LONDON AIRSPACE MANAGEMENT PROGRAMME (LAMP) PHASE 1A

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

CAP 1366/B

Published by the Civil Aviation Authority, 2015

The latest version of this document is available in electronic format at www.caa.co.uk

CONTENTS

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

LONDON AIRSPACE MANAGEMENT PROGRAMME (LAMP) PHASE 1A

AIRSPACE CHANGE PROPOSAL – MODULE B

LONDON CITY RNAV-1 REPLICATIONS

PROPOSED BY LONDON CITY

References:

A. Module B – London City Airport RNAV-1 Replications ACP Issue 1 dated February 2015.

B. London City Airport RNAV-1 Replications Consultation Document dated September 2014.

C. London City Airport RNAV-1 Replications Consultation Feedback Report dated February 2015.

D. LAMP Phase 1a: ACP Environmental Benefits Report v 1.2 dated March 2015.

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

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

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

H. Instrument Flight Procedure design submissions.[1]

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.

[1] For final versions of designs submitted, see published designs in the UK AIP (AIS website at: http://www.nats-uk.ead-it.com/public/index.php.html.

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**[2] 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 B (Reference A).

5. This Module is sponsored by London City and proposes replacing conventional departure and arrival procedures at London City with departures and arrivals (known as SIDs and STARs respectively) based on a variation of modern performance-based navigation technology known as RNAV-1.[3]

6. This Module proposes RNAV-1 replications up to 4000ft AMSL; that is RNAV-1 replications of the low altitude portions of all the existing ten London City conventional SIDs, and the introduction of RNAV-1 replication arrival transition procedures for the London City radar vectored arrival flight paths to intercept the Instrument Approach Procedures (IAP) for both Runway (Rwy) 09 and Rwy 27. It is also proposed that a portion of the Runway 09 procedure will be used by traffic inbound to Biggin Hill.

7. This proposal has been subject to consultation as detailed in Reference B which was followed by the publication of a consultation feedback report detailed in

---

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

[3] Performance-based navigation (of which RNAV-1 is a type) is satellite aviation guidance; in comparison to ground-based navigation aids (such as those used by conventional SIDs) performance based navigational technology will allow aircraft to fly much more accurate and flexible tracks. Satellite guidance will also allow the UK's complicated and busy airspace to be redesigned, increasing capacity and efficiency while maintaining or enhancing safety performance. A route structure optimised for satellite guidance with aircraft flying a pre-programmed trajectory will also reduce the need for tactical intervention by air traffic controllers to instruct pilots to change direction, bringing down the cost of air traffic control, and optimise the climb and departure profiles of aircraft (which is the most expeditious routing of aircraft so far as airlines are concerned, and which also burns the least fuel and overall causes the least noise.

Reference C. This proposal was accompanied and supported by the documents detailed in References D – H above.[4]

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

INFORMATION THAT HAS BEEN CONSIDERED

9. 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.[5]

PROPOSAL OVERVIEW

10. As set out above this proposal aims to replicate the nominal track of the existing conventional departure and arrival routes from and to London City Airport up to an altitude of 4000ft AMSL.[6] It is proposed this is achieved by introducing Performance-Based Navigation (PBN) i.e. RNAV-1 SIDs which replicate the current conventional SIDs and RNAV-1 arrival 'transition' procedures which replicate the current tracks patterns experienced as a result of current radar vectored arrival flight paths.[7]

Departures

11. The current tracks of the replicated SID procedures are portrayed in a diagram in the consultation document (Reference B).[8] The southerly Dover (DVR) and Lydd (LYD) conventional SIDs are replicated as far as the positions indicated in that diagram, after which the SIDs follow a new route alignment to a position north of Gillingham – it is proposed that these SIDs be designated as the EKNIV SIDs. (This new route alignment is proposed in the separate LAMP Phase 1A Module C - see separate part decision regarding Module C.) To enable an understanding of the overall proposal and acknowledging the relationship

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

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

[6] Module C covers proposals for departures and arrivals at London City beyond the altitude that is within the scope of this Module B.

[7] That is the track dispersions currently flown over the ground a result of decisions and directions given by air traffic controllers to aircraft arriving at London City.

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

between the proposals in Module B and C, a diagram to show the new route alignment of the EKNIV SIDs covered by Module C is shown at Annex A.

12. The proposed new tracks over the ground for the Rwy 27 EKNIV1A and Rwy 09 EKNIV1H SIDs departing to the south from the positions are as indicated below:

- The Rwy 27 DVR/LYD5T SID is replicated by the EKNIV1A RNAV-1 SID up to LCN06 (approximately Harold Hill), after which the new track routing is: LCN06-LCE06-SODVU-EKNIV (the SID termination point).
- The Rwy 09 DVR/LYD5U SID is replicated by the EKNIV1H RNAV-1 SID up to LCE03 (approximately Upminster), after which the new track routing is: LCE03-LCE06-SODVU-EKNIV (the SID termination point).

13. The proposed SID replications that are the subject of this Module B proposal are all concerned with aircraft below 4000ft AMSL except for the new portions of route alignment as indicated above the Clacton (CLN) SIDs which extend beyond 4000ft AMSL to Clacton.

