London Airspace Consultation
Part G
Justification and Further Detail for Proposed Changes including Effects on Aviation

Contents

1. Introduction

1.1 This part of the consultation document describes the justification, and provides detail on the proposal as a whole; it also covers the benefits and impacts for the various stakeholder groups in the aviation community; it is therefore by definition more technical than the other parts of the consultation document[1]. Parts B-F of the consultation document address component parts of the proposal related to specific geographic areas; they are designed for those mainly interested in local effects over a particular area, and therefore avoid, as far as possible, the use of technical language.

1.2 Part A of the consultation document should be read first as it provides the context for the proposed changes and for the consultation. This includes a description of the design objectives for airspace change at various altitudes.

1.3 In this part, Section 2 outlines the scope of the proposed changes; Sections 3, 3.9 and 5 provide the context behind this change, discussing Performance Based Navigation (PBN) standards and the resultant strategy for phasing and consultation. Sections 6-9 describe the principles behind the proposed changes and their justification; Sections 10-13 describe the effects for aviation stakeholder groups.

1.4 Questions on key issues are presented throughout the document, highlighted in yellow. Many of these questions, for example to what extent you support our objectives for the airspace change, have also been asked of local environmental stakeholders in Parts B to F. It is important to ensure a balance in the response to this consultation, and we therefore ask you to answer questions highlighting parts of the proposal you support, as well as those with potential impact.

[1] A glossary of terms used is provided in Appendix B

2. Scope of Consultation

2.1 This consultation relates to proposed changes to a number of routes over the London and South East England, as listed below.

2.2 For Gatwick Airport air traffic flows we are consulting on:

- The introduction of an RNAV1[2] Point Merge route system for all arrivals (including new holding stacks for overflow/contingency; holding stacks are herein referred to generally as 'holds'[3])
- Introduction of RNAV1 Standard Arrival Routes (STARs) delivering traffic into the Point Merge system (including additional Controlled Airspace, herein referred to as 'CAS'[4])
- Introduction of RNAV1 routes from the Point Merge to final approach
- Introduction of new RNAV1 Standard Instrument Departure routes (SIDs) to the south (in air traffic control terms these are referred to as the BOGNA, HARDY and SFD[5] SIDs) to complement the Point Merge system
- Potentially repositioning all Runway 26[6] SIDs at low altitudes to improve 'departure splits' (see Section 9 for details)
- Consideration of additional RNAV1 arrival routes and SIDs below 7,000ft to/from Runway 26 for noise respite purposes

2.3 For London City air traffic flows we are consulting on:

- The introduction of an RNAV1 Point Merge route system for all arrivals (including new holds for overflow/contingency and related CAS)
- Introduction of RNAV1 Standard Arrival Routes (STARs) delivering traffic into the Point Merge system
- Introduction of RNAV1 routes from the Point Merge system to deliver traffic to the vicinity of the airport at approximately 4,000ft
- Introduction of new RNAV1 SIDs heading to the south (DVR/LYDD) from approximately 4,000ft; this is to complement the Point Merge system

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[2] RNAV1 is a particular design standard for PBN – Part A introduces the concept of PBN and provides links to further information.
[3] A hold is essentially a route structure where aircraft are delayed until a landing slot is available. The Point Merge route system could therefore be considered a form of hold, where aircraft are delayed on arcs instead of orbital/racetrack holding patterns. However, for the purposes of this document a 'hold' is specifically referring to orbital/racetrack holding stacks rather than other forms of holding unless otherwise stated.
[4] Controlled airspace (CAS) is airspace in which NATS or other air traffic service providers provide a service to aircraft. There are a range of sub-classifications for controlled airspace that dictate the type of service that is provided, from Class A to Class E. The airspace outside of the classified areas is referred to as uncontrolled, which can be further classified as Class F or G.
[5] The air traffic route system is defined by routes going between points that have 3 or 5 letter name codes. These are shown in capitals when referenced in this document.
[6] Naming of Runways is discussed in Parts B and C for Gatwick Airport and Part E for London City.

2.4 The London City consultation also covers proposed changes to some arrivals for London Biggin Hill and London Southend Airports that use the same route structure/airspace as the London City arrivals. Specifically:

- London Biggin Hill arrivals will share use of the RNAV1 Point Merge and all associated RNAV1 arrival routes developed for London City airport
- London Southend will share use of the RNAV1 STARs from the southerly directions; this traffic will not use the Point Merge route structure but will use the same CAS to transit to the north of the Shoeburyness Danger area (an arrival route system from here is not covered in this consultation; this will be subject to separate design and consultation processes at a later date – see Section 11 for further details)

2.5 The development of PBN routes at low altitude (below 4,000ft) is the responsibility of the local airport. London Gatwick Airport is co-sponsoring this proposal/consultation and so the consultation covers the development of a PBN route system in the vicinity of Gatwick Airport from the ground up.

2.6 This consultation does not cover London City routes below 4,000ft. London City Airport is in the process of determining how to best modernise its existing routes below 4,000ft in line with FAS and the forthcoming European requirement for PBN routes (see Part A for details); their intention is to match the position of today's flight paths as closely as possible.

2.7 The changes to routes above 4,000ft proposed here will be more effective if they feed into/from a PBN route structure below 4,000ft, however, they would still be of some benefit, and could be implemented, without any low level changes.

2.8 NATS and London City Airport are working together to ensure that the changes above 4,000ft and the route modernisation below 4,000ft are coordinated, however, for the time being London City Airport are progressing this work independently, and hence they are not co-sponsors of this exercise; the intention is to draw the two strands of work together in a joint submission to the CAA in the latter part of 2014.

2.9 Low altitude changes at London Biggin Hill Airport would also complement the airspace being proposed here, and whilst optimising the PBN system will require PBN routes at low altitudes for London Biggin Hill, their relatively small traffic numbers mean their impact on overall efficiency is significantly less than London City. London Biggin Hill does not, at this stage, intend to modernise their low altitude routes.

2.10 NB Farnborough and London Southend Airports are independently developing airspace used by their flights. While these airport-led changes are beyond the scope of LAMP Phase 1, they will affect some of the same geographic areas covered in this London Airspace Consultation. In addition to considering/responding to this consultation, we would encourage you to go to www.tagfarnborough.com for details of proposals being generated by Farnborough Airport, and www.southendairport.com for those being generated by London Southend Airport.

