-route. Any application is conditional on there being a performance objective. The instrument approach requirement is effectively a mandate for implementing the RNP APCH on all Instrument Flight Rules (IFR) runways. Publication of the Opinion from EASA is anticipated by early 2016.

E5. In order to encourage PBN equipage and use, the CAA published Aeronautical Information Circular (AIC) Y092/2014 in December 2014 requiring mandatory equipage to an RNAV-1 PBN specification by November 2017 for all aircraft operating in to and out of the five major London airports plus Southend, Farnborough and Biggin Hill.

E6. In summary, the UK is under an obligation to ICAO, the European Commission and EASA to transition to PBN-based procedures in all flight phases. Whilst the European mandate is some years away, RNAV-1 is seen as a transitory step to achieve this objective.

GLOSSARY

	2001 Directions	Civil Aviation Authority (Air Navigation) Directions 2001
	2002 Guidance	The Secretary of State's Guidance to the CAA on Environmental Objectives Relating to the Exercise of its Air Navigation Functions published in 2002
	2014 Guidance	The Secretary of State's Guidance to the CAA on Environmental Objectives Relating to the Exercise of its Air Navigation Functions published in 2014
A	A330	Airbus 330 Aircraft
	A380	Airbus 380 Aircraft
	a/c	Aircraft
	AAL	Above Aerodrome Level
	ACP	Airspace Change Process
	AIC	Aeronautical Information Circular
	AIP	Aeronautical Information Publication
	Alt	Altitude Above Mean Sea Level
	AMSL	Above Mean Sea Level
	ANO	Air Navigation Order
	ANSP	Air Navigation Service Provider
	AONB	Area of Outstanding Beauty
	APD	Approved Procedure Designer
	APF	Aviation Policy Framework
	ARINC 424	Airlines Electronic Engineering Committee - Navigation System Data Base
	ATC	Air Traffic Control
	ATM	Air Traffic Management
	ATS	Air Traffic Service
B	B747-400	Boeing 747-400 Aircraft
	B777	Boeing 777 Aircraft

C	CAA	Civil Aviation Authority
	CF leg	Course To Fix leg
D	dB	Decibel units
	dBA	Decibel units measured on an A-weighted scale
	DfT	Department for Transport
	DEM	Digital Elevation Model
	DER	Departure End of Runway
	DET	Detling D/VOR
	DME	Distance Measuring Equipment
	DVOF	Digital Vertical Obstruction File
	DVOR	DME/VOR Navigational Aid D DVR – Dover D/VOR (plus a number D21) = 21 nautical miles from the VOR
	DVR	Dover D/VOR
	D (plus 2 or 3 digit no.)	DME range from a navigational aid (eg DVR D21 = 21 nms from the specified beacon, in this case the Dover D/VOR)
E	EGGW	ICAO Location Indicator for London Luton Airport
	EGHH	ICAO Location Indicator for Bournemouth Airport
	EGHI	ICAO Location Indicator for Southampton Airport
	EGKK	ICAO Location Indicator for London Gatwick Airport
	EGLC	ICAO Location Indicator for London City Airport
	EGLF	ICAO Location Indicator for Farnborough Airport
	EGLL	ICAO Location Indicator for London Heathrow Airport
	EGMC	ICAO Location Indicator for Southend Airport
	EGSS	ICAO Location Indicator for London Stansted Airport
	EGWU	ICAO Location Indicator for Northolt Airport
F	FAS	Future Airspace Strategy
	FB WP	Fly-by waypoint
	FDR	Flight Data Recorder
	FIR	Flight Information Regions

	FL	Flight Level
	FMC	Flight Management Computer
	FMGC	Flight Management Guidance Computer
	FMS	Flight Management System
	FO WP	Fly-over waypoint
	FTE	Flight Technical Error
G	GNSS	Global Navigation Satellite System
	GPS	US DoD Global Positioning System
H	HDGs	Headings
	hPa	Hectopascal – 1 hectopascal is equivalent to 1 millibar
I	ICAO	International Civil Aviation Organisation
	IFP	Instrument Flight Procedure
	ILS	Instrument Landing System
	IRS	Inertial Reference System
J	JAA	Joint Aviation Authorities
K	KIAS	Indicated Air-speed in Knots
	Kts	Knots
L	Leq	Equivalent continuous sound level
	LAMP	London Airspace Management Programme
	LHR	London Heathrow
M	M	Magnetic
	Mag Var	Magnetic Variation
	MID	Midhurst D/VOR
	MSD	Minimum Stabilisation Distance
	MSL	Minimum Segment Length
N	NADP	Noise Abatement Departure Procedures
	NATS	The group of companies that includes NERL and NATS Services Limited
	NERL	NATS (En Route) plc

	ND	Navigation Display
	NOTAM	Notice to Airmen
	NPR	Noise Preferential Route
	NMS or nms	Nautical Miles
	NSE	Navigation System Error
P	PANS OPS	Procedures for Air Navigation Services Operations
	PBN	Performance-based Navigation
	PDE	Path Definition Error
	PF	Pilot Flying
	PIR	Post Implementation Review
	PIRG	PIR Group
	PM	Pilot Monitoring
	PNF	Pilot Not Flying
	PRNAV	Precision Area Navigation
	PT	Path Terminator
R	R plus 3 digit number	Radial (No:) from a VOR (eg. R260 = 260 degree radial from a specified point)
	RF Turns	Radius to Fix Turns
	RNAV-1	Area Navigation
	RNP	Required Navigation Performance
	RNP APCH	PBN approach procedure
S	SAM	Southampton D/VOR
	SEL	Sound Exposure Level
	SFD	Seaford D/VOR
	SID	Standard Instrument Departure
	STAR	Standard Terminal Arrival Route
	SW	South West
T	TF leg	Track to Fix leg
	TSE	Total System Error

V	VI leg	Vector to Intercept leg
	VOR	Very High Frequency Omnidirectional Radio Range
W	WP	Waypoint