Arrivals

14. The proposed arrival routes (RNAV-1 arrival transitions) relate to aircraft from 4000ft AMSL down to either the Final Approach Fix (FAF) on Rwy 27, or a manual termination point (ODLEG) on the base leg for Rwy 09 (after which aircraft will then continue as currently to be vectored to intercept the Instrument Landing System (ILS). The existing arrival flight paths are shown at Annex B and the proposed replicated arrival procedures are shown at Annex C.

15. It is proposed that the Rwy 09 RNAV-1 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 London City downwind track where the transition for Biggin Hill will terminate to enable aircraft to intercept the instrument approach procedure for Biggin Hill.

16. The arrival tracks of the aircraft affected by the proposed arrival RNAV-1 replications in this proposal are already concentrated on the ILS centreline for Rwy 27, and from a position east of London City Airport, where aircraft are today concentrated by radar vectoring due to the constraints of controlled airspace. This is illustrated in Figure 23 on page 33 of the Consultation Document (also shown in Annex C).

CHRONOLOGY AND CONSULTATION

17. The wider proposals of LAMP Phase 1A have been the subject of discussion with NATS since 2012. The formal stages of this airspace change proposal commenced with a Framework Briefing between the CAA and London City on

3 March 2014. Consultation on the changes to departures and arrivals below 4000ft AMSL were matters for London City Airport to sponsor.

18. At the Framework Briefing the CAA advised London City that in accordance with the CAA's Policy Statement 'Guidance on PBN SID Replication for Conventional SID Replacement' dated 19 August 2013,[9] consultation with the Airport's Consultative Committee was an acceptable vehicle for conducting the consultation on the elements of this proposal that relate to departures, as well as a consultation with NATMAC[10] and the airport users (airlines). With regard to the proposed RNAV-1 replication of the arrival routes; the CAA agreed with the sponsor that London Boroughs overflown by the arrival routes must be included as additional consultees.

19. In addition, the consultation document was published on (and remains at the date of this decision) on London City Airport's website. The consultation feedback report was similarly published and remains on London City's website.

20. 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. In summary, we concluded that the Consultation Report and associated material were adequate, well presented and met our requirements. Albeit no changes to the RNAV-1 replications designs have been made by the sponsors as a result of feedback from consultation, we concluded that the sponsor had properly taken the results of the consultation into account.

21. 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.[11]

22. The individual responses to the consultation were forwarded to the CAA by the sponsor in unprocessed form and all items have been individually read. These individual responses comprises feedback from 16 (identified) aviation

---

[9] http://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=6987.

[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.

[11] Discussion of key themes was presented in the sponsor's Feedback Report, as are responses to more specific questions raised by respondents.
One such question and response for example was: "Will more people be overflown?"
The response provided was: "No. By replicating the existing routes, the same areas/people will be overflown. Over time due to the increasing proportion of RNAV equipped aircraft there will be a small degree of concentration of the traffic along the route centre-line. This will result in fewer people being directly over-flown, but we expect the change to have only a marginal impact on people's experience of noise."

stakeholders, 16 (identified) non-aviation stakeholders and 483 members of the public.

23. The main areas of objection surrounded the issues of flight path concentration, the lack of design options and the airport's failure to consider respite routes. See the CAA's Module B Consultation Assessment[12] and consideration of the environmental impact of the proposal below.

24. The CAA also received direct feedback from individuals who considered that the use of the London City's Consultative Committee as a vehicle for consultation was not appropriate in these circumstances. However, we have taken into account the fact that the consultation was brought to the attention of appropriate representative organisations and have concluded that our requirements for publicity of the fact the consultation was on-going via those organisations was proportionate and appropriate given the extent of the anticipated impact of the proposed change (which is discussed in more detail below). We have also taken into account that the consultation was published and remains on London City Airport's website.

25. We have decided that the consultation provided sufficient and clear information on the expected impacts of the proposed change that would enable someone reading the consultation to understand the impact of the changes on them.

26. The CAA has concluded that the consultation was in accordance with the requirements of CAA policy contained in CAPs 724 and 725[13] and the SID replication policy statement (referred to above). Further detail of the CAA's assessment of the consultation is set out in the CAA Module B Correspondence Assessment.[14]

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

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

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

STATUTORY DUTIES

27. 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).[15]

28. 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

29. 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.[16] 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.

30. CAA's Safety and Airspace Regulation Group's Instrument Flight Procedure (SARG IFP) regulators' analysis reached the view that all designs, in the final form proposed, were compliant with extant regulations.

---

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

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

31. As the designs were reviewed a small number of instances were identified where design mitigation was required. No critical design issues were identified. Only one design non-compliance was identified: on the Rwy 27 SID, the location of the first waypoint is closer than the 1NM minimum that is normally used in these designs. The CAA had indicated 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 was therefore accepted.

32. With regard to the RNAV-1 SID and arrival replications flying adjacent to other aerodrome patterns, a full route spacing assurance report has been completed by NATS. After analysis by the CAA, in order 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 phase to ensure appropriate separation is assured. These are set out in detail in Annex D.

33. The CAA has therefore concluded that all RNAV-1 SIDs and arrival procedures proposed in Module B 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 regulator. The CAA has also concluded that a robust assessment of separation standards with other procedures has been conducted and that appropriate arrangements are in place to ensure separation with other traffic in the early phase of departure and the latter part of the Rwy 09 arrival procedure.