3. Consultation Strategy

3.1 This consultation is part of the FAS[7], and in particular LAMP (see Part A for details of these). LAMP is led by NATS, which is responsible for providing Air Traffic Management for the network of airspace over the UK; however, it also involves the individual airports which have the main interest in, and responsibility for, local, low altitude, airspace issues. NATS and the airports share many common aims and coordinate regularly through FAS. However, the specific priorities and timescales for investment for each business are not necessarily the same; this means that developing a joint strategy to implement FAS is complex.

3.2 Not only does FAS/LAMP involve a number of separate organisations, it is also subject to a number of other factors which add to the complexity – these factors include:

- Technical issues such as Performance Based Navigation (PBN) and Transition Altitude requirements stemming from European legislation (see Part A)
- Environmental sensitivities which can be difficult to predict and can generate very localised requirements; and
- The scale of the change required in complex, safety-critical airspace

3.3 As a consequence of this complexity, the change process for LAMP and associated airport developments is not straightforward, requiring the overall system change to be broken down into separate geographic parts, and into a number of phases.

3.4 The first phase relates primarily to network changes at higher altitudes for routes feeding Gatwick and London City airports, and low altitude changes that will affect arrival routes and some departure routes at Gatwick Airport. Elements relating to Gatwick Airport in low altitude and intermediate airspace are presented jointly by NATS and Gatwick Airport.

3.5 NATS and Gatwick Airport have developed a consultation strategy to ensure that stakeholder viewpoints are captured early in the process before final route designs are completed. This involves a geographically wide consultation to capture local requirements across a broad range of potential design options.

3.6 This also manages the risk associated with complexity, as it ensures that changes in requirements and/or external factors do not invalidate the consultation response (as would be the case if consultation was undertaken on one specific design underpinned by one specific set of assumptions).

3.7 This approach involves asking local environmental stakeholders questions about the justification for, and effects of, a range of potential changes; these questions are posed in the environmentally focussed parts of the consultation document.

3.8 This part of the consultation document asks the same kind of questions. We recognise though, that while this general approach is suitable for consultees

[7] The CAA explains the background to FAS here: www.caa.co.uk/default.aspx?catid=2408

with very local perspectives, it does not fulfil all the needs of all stakeholders, particularly those from the aviation community who need details of the procedures to determine the particular effects on their operations.

3.9 Therefore this consultation should be seen as part of an on-going dialogue; as the designs mature after this consultation we will seek to provide more detailed information about the effect on aircraft operators and General Aviation (GA) communities. We will also continue dialogue with key representative groups such as airport consultative committees and planning authorities.

4. The move to PBN

4.1 PBN equipage is already widespread across the fleets operating out of London, and a legally binding mandate (referred to as an 'implementing rule') for PBN is under development through the Single European Sky programme[8]. This is expected for 'terminal airspace'[9], such as that over London and the South East, by 2020. The move to PBN is an integral part of the FAS being delivered through an industry collaboration including the CAA, NATS, the Ministry of Defence (MOD), airports and aircraft operators.

4.2 Many UK airports have already begun the process of developing local PBN structures and Gatwick Airport has led the way for the UK's major airports by implementing RNAV replications of its conventional departure routes. Further afield, Dublin and Oslo have implemented Point Merge based on RNAV1 for their arrival streams and Amsterdam Schiphol has mandated RNAV1 for its traffic.

4.3 The change to a PBN environment is beyond the scope of this consultation (see Part A). This consultation is about how NATS and Gatwick Airport propose to change the route structure to accommodate PBN. Stakeholders wishing to discuss the overall PBN strategy should contact the CAA.

5. PBN Standards and Mandates

5.1 At the time of writing NATS anticipates that the European implementing rule expected in 2020 will specify an 'RNP1' minimum standard in terminal airspace. RNP1 is a particular design standard for PBN which, amongst other things, allows the definition of 'radius-to-fix' turns on routes; these are not allowed on the more basic 'RNAV1' PBN standard[10]. Radius-to-fix turns mean that the aircraft navigational accuracy around turns is much improved; this reduces the spread of aircraft flight paths. It is beyond the scope of this

[8] Single European Sky or SES is a legislative framework for European aviation aimed at accommodating increasing air traffic flows, whilst cutting costs and improving performance - see www.eurocontrol.int/dossiers/single-european-sky. The PBN legislation will be enacted through a legally binding SES 'Implementing Rule' – see www.eurocontrol.int/category/keywords/ses-implementing-rules for more details

[9] See Appendix B Glossary

[10] RNAV1 is a replacement term for PRNAV. There are technical differences in the RNAV1 and PRNAV specifications but in general PRNAV can be considered the forerunner to RNAV1, and so in modern applications of PBN, RNAV1 replaces PRNAV.

document to describe PBN standards in any detail – further information can be found on the CAA and Eurocontrol websites[11].

5.2 While the implementing rule is expected to specify an RNP1 standard, RNP1 airspace design guidance for the UK has not yet been published by the CAA. This means that we cannot yet undertake detailed design work for an RNP1 route system.

5.3 The Phase 1 development of PBN routes for Gatwick, London City, London Biggin and London Southend airports we are consulting on here will therefore be designed to the RNAV1 standard for which CAA guidance is expected in 2014[12]. This is a lesser standard than RNP1, but is nonetheless a vast improvement on the conventional navigation standards that underpin the route system in place today.

5.4 However, it is expected that RNP1 standards will be available for LAMP Phase 2 and therefore this is the assumed basis for later designs; this will include possible adaptation of the Phase 1 designs for Gatwick, London City and London Biggin Hill traffic.

5.5 The application of PBN (either RNAV1 or RNP1) will be underpinned by a CAA-issued mandate for the appropriate level of equipage and certification. However, as discussed above, the application of PBN will be a phased process. The CAA is therefore considering location- or route-specific mandates to precede the wider roll-out across the UK (and indeed Europe). The CAA is currently assessing the impact of PBN on the routes covered in this consultation.

5.6 While the focus of the design is to provide an optimal system for RNAV1 approved operators, we are considering ways in which non-compliant operators can be accommodated. Non-compliant operators cannot utilise RNAV1 routes and so their aircraft will be managed tactically by ATC; this is where aircraft are following an instruction issued by ATC rather than the route structure.

5.7 Allowing non-compliant aircraft within the RNAV1 route system will, however, reduce the efficiency of the RNAV1 system for the RNAV1 approved operators. This is because the efficiency of the RNAV1 route system will stem from the predictability of aircraft flight paths following the route structure. Not only would non-compliant aircraft have to be managed tactically, their presence would have a knock-on effect to the approved aircraft on neighbouring routes. This is because the approved aircraft may themselves have to be given tactical instructions that take them off the route structure to ensure separation from the non-certified aircraft.