34. The introduction of RNAV-1 procedures at London City Airport will enable London City to conform to European legal requirements and proposed CAA mandates (set out in detail in Annex E). London City's intention is to meet these requirements with the minimum impact to stakeholders; hence London City is seeking to replicate all the existing conventional SID routes with equivalent RNAV-1 routes rather than designing new ones. There are benefits to be realised from a flight safety perspective in that all SIDs flown will have standard, formally designed, departure and arrival routes coded into the aircraft Flight Management System which should be the same for all operators as opposed to the possibility of various flight paths being flown if the conventional SIDs were coded differently by the various database houses.[17] In the case of London City arrivals for Runway 09, with an RNAV-1 arrival procedure being introduced, this means that all arrivals flying the RNAV-1 arrival transition will fly a pre-

[17] This can sometimes occur as this process is un-regulated. It is often described as the use of 'coded overlays'.

determined flight path and turn north onto base leg without requiring vectors from air traffic control, other than one final vector to intercept the final approach track for the instrument approach procedure. This reduces both air traffic control and flight deck workload, and contributes to the rationale for approving the change.

35. In the broader context, LAMP Phase 1A starts the process of systemising the LTMA.[18] As set out above, 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 enable further systemisation to be delivered in the future.

36. In addition, it is our view that safety would be enhanced by the introduction of the RNAV-1 SID replications of the London City southerly departures because these profiles have realignment above 4000ft AMSL which enables improved climb profiles to be achieved due to the removal of other traffic from the Lambourne - Detling axis where the previous (and the new RNAV-1 SIDs would) fly. Therefore, the southerly replications are a contributory factor in enabling the LAMP Phase 1A design to be implemented which contributes to a reduction in the NATS safety risk index for Thames Radar – see more detail Module C.

37. Further, systemisation means that future growth in aircraft traffic can be managed safely.

38. Accordingly, the CAA is satisfied that a high standard of safety can be maintained as a result of this proposal.

The most efficient use of airspace

39. 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]

40. 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.

41. 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.

---

[18] Systemisation: 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.

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

42. It is the CAA's view that the introduction of RNAV-1 procedures and technology is necessary in order ensure the most efficient use of UK airspace. This is reflected in more detail in the CAA's Future Airspace Strategy.[20] The CAA's Future Airspace Strategy reflects the UK's relevant international obligations in this area. These are set out in detail in Annex E.

43. In this respect, the CAA is content that the RNAV-1 replication proposal contained in this Module will enable 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. The lower altitude part of these designs helps to reduce both controller and flight deck workload. The repositioning of the existing SIDs to the south with the re-route to EKNIV enables better climb profiles for London City departures, because the proposal will give London City departures more airspace to gain height to climb above the revised London City arrival procedures – details of which are covered in Module C. The arrival procedures below 4000ft AMSL form part of the final RNAV-1 arrival transition procedure which is mainly covered in Module C and provide a semi-systemised[21] procedure, again resulting in reduced controller workload. When this Module is connected to and combined with the proposals for London City network changes in Module C, it is anticipated that the end result is that the whole LAMP Phase 1A design package will produce 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 Module C.

Requirements of aircraft operators and owners

44. The CAA is required to satisfy the requirements of operators and owners of all classes of aircraft.[22]

45. In this respect, as no change to the size and shape of controlled airspace is proposed to support Module B, the CAA is content that there will be no impact to Class G airspace users.

46. Implementation of the proposed RNAV-1 procedures in this Module provide the benefits of performance-based navigation to those operators whose crews and aircraft are approved and certified to fly RNAV-1 procedures; currently, it is estimated that on implementation of these proposals in February 2016, this equates to 70% of all operators or airlines using London City Airport. However, until such time when the CAA mandate for RNAV-1 operations becomes

[20] http://www.caa.co.uk/docs/2065/20110630FAS.pdf.

[21] That is only horizontally as opposed to vertically as well.

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

effective and all operators will need to be equipped to fly RNAV-1 procedures (currently November 2017)[23], non-RNAV-1 operators will be able to fly the existing conventional SIDs and so will not be disadvantaged by the approval of these changes in the medium term. 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. The implications of the changes proposed to arrivals for non-RNAV-1 operators is covered in more detail in Module C.

47. As this Module largely reflects the replication of procedures below 4000ft AMSL, with no anticipated changes to track mileage or vertical profile, there is no expected impact upon either fuel burn or CO_2 emissions. However, the proposal makes it clear that this Module is an "enabler" for the changes in Module C, which does have an expected lower fuel burn and therefore coincident lower CO_2 emissions, and the combined impacts that arise from all of the LAMP Phase 1A Modules and which therefore benefit operators. A summary of the impacts on CO_2 emissions from the LAMP Phase 1A Modules is attached at Appendix 1 to the Environmental Assessment.[24]

Interests of any other person

48. 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.

49. The CAA is required to take account of the interests of any person (other than an owner or operator 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.

50. 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 below.

51. 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 that it enables. This will produce both a safety and a potential capacity benefit.

---

[23] See also Annex E.

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

Guidance on environmental objectives

52. In performing the CAA's statutory duties, we are obliged to take account of the 2014 Guidance provided by the Secretary of State,[25] 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 conclusions below with respect to the anticipated environmental impact of the proposal.

53. The CAA's Environmental Research and Consultancy Department (ERCD) has undertaken an assessment of the environmental impact of this change.[26]

54. We do not anticipate any reduction in CO_2 emissions resulting solely from the changes proposed in this Module. However, as discussed in the CAA's Environmental Assessment, 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, (as enabled by Module B) would deliver a reduction of approximately 17,400 tonnes of CO_2 in 2016 and 20,800 tonnes in 2020.

55. 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.

56. Since the proposed change does not alter operations below 1000ft AMSL we anticipate there will be no effect on local air quality. We also do not anticipate that there will be any effects on Areas of Outstanding Natural Beauty and National Parks.

57. There are unlikely to be any adverse tranquillity or visual intrusion impacts as a direct result of these changes.

58. 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**).

59. 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:

---

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

[26] 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"

60. 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.[27]

61. Although we do not anticipate a significant noise impact as a result of these changes, we do consider that there is likely to be some change in noise dispersion. Experience of implementation of RNAV-1 departures at other airports leads us to conclude that departing aircraft from London City after the first turn will more accurately fly the nominal track of the RNAV-1 route and will, consequently, produce a more concentrated track dispersion over the ground than aircraft flying the existing conventional departures. However, because of the type of RNAV design criteria used for the proposed London City departures (specifically because of the use of a 'fly-over' waypoint for the first turn), there is the likelihood of greater concentration than is currently the case because of the characteristics of the SID design. This may be slightly different to the track of the black dots shown in the consultation diagrams, but this can only be confirmed

[27] Noise contours are used to represent on a map the location of places affected by different volumes of noise.

after the procedures are actually flown under a representative set of operating conditions. Therefore, for the reasons set out below we anticipate track dispersion is likely to be very similar to the dispersion resulting from existing conventional SIDs around the first turn, but once aircraft have completed these turns, thereafter, the anticipated impact is that aircraft will be more concentrated along the nominal track of the SID as the aircraft fly east, compared with the conventional SID designs.

62. The new RNAV-1 designs for SIDs at London City are based around the use of a fly-over waypoint (as opposed to fly-by) for the first turn followed by a DF (direct-to-fix) path terminator to the next waypoint. This means that aircraft will initiate the first turn at exactly the same point as they do in the conventional procedures.[28] However, we anticipate there will continue to be some dispersion around the first turn which will vary by aircraft type due to their differing operating speeds and because the aircraft are still accelerating at this point in their flight path. This will affect the radius of the turn and this may be exacerbated by wind direction and speed under certain circumstances. After the first turn has been completed, there will then be a more concentrated swathe of departures compared with the conventional SIDs. However, because at the point of change to the new procedures, approximately 30% of the aircraft types currently using London City will be unable to fly RNAV-1 SIDs, there will still be some aircraft flying the current conventional profile as this will remain as a published alternative. As a result, we anticipate that there may be some variance from the track patterns shown by the black dots in the consultation document diagrams for the departures, but the impact will not become totally apparent until all aircraft are flying RNAV-1 departures (there is currently no anticipated date for this to occur). This is an impact that we will review during the post implementation review (see paragraph 6 of **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E**).

63. Regarding arrival tracks, we anticipate that the black dots on the consultation diagrams are a fair representation of the track dispersion that is likely to result from the implementation of the changes proposed in this Module, but again, this is an impact that we will review during the post implementation review (see paragraph 6 of **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E**).

64. We therefore consider that some residents should experience a reduction in noise impacts because they will have fewer flights overhead as a result of redistribution arising from concentration. However, some residents already

[28] A fly-over waypoint is used by database coders when they provide informal RNAV-1 ‘coded overlays’ of the conventional SID designs. There is, therefore, less likelihood of experiencing track dispersion around the initial turns, and consequently, the CAA believes that the designs for the SIDs at London City will provide a better SID replication than the design used for the recent Gatwick Route 4 RNAV-1 SID design.

under the nominal tracks of the conventional SIDs which are being replicated in this proposal, are likely to experience more overflight and more noise as a result of this concentration. In our view this impact will not be significant in terms of the Secretary of State's policy and guidance to the CAA set out above.

65. Having carefully considered this information we have concluded that overall, the proposals in Module B contribute to and enable the environmental benefits anticipated as a consequence of the package of proposals in LAMP Phase 1A. We acknowledge that this is achieved as a consequence of the anticipated concentration and associated noise impact described above.

Integrated operation of ATS

66. We are 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.[29]

67. In this respect, there is no impact on other ATS providers.

Interests of national security

68. We are required to take into account the impact any airspace change may have upon matters of national security.[30] There are no impacts for national security.

International obligations

69. We are required to take into account any international obligations entered into by the UK and notified by the Secretary of State.[31] 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.

REGULATORY DECISION

70. 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

[29] Transport Act 2000, section 70(2)(e).
[30] Transport Act 2000, section 70(2)(f).
[31] Transport Act 2000, section 70(2)(g).

whether the airspace change proposal produces any conflicts between the material considerations identified in section 70(2).

71. We have identified the environmental noise impact of concentration of aircraft tracks that we anticipate will result from the introduction of RNAV-1 technology and procedures.

72. However we have taken into account that we consider there are significant flight safety benefits from this proposal and that the proposal itself is a key enabler for the specific benefits of Module C and the overall benefits of LAMP Phase 1A set out in the **CAA Decision: Part applicable to each LAMP Phase 1A Modules A – E**. That is, although Module B as a stand-alone proposal for the replications should in our view be approved in its own right, we have also taken into account that the revised London City departure and arrival replications are an enabler for the LAMP Phase 1A Module C proposal and therefore approving this proposal will mean that the wider benefits as outlined in Module C can be achieved. Without this change in Module B, the overall design for LAMP Phase 1A Module C could not be achieved.