5.8 NATS will continue to provide a conventional service to non-compliant aircraft under the terms of any exceptions granted by the CAA, but we have yet to

[11] See www.caa.co.uk/pbn and www.eurocontrol.int/navigation/pbn

[12] It is assumed that in addition to all operators being RNAV 1 approved, all aircraft will either have a DME/DME/IRU or GNSS position updating capability. In the absence of GNSS, it is assumed that aircraft can align to a position on the ground and rely upon inertial coasting in order to fly the initial part of the departure procedure ie until the aircraft is within DME/DME updating coverage. For more details on the technical requirements of PBN please contact the CAA.

determine the conditions for this service[13]. The question overleaf seeks to ascertain the views of the whole stakeholder group on accommodating non-compliant aircraft within the RNAV1 route structure; we are seeking the views of both the non-compliant operators that may be restricted, and the RNAV1 approved operators whose efficiency may be compromised by non-compliant aircraft in the system.

Procedures for accommodating operators who are not compliant with the RNAV1 standard are yet to be finalised. Accommodating non-compliant operators will reduce overall system efficiency for the majority of the fleet which is RNAV1 approved.

To what extent should non-certified aircraft be accommodated (NB you may wish to highlight more than one of these options)?

- **Accommodated with time restrictions**
- **Accommodated but with restricted route availability**
- **Accommodated but with potential delay**
- **Accommodated without restriction (and therefore reducing efficiency for all)**
- **Should not be accommodated at all**

What, if any, comments do you have on accommodating non-certified aircraft?

Please go to the online questionnaire at www.londonairspaceconsultation.co.uk to give your answers to these questions

6. Objectives and Justification for Proposed Changes

6.1 The following sections describe our objectives for the proposed changes. They describe what we are trying to achieve and the generic benefits/impacts that would result. We then seek your view on these objectives. The specific local benefits and impacts of these changes are not yet known as the final route alignments are yet to be determined. Descriptions and questions relating to these potential local effects are covered in later sections and in the other Parts of the consultation document[14].

6.2 Design work to date has focused on the development and application of new methods for managing the airspace to take advantage of the benefits of PBN. This work falls under three generic headings: Point Merge for Gatwick, London City and London Biggin Hill airports (Section 7); respite routes for Gatwick Airport (Section 8); and redesign of low altitude routes at Gatwick Airport (Section 9).

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[13] Exceptions will apply for diversions and the specification of alternate arrival airports; such aircraft would be always accommodated regardless of certification.

[14] Fuel burn impacts for specific routes are discussed in Section 10, impacts on specific aviation users are discussed in Sections 11 - 13, and local environmental benefits/impacts are discussed in the geographically localised parts of the consultation document – see Part A for details.

7. Point Merge for Gatwick, London City and London Biggin Hill Airport Arrivals

7.1 LAMP design work for Gatwick, London City and London Biggin Hill arrivals has concentrated on developing concepts of operation for managing arrival air traffic flows. The focus has been on improving efficiency by reducing the need for regular 'stack' holding, and reducing reliance on tactical management of arrivals in order to generate an appropriately spaced sequence of arrivals.

7.2 A new concept of operations for managing arrivals in a more systemised manner can also optimise departure profiles. The close geographic proximity of London's airports means that departures are currently trapped beneath the complex arrival flows and are therefore subject to altitude-capping and flight path variation. The development of the concept of operation also prioritised continuous climb for departures; this is the single biggest improvement to flight efficiency and environmental impact that can consequently be achieved through LAMP.

7.3 We have been working for some time on developing the best approach for using PBN to systemise the way in which we manage air traffic. The conclusion of this work is that a system based on Point Merge for Gatwick, London City and London Biggin Hill airports can best realise the benefits available from PBN.

Overview of Point Merge

7.4 Point Merge is a system by which the aircraft in a queue to land fly an extended flight path around an arc instead of holding in circles, or being vectored to extend their flight path at low altitudes. They fly along the arc until the next slot in the landing sequence is free, at which time Air Traffic Control (ATC) will turn the aircraft off the arc into the landing sequence. Extending the flight path in this way means that aircraft queue one behind another, rather than one on top of another in a holding stack or in unpredictable patterns at low altitudes (see Section 2 of Parts D and F for descriptions of this low altitude vectoring).

7.5 The Point Merge structure shown in Figure G1, with arcs that may be anything from around 15 to 40 nautical miles[15] long, will need to be positioned into the consultation areas discussed in Parts D and F of this consultation document. Arcs from opposite directions are separated vertically by 1,000ft.

7.6 The appropriate size and precise location for the Point Merge arcs will be determined through the detailed design process to be undertaken following consultation.

7.7 Figure G1 is provided as background information. Should you wish to understand more about Point Merge, further technical information may be found at
www.eurocontrol.int/eec/public/standard_page/proj_Point_Merge.html

[15] Aviation measures distances in nautical miles. One nautical mile (nm) is 1,852 metres. One road mile ('statute mile') is 1,609 metres, making a nautical mile about 15% longer than a statute mile.