73. 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. A diagram from the consultation to show the changes is shown at Annex A.[32]

74. 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.

75. In line with our standard procedures 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

[32] The impacts of the re-alignment of the tail end of the southerly SIDs from Harold Hill for Rwy 27 departures and from Upminster for Rwy 09 departures where the tracks over the ground have changed, have been highlighted in the consultation feedback report of Module C (shown at Annex A for convenience).

ANNEX A

Diagram to show the new alignment of the EKNIV SIDs

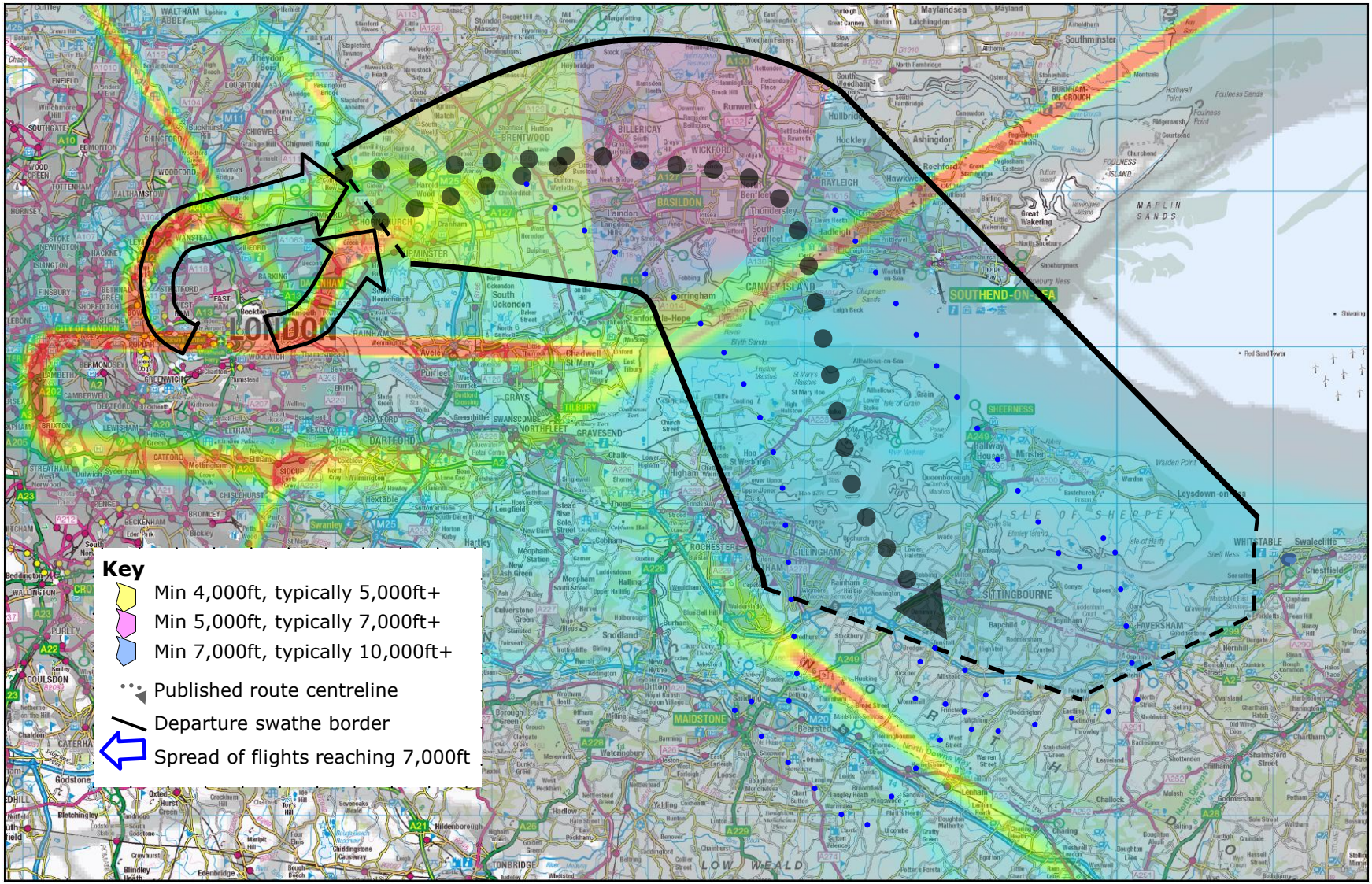

Figure 4: Proposed London City Departures to the South above 4,000ft, overlaying today's London City and Biggin Hill flight paths