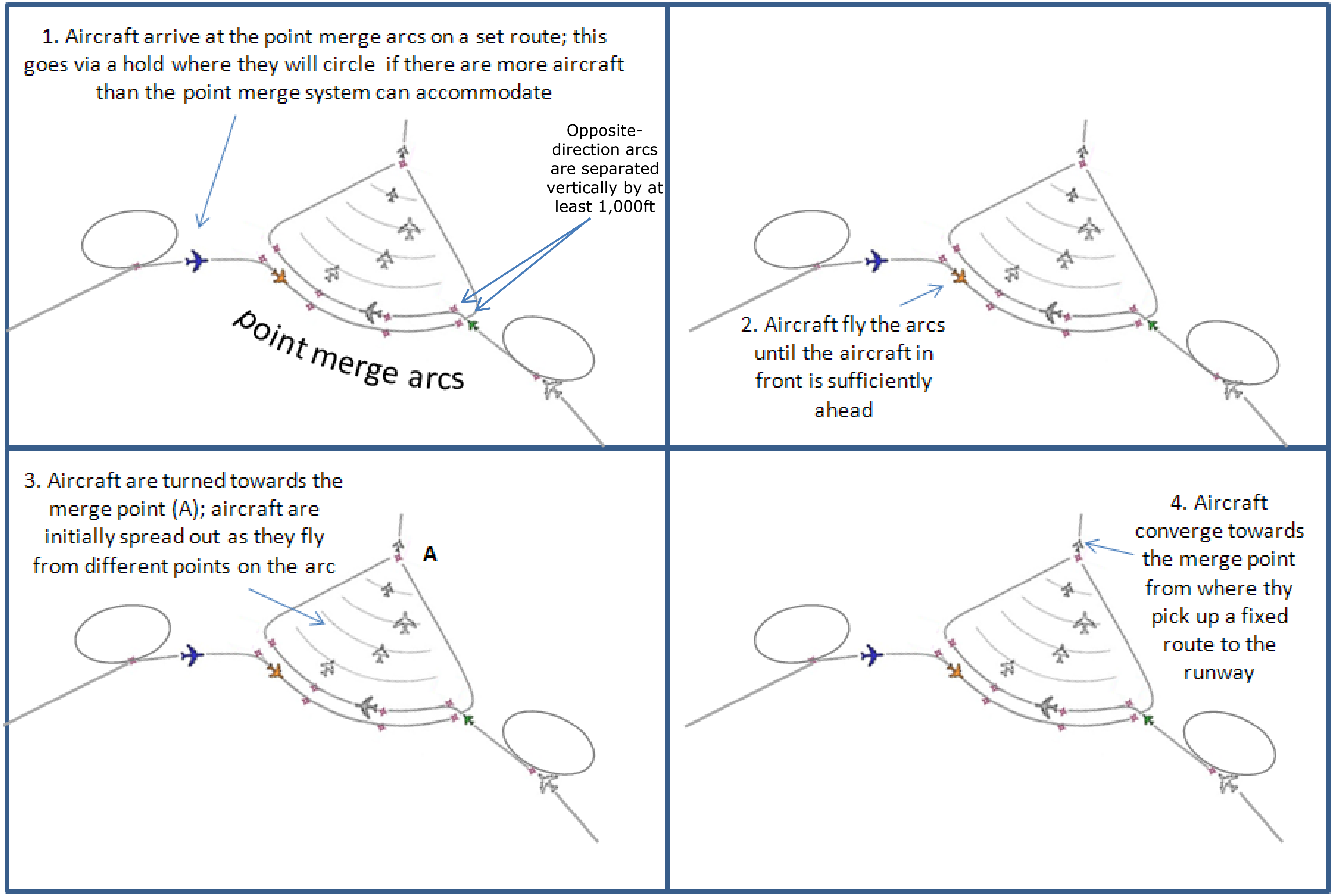

Figure G1: An illustration of Point Merge

7.8 Stack holds are still required as an overflow for the Point Merge system; however, they would be used less often and could be at higher altitudes than the holds in place today.

7.9 The generic benefits of the proposed system based around the introduction of Point Merge are:

- Enhanced safety
- Reduced delays
- Fewer areas overflown at lower altitudes
- Reduction in stepped descent
- Reduction in stepped climb
- Improved predictability and facilitation of 'collaborative decision making'
- Improved recovery from service disruption
- Reduced average fuel and CO_2 per flight

7.10 Point Merge also presents some potential impacts and issues:

- Fuel uplift issues
- Transition from 'tactical' environment
- Changes to local impacts (both positive and negative)

7.11 All the potential benefits and impacts are discussed in more detail below.

Point Merge enhances safety

7.12 Holds and the associated vectoring required to develop the landing sequence are a particularly complex operation. Although it is complex, this system has been in use worldwide for many decades. It is, however, generally accepted that a reduction in complexity will enhance safety. Point Merge is a more predictable system where the aircraft flight paths are less complex; its introduction therefore offers the opportunity to further enhance the safety of the air traffic network.

Point Merge reduces delays

7.13 The number of aircraft that the air traffic controllers can manage in any given hour is limited for safety reasons – complexity is a key factor that determines what the limit is for a given sector of airspace. Once it is predicted that the limit will be reached, additional flights due to pass through the sector are delayed until such time that they can be safely accommodated.

7.14 Point Merge helps sort the air traffic into an efficient sequence at higher altitudes, reducing the complexity of the operation and therefore increasing the number of aircraft the controller can safely handle. This is referred to as an increase in the airspace capacity which also means a reduced likelihood of delay for arriving aircraft and their passengers.

7.15 Delay was becoming a significant issue until the economic downturn in 2008 depressed traffic levels. Air traffic levels are now recovering, albeit slowly, and without a change to the way in which air traffic is managed we will see an increase in delays as traffic levels grow.

7.16 Testing has shown that the improved system efficiency that Point Merge enables will be able to accommodate forecast air traffic growth[16] to 2025 without significant delay. NATS operates under the terms of our Air Traffic Services Licence which requires us to be capable of meeting, on a continuing basis, any reasonable level of overall demand for air traffic control services. Airspace change is required to accommodate growing demand; growth in the overall number of flights is therefore assumed with or without this proposed airspace change.

Point Merge reduces the area regularly overflown at lower altitudes

7.17 Today's holding and vectoring results in variable flight paths at intermediate and low altitudes. This means that aircraft flight paths at these altitudes are not consistent and can be spread over a wide area (described in Parts C and E).

7.18 Point Merge not only provides a queuing area, it also helps ATC sort the aircraft into an efficient sequence at higher altitudes than today. In turn this means that the flight paths to the runway can be flown more consistently, with distinct environmental benefits:

- The spread of traffic is much less, so the extent of the area where aircraft are regularly flying directly overhead is smaller - this is in line with Government guidance (see Appendix A);
- The routes can be positioned to reduce overflight of populations and/or environmentally sensitive areas below 7,000ft (for instance the London City/London Biggin Hill Point Merge could be largely positioned over the sea).

7.19 Operationally, reduced dispersal means improved predictability. This contributes to the safety and delay reduction argument for ATC discussed in previous paragraphs, and will also provide a benefit to airlines in terms of more consistent fuel planning.

Point Merge reduces stepped descent

7.20 Point Merge provides more predictability for flight crew compared to today's approach environment in which pilots follow specific instructions from ATC rather than follow a fixed route.

7.21 More predictability means the flight crew can plan a more gradual descent rather than a 'stepped descent' where aircraft descend in stages, often with long periods of level flight at low altitudes. Minimising stepped descent can reduce noise impact and improve fuel efficiency; saving fuel means less CO_2.

[16] The forecast growth used to underpin the analysis in this document can be found at Appendices G and H.

It can offer such an efficiency improvement that it can often present an overall benefit even if aircraft flight paths are extended in order to achieve it[17,18].

7.22 Airspace changes alone would not guarantee continuous descent as both Gatwick and London City traffic flows interact with air traffic to/from neighbouring airports; however, Point Merge would reduce the extent of stepped descents and increase the likelihood of continuous descent in the short term. It would also pave the way for it to become more common in the future as neighbouring airspace is changed, and wider changes to the air traffic management system are put in place.