ANNEX B

Diagram to show the existing arrival flight paths

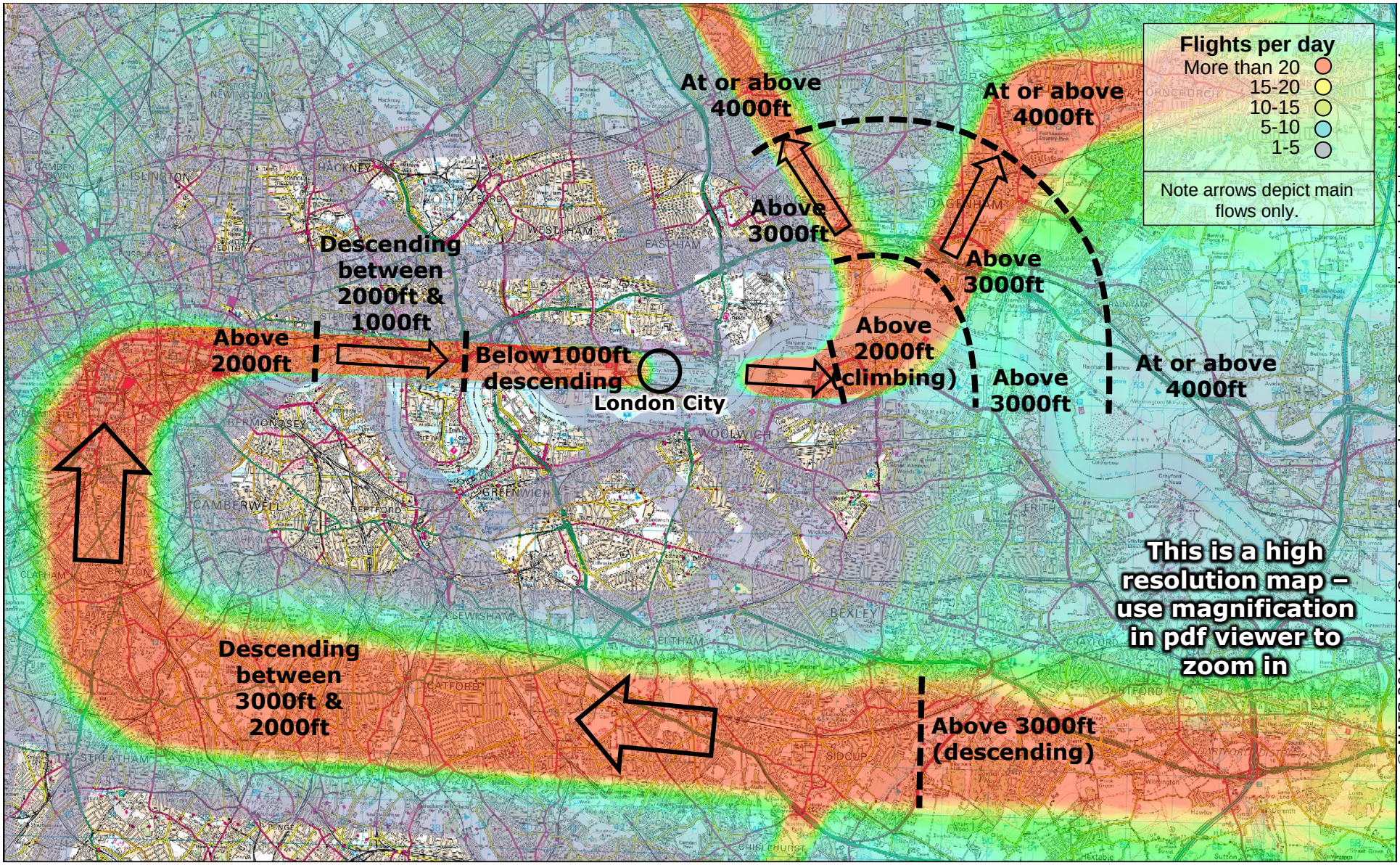

Figure 3: Indicative Aircraft Heights for Runway 09

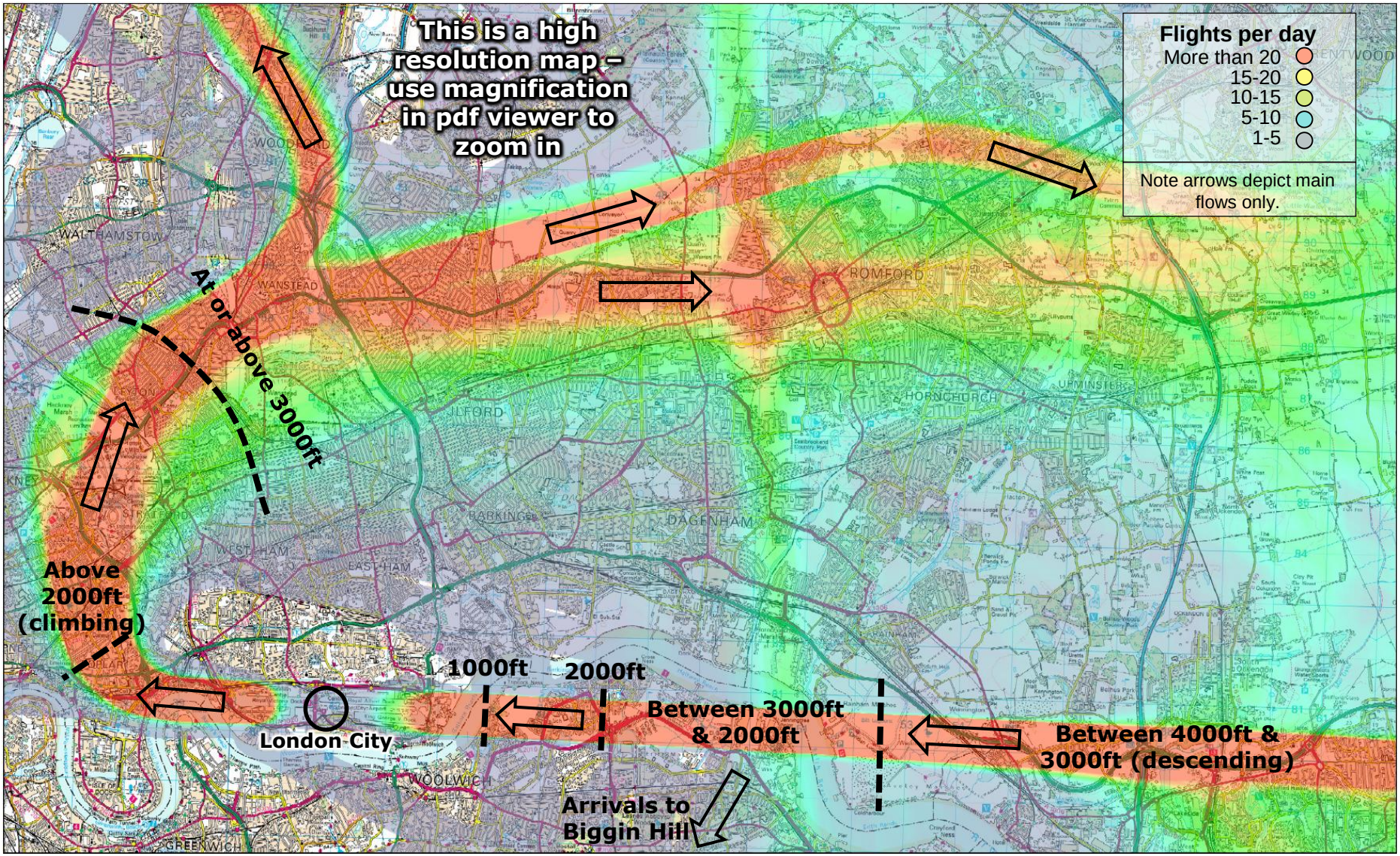

Figure 4: Indicative Aircraft Heights for Runway 27

ANNEX C

Diagram to show the new RNAV replicated arrival flight paths

5.4.7 Runway 09 RNAV Arrivals (average 127-151 flights per day for 99 days per year)