Point Merge reduces stepped climb

7.23 At Gatwick the application of Point Merge requires some changes to neighbouring departure routes so that they fly around the Point Merge arcs. At London City, changes to departure routes are also required to ensure that the system based on Point Merge operates efficiently. In both cases the combination of PBN and the Point Merge system presents an opportunity for improving the efficiency of the departure routes themselves, by enabling more continuous climb. In particular this improvement could be achieved on the Gatwick BOGNA, HARDY and SFD routes and the London City DVR, LYDD and SAM routes.

7.24 Aircraft operate more efficiently at higher altitudes meaning less fuel is burned, therefore emitting less CO_2 into the atmosphere. Aircraft at higher altitudes are also less likely to cause local impact from noise or visual intrusion. It is therefore in everyone's interest that aircraft are able to climb efficiently to higher altitudes, minimising 'steps' where they have to stop climbing and fly level for a period, often at lower altitudes [see footnote 17 on page 13].

7.25 By introducing a Point Merge system and redesigning the surrounding airspace we have the opportunity to relieve climb restrictions, and allow Gatwick and London City departures to climb to higher altitudes more efficiently. This does, however, mean repositioning some departure routes.

7.26 By facilitating climb in this way, Point Merge would enable aircraft to more quickly achieve 7,000ft where noise is considered less of a nuisance (see Government guidance at Appendix A); climbing more quickly to efficient cruising altitudes also provides a contribution to the fuel and CO_2 savings (see paragraphs 7.32 to 7.36). Continuous climb offers such an efficiency improvement that it can often present an overall benefit even if aircraft flight paths are extended in order to achieve it[19].

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[17] A short video explaining the benefits of airspace change – including those from continuous climbs and descents - can be found at www.londonairspaceconsultation.co.uk.
[18] Overall fuel efficiency is discussed in paragraphs 7.32 - 7.36. Further details and a route by route analysis are provided in Section 10.
[19] See footnote 18

Point Merge improves predictability, facilitates collaborative decision making

7.27 Making the best use of existing runway capacity is a high priority. Runway utilisation is, however, a complicated formula requiring ATC and the aircraft to be synchronised with baggage and passenger handling systems, and support functions such as refuelling and even cleaning.

7.28 Gatwick Airport is investing in a Collaborative Decision Making (CDM) programme linking these systems to enable aircraft to be turned around efficiently and depart on time, helping optimise runway utilisation.

7.29 However, the current tactical ATC method of managing arrivals does not provide a predictable enough flight path for the system to realise its potential, with predicted arrival times subject to variation. Point Merge will reduce this variation, increase the accuracy of the predicted arrival time and contribute to effective CDM.

7.30 While CDM is not being actively progressed at London City at this time, it is part of the blueprint for the future European air traffic system[20], including the UK and its major airports. The full CDM benefit would therefore be relevant to London City Airport in the future; in the meantime Point Merge will provide a predictable arrival flow which will itself facilitate more efficient ground operations at the airport.

Point Merge improves recovery from service disruption

7.31 Introducing Point Merge and the associated airspace changes cannot reduce the immediate disruption caused by unplanned runway closures or weather events such as snow or thunderstorms. However, the increased systemisation provides the airspace capacity to handle more aircraft and so the recovery phase after such events is less likely to be constrained by ATC than it is today.

Point Merge enables a reduction in average fuel and CO_2 per flight

7.32 We have undertaken computer based simulation modelling to assess the potential fuel benefits that the implementation of Point Merge would enable across the network, including changes to the arrival routes feeding into the Point Merge system and changes to neighbouring departure routes. The modelling has estimated enabled fuel benefit for a range of draft designs. Enabled fuel benefit is a measure of trip fuel, assuming that the issues around fuel uplift for the Point Merge arcs will be resolved, and that once Point Merge has been implemented, the required uplift[21] for the arrival phase can be influenced by practical experience of its operation (see paragraph 7.44).

[20] For more detail see: www.eurocontrol.int/eec/public/standard_page/proj_Airport_CDM.html
[21] The enabled fuel benefit measure provides an estimate of the fuel uplift difference as a result of a revised profile and not changes to aircraft weight. A reduced fuel requirement for an improved profile would, however, mean less fuel needs to be carried, making the aircraft lighter and further reducing the fuel uplift requirement. This modelling process is not able to capture this additional benefit.

7.33 We have assessed the fuel benefit of a number of draft designs which gives us a good indication of the order of magnitude of the expected benefit. Because final route alignments cannot be established until after consultation, we are presenting this range of possible results rather than one figure. We hope to realise benefits towards the high end of the range; however, whether we can achieve this will depend on design decisions after consultation, which will need to balance environmental and operational impact. In order to ensure your interests are captured in these design decisions please see paragraph 7.41 to 7.43 and provide feedback on the associated question.

7.34 The enabled fuel benefit for London City and London Gatwick airports as a result of the application of Point Merge and associated departure route changes are shown in Tables G1 and G2 below. Route by route estimates are provided in Section 10.

Airport	2016	2020	2025
Gatwick	7,100 and 14,200	7,400 and 14,700	8,000 and 16,000
London City	2,500 and 5,000	2,900 and 5,800	3,000 and 5,900
Total	**9,600 and 19,200**	**10,300 and 20,500**	**11,000 and 21,900**

Table G1: Enabled fuel savings; tonnes per annum for the fleet as a whole
(All figures are rounded to nearest 100 tonnes; rounding occurs after calculations)

Airport		**Enabled Fuel Burn Savings (kg per movement)**
Gatwick	Arrival	50 to 100
	Departure	10 to 15
	All movements	30 to 55
London City	Arrival	30 to 55
	Departure	30 to 60
	All movements	30 to 55

Table G2: Enabled fuel savings; kg per movement
(All figures are rounded to nearest 5kg; rounding occurs after calculations)

7.35 The savings in planned fuel give an indication of the potential CO_2 savings as the amount of CO_2 emitted is directly proportional to the amount of fuel burned; 1 tonne less fuel burned means 3.18 tonnes less CO_2 released into the atmosphere[22] and so the above fuel figures indicate *potential* CO_2 savings of up to 70,000t per annum[23]. However, the enabled fuel benefit modelling process[24] cannot take account of tactical intervention, except where it is

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[22] The mass of CO_2 emitted is greater than the mass of fuel burnt because the oxygen component of CO_2 is drawn from the atmosphere rather than the fossil fuel itself (which provides the carbon component).
[23] These figures represent the saving as a result of the proposed change compared with the 'do nothing' scenario, assuming the same number of flights for both scenarios. They do not represent a reduction in the overall amount of CO_2 – the main factor in overall CO_2 is the growth in the number of flights; this is beyond the scope of this consultation (see Part A Section 3).
[24] Modelling air traffic requires a set of rules that will describe aircraft behaviour; tactical intervention is generally subjective by its nature and therefore difficult to describe with a set of definitive rules. The exception to this is tactical intervention for traffic in holds, on the point merge system and turning onto final approach. This is generally more predictable and can be represented by a rule set; hence it can be captured in the 'enabled fuel burn' measurement and results. Tactical shortcuts in the en-route environment are not so predictable, nor is the lateral vectoring of departures that takes them off promulgated departure routes; therefore neither is accounted for in the enabled fuel burn metric.

associated with the operation of the Point Merge system and establishing a sequence onto final approach.

7.36 The results in Table G1 do not therefore relate directly to actual fuel burn or CO_2 savings (although they provide an indication of order of magnitude). Once we have undertaken detailed design work considering all the consultation feedback, we will undertake further analysis to determine the expected effect of Point Merge on average CO_2 per flight[25]. While we are not able to quantify the benefit at this stage, we will ensure that the reduction in planned fuel means that average CO_2 emitted per flight would reduce.

7.37 Fuel efficiency for London Biggin Hill arrivals is also expected to be improved commensurately with London City arrivals; however given the limited number of London Biggin Hill arrivals there were insufficient flights in our analysis data sample to produce reliable results.

7.38 However, we can make broad assumptions to estimate the order of magnitude for this benefit: London Biggin Hill has approximately 10% of the number of flights that London City has, but these are generally smaller, more fuel efficient aircraft types. On the basis of these assumptions we broadly estimate that the commensurate benefit for London Biggin Hill arrivals would be in the region of 5% of those quoted above for London City arrivals.

7.39 London Southend arrivals from the south and east in network airspace over Kent and the Thames Estuary are also covered by this consultation; however, the impact of this change on fuel/CO_2 can only be assessed when the connectivity through intermediate and low altitude airspace is established. This is outside the scope of this consultation and hence no analysis is presented here. NATS is working closely with London Southend airport on changes to intermediate and low altitude airspace; any such changes are subject to separate design and consultation processes at a later date (see Section 11 for further details on London Southend changes).

7.40 Given the limited numbers of aircraft in these flows their exclusion from the results above would have a negligible impact on assessment of overall system efficiency undertaken at this stage. Further analysis will be possible as the detail of this proposal is developed after consultation.

7.41 The detailed design phase for Point Merge at London City, London Biggin Hill and Gatwick airports will require decisions on positioning the route within the consultation areas. These decisions will depend on operational factors, in particular safety and efficiency, and on environmental factors which may, among other things, mean considering whether flying a longer flight path to avoid a particular area outweighs the cost in terms of fuel and CO_2.

7.42 On average, adding one nautical mile to a typical Gatwick Airport flight such as an Airbus A319 at 6,000ft will result in an extra 11kg fuel burned per flight. If this was applied to all Gatwick Airport flights, it would relate to approximately 2,800t more fuel (8,900t of CO_2) per year in 2016 rising to over 3,200t fuel (10,100t CO_2) in 2025. In addition to the environmental costs, financially this

[25] Estimating the likelihood and effect of air traffic control intervention requires assessment of the detailed design; therefore this estimation cannot occur until after consultation and subsequent design work has been undertaken.

would cost the airlines (and ultimately their passengers) £1.8m per annum in 2016 rising to £2.1m per annum by 2025[26].

7.43 On average, adding one nautical mile to a typical London City Airport flight such as a two engine small jet (eg Embraer E170) at 6,000ft will result in an extra 7.3kg fuel burned per flight. If this was applied to all London City Airport flights, it would relate to approximately 700t more fuel (2,100t of CO_2) per year in 2016 rising to over 800t fuel (2,500t CO_2) in 2025. In addition to the environmental costs, financially this would cost the airlines (and ultimately their passengers) £430,000 per annum in 2016 rising to £510,000 per annum by 2025[26].

Altering routes to fly around environmentally sensitive areas rather than overhead is likely to mean more fuel burn and more CO_2 emissions because the altered route would usually be longer. In general, which should take precedence - minimising overflight of sensitive areas by flying a longer route around them, or flying the direct route overhead the area to keep the route shorter and minimise fuel burn and CO_2?

- **Flying longer routes around environmentally sensitive areas should always have greater precedence than flying overhead on shorter routes which minimise fuel burn/ CO_2**
- **Flying longer routes around environmentally sensitive areas should generally have greater precedence than flying overhead on shorter routes which minimise fuel burn/ CO_2**
- **Flying longer routes around environmentally sensitive areas should be given equal weighting to flying overhead on shorter routes which minimise fuel burn/ CO_2**
- **Flying shorter routes which minimise fuel burn/CO_2 should generally have precedence over flying longer routes around environmentally sensitive areas**
- **Flying shorter routes which minimise fuel burn/CO_2 should always have precedence over flying longer routes around environmentally sensitive areas**
- **Don't know**

What, if any, factors should be taken into account when determining the appropriate balance of flying around environmentally sensitive areas versus overhead (for instance the altitude of the aircraft may be a factor, or the frequency/timing of flight)?

Please go to the online questionnaire at www.londonairspaceconsultation.co.uk to give your answers to these questions

[26] Using a typical aviation fuel cost of £650 per tonne. Note that the figures shown are rounded.

Point Merge and fuel uplift

7.44 Implementation of Point Merge at Dublin and Oslo has identified potential issues regarding fuel uplift; this is the amount of fuel that aircraft have to carry on a journey, including the fuel for the flight plan, contingency fuel for airborne delay if there is a queue to land, and contingency for emergencies.

7.45 Airborne (holding) delay is not always required and so the fuel uplift for holding is generally considered part of the 'contingency' fuel requirement rather than the 'flight plan' fuel requirement for flying the route structure without holding. With a Point Merge system, most delay will be absorbed on the Point Merge arcs; effectively replacing today's holding in orbital stacks with distance flown along a point merge arc[27].

7.46 However, the interpretation of rules for fuel uplift can mean that, for fuel planning purposes, aircraft have to assume that they would fly along the entire Point Merge arc, when in fact they will only do that if they need to be delayed. If the Point Merge arc is counted as part of the 'flight plan' trip fuel requirement rather than as 'contingency' fuel, aircraft would have to uplift fuel for the entire Point Merge arc in addition to uplifting contingency fuel as they do today.

7.47 In reality Point Merge will mean aircraft would, on average, burn no more fuel than in today's orbital holding and the overall benefits to the terminal airspace design enabled by Point Merge will deliver an overall fuel benefit. Therefore a way needs to be found to ensure that there is not an unnecessary fuel uplift penalty when the procedures are introduced.