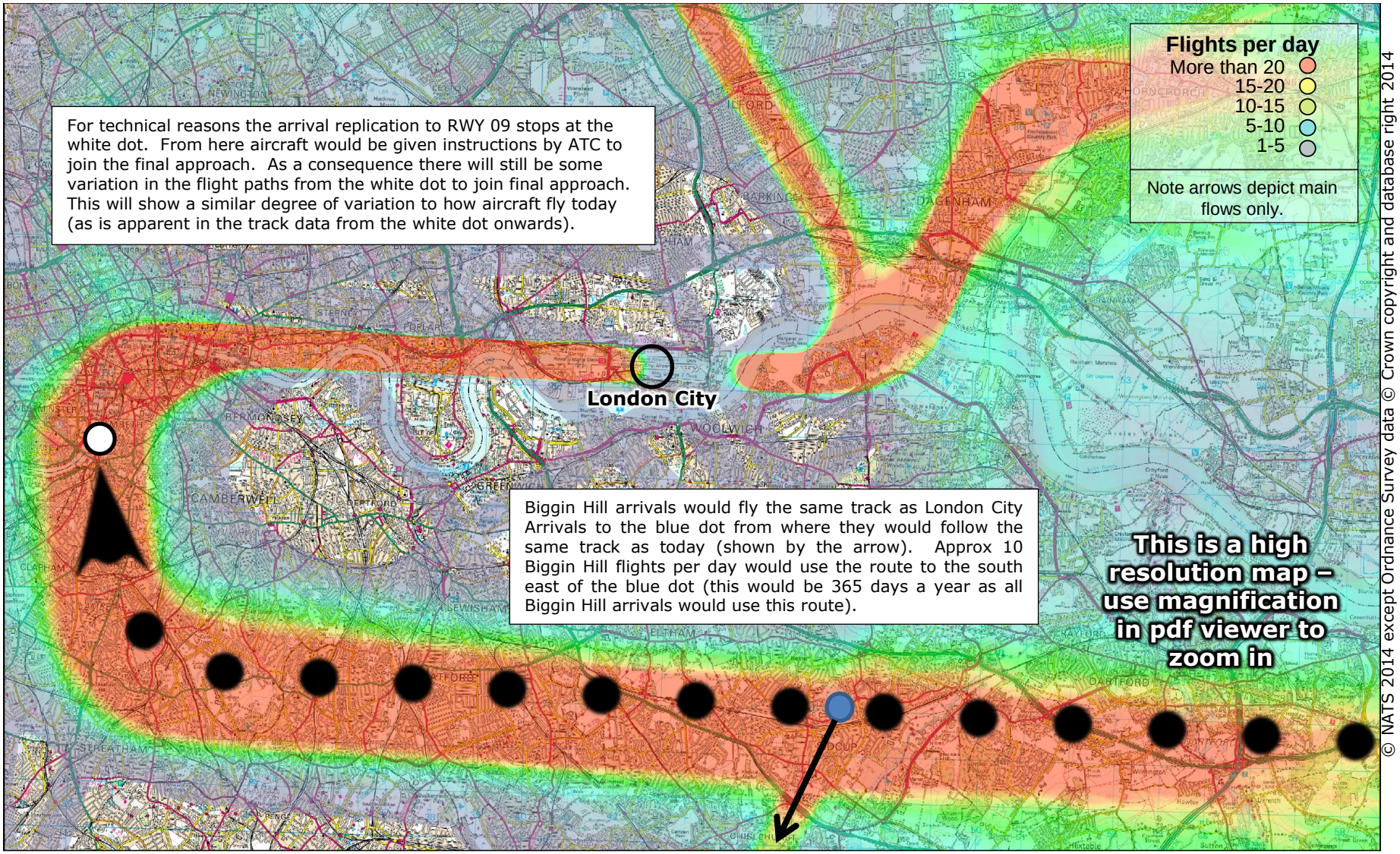

Figure 23: Arrivals to RWY09 (Dotted line shows the area where most flights would be concentrated)

5.4.8 Runway 27 RNAV Arrival (average 127-151 flights per day for 266 days per year)

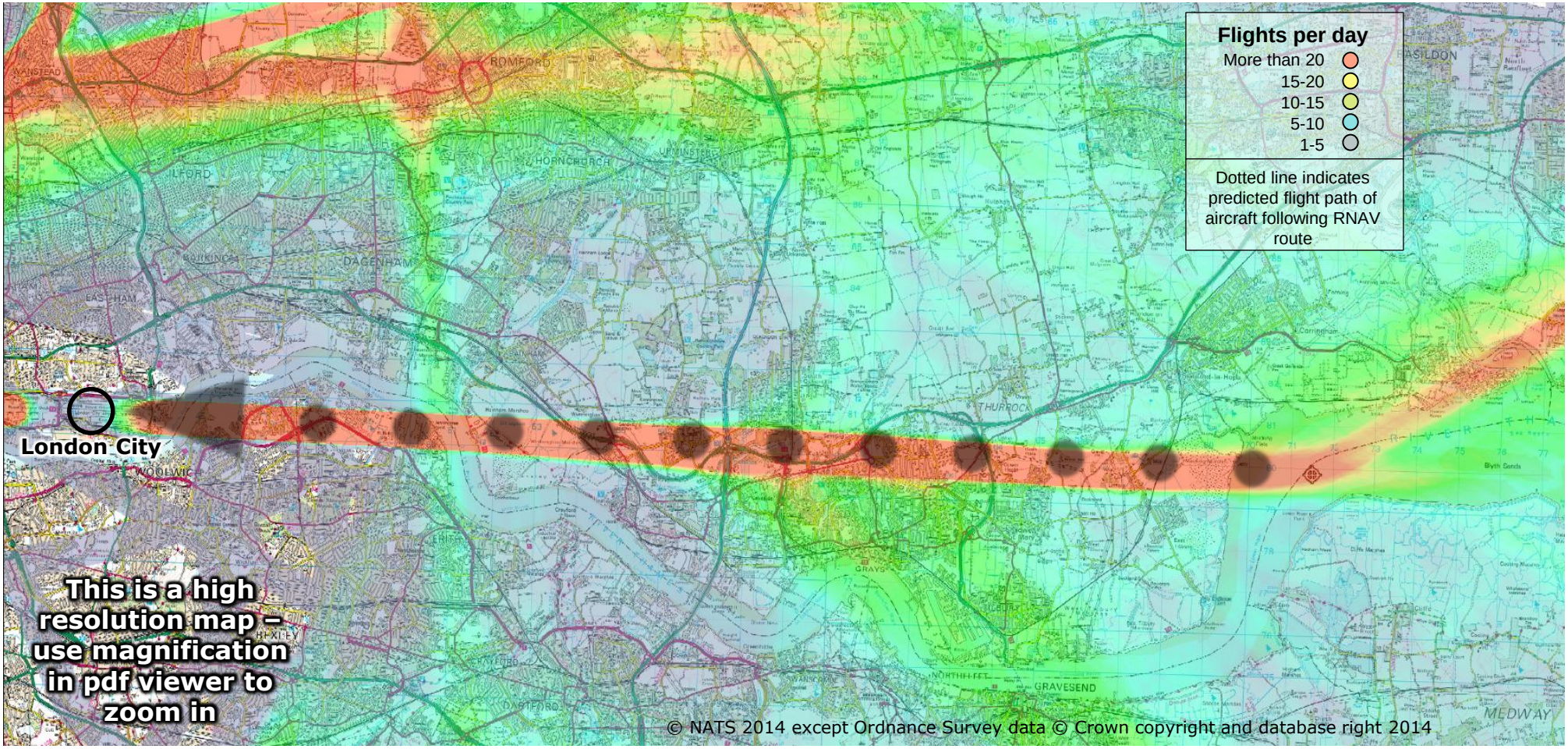

Figure 25: Arrivals to RWY27 (Dotted line shows the area where most flights would be concentrated)

Note: since the arrival route to RWY27 is simply a straight line, this has not been modelled in the computer simulation.

ANNEX D

Conditions of the CAA's decision to approve the Module B 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 B that:

1	Thames Radar controller to ensure that traffic entering the ATPEV Hold does not enter the Shoeburyness Danger Areas to the north-east.
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.

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