7.48 NATS proposes that the Point Merge arc should be considered part of the contingency fuel uplift for holding, in a similar manner to today's stack holds. Furthermore, NATS contends that, over time, fuel uplift calculations for Point Merge arrivals should reflect the practical experience of its operation. This will ensure that the PBN structures do not result in unnecessary fuel uplift.

7.49 There are, however, practical issues relating to this that need to be resolved. NATS has raised this policy issue through the FAS Industry Implementing Group (FASIIG) and CAA is now leading discussions to resolve it for the UK as a whole. Should stakeholders wish to raise matters relating to UK fuelling policy they are advised to contact the CAA Flight Operations Department. While this is an issue for the CAA, we are taking the opportunity to seek stakeholder views on the issues around fuel uplift which we will feed into our on-going design process and FASIIG discussions on the matter.

[27] NATS has a target to eliminate stack holding in normal operations by 2020 through more efficient delay absorption techniques. This will require more than Point Merge alone, for example arrival management systems to slow down aircraft early; these additional systems will not be available in 2015 when we plan for the Phase 1 point Merge airspace changes being consulted on here going live. Therefore there will still be some stack holding in the system until 2020.

Should fuel for the Point Merge arcs be considered part of the *contingency* fuel uplift, or part of the *flight plan* fuel uplift?

Please state the reasons why you believe fuel for the Point Merge arcs should be considered part of the *contingency* fuel uplift or part of the *flight plan* fuel uplift.

Please go to the online questionnaire at www.londonairspaceconsultation.co.uk to give your answers to these questions

Transition from tactical management to Point Merge systemisation

7.50 While this proposal is seeking to implement Point Merge based on RNAV1 for Gatwick, London City and London Biggin Hill arrivals in Phase 1 in 2015, the transition from highly tactical traffic management today, to a more systemised approach relying on PBN, may take some time. This means that even once in place, the Point Merge airspace may still be used tactically on some occasions, for a number of potential reasons:

- Point Merge provides a systemised airspace structure; however, keeping aircraft on prescribed routes at all times would require more than just a separated route structure. In particular, queue management will be required to ensure that aircraft do not arrive in bunches; while Point Merge can help manage busy flows, maintaining runway throughput if traffic is too bunched may require ATC to revert to more tactical working in some circumstances. Queue management will not be fully operational by LAMP Phase 1.
- ATC will still provide direct routeings tactically, where practical, during quieter periods of the day, to reduce fuel burn. As traffic levels increase towards 2025, there will be fewer quiet periods, and therefore fewer opportunities for direct routes.
- Some tactical intervention may be required for non-certified aircraft still operating within the airspace (see Section 5).
- The high levels of safety and efficiency in UK airspace are due to the experience of our air traffic controllers. Developing similar experience in a new concept of operating will take some time; during this time safety will be maintained using today's more tactical methods for managing traffic where appropriate.
- Some tactical adjustments may be necessary to ensure precise spacing between aircraft on final approach.

Point Merge would change the location of flight paths

7.51 The application of Point Merge would influence general characteristics of the new traffic patterns for both arrivals and departures.

7.52 Parts B-F present maps that show how flight paths today can be seen over the whole area of interest. This will continue to be the case; however the areas where traffic is concentrated are likely to change. Overall we expect Point Merge to mean a reduction in local impact because of the generic benefits from reduced flight path dispersal, and more continuous climb/descent as described above. However, whilst many areas would experience less impact (fewer flights overhead, or flights overhead at higher altitudes), some others would experience more as traffic patterns shift to reflect the PBN route structure and Point Merge traffic patterns illustrated in Figure G1.

7.53 Final positioning of the Point Merge airspace routes and the associated changes to other routes is not yet determined; one of the objectives of this consultation is to understand the factors to consider in determining the optimal positioning (questions relating to this are asked in Parts B-F). However, in addition to feedback on local matters, this consultation is seeking feedback on whether the *objective* of changing today's route system to one based on Point Merge is justified, given the generic benefits and impacts described in this document.

This proposal is seeking to change the way aircraft use airspace by developing a system for managing arrivals based on Point Merge, rather than the holding stacks/vectoring currently in use.

Please indicate the extent to which you support or oppose our *objective* of providing a future arrival system based around Point Merge.

Please provide any additional information you think is relevant to our objective to redesign arrival routes around a Point Merge system.

NB separate questions are provided in Parts B, C, D, E and F to identify specific local considerations relating to the positioning of the routes associated with Point Merge.

Please go to the online questionnaire at www.londonairspaceconsultation.co.uk to give your answers to these questions

8. Respite Routes at Gatwick Airport

8.1 Respite routes are where more than one route is implemented for air traffic in a particular direction. This means that all aircraft would alternate use of the routes. A schedule would be agreed, for example by time and/or day of the week, which would give the populations beneath the routes a degree of predictability around potential impact. This is illustrated in Figures G2 and G3.

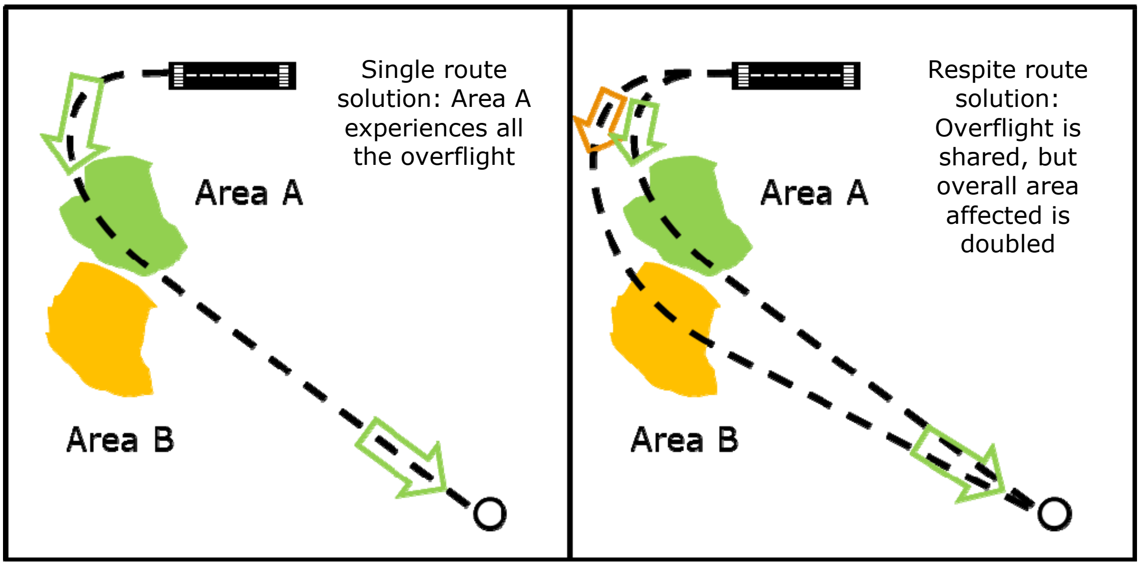

Figure G2: Respite routes concept for departures

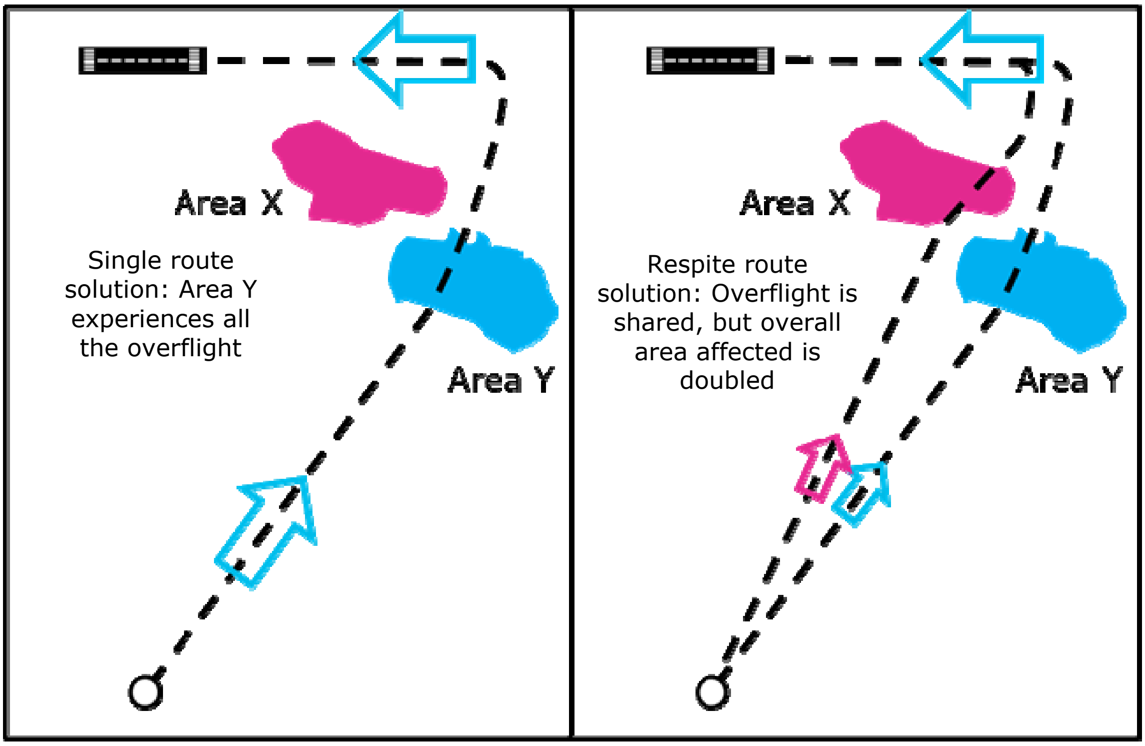

Figure G3: Respite routes concept for arrivals

8.2 PBN and Point Merge provide the opportunity to consider additional routes for arrivals and/or departures as a potential noise management solution. Respite routes are of particular value for heavily utilised routes in low altitude airspace.

8.3 Respite routes are being considered for Gatwick Airport arrivals and departures in low altitude airspace (below 4,000ft –see Part B), and because of the volume of traffic at Gatwick Airport consideration is also being given to the application of respite routes in intermediate airspace (4,000ft to 7,000ft – see Part C).

8.4 London City Airport is not a joint sponsor of this consultation exercise as they are not consulting on any changes to their route structures in low altitude airspace at this time. Above 4,000ft, the options for respite for London City traffic flows are limited, both in terms of potential benefit and scope. The traffic volumes involved are relatively small and the arrival system has in any case been designed to be over the Thames Estuary as far as possible and to line up with Runway 09; therefore there is little potential benefit in terms of alternative routes for respite.

8.5 For London City departures, the route being addressed in this consultation is subject to a complex interaction with Heathrow arrivals. Increasing the complexity with additional options for respite is not operationally desirable, and the potential benefit is limited given that the route changes in question are above 4,000ft and the route is not particularly busy (on average 4 aircraft per hour). For these reasons this consultation is not considering respite options for London City routes in intermediate airspace.

8.6 Extra routes to provide respite also have potential disadvantages as they spread noise over a larger area. They can also have operational implications: for flight systems (eg flight database capacity), for flight crew (in terms of familiarity), and for ATC (in terms of increased complexity). Additional routes for respite purposes may also be longer in which case there may be fuel and CO_2 implications – see paragraphs 7.41 to 7.43.

8.7 Parts B and C provide maps and questions to enable you to provide information on local issues that may affect where and how respite routes might be applied. Here, we would like your feedback on the *objective* of providing respite routes given the benefits and impacts discussed above.

This proposal is considering extra routes to enable periods of respite. This would mean implementing two routes in a particular direction instead of one, with a schedule for using each route to provide periods of relative respite for people living in the area beneath the routes. While this would provide respite, it would also increase the geographic area regularly exposed to noise.

Please indicate the extent to which you support or oppose the *objective* of providing respite routes, given that it potentially impacts more people in order to offer respite. Please consider this for respite routes below 4,000ft, and/or respite routes between 4,000ft and 7,000ft.

Please state the reasons why you support or oppose the *objective* of providing respite routes below 4,000ft and/or between 4,000ft and 7,000ft.

NB separate questions are provided in Parts B and C to identify specific local considerations.

Please go to the online questionnaire at www.londonairspaceconsultation.co.uk to give your answers to these questions

9. Making best use of Runway 26 at Gatwick Airport

9.1 Gatwick Airport is seeking to reconfigure all Runway 26 departure routes and their associated Noise Preferential Routes (NPRs, see paragraph 9.4) below 4,000ft to make best use of the existing runway infrastructure. This includes the three main flows that, shortly after take-off, turn to head east[28], west[29] and south[30] (maps showing these flows are provided in Part B). It also includes the little-used routes that turn left from the runway, pass east of Horsham and head east[31]. The objective of this change is to develop a route structure where the departure flight paths diverge from one another earlier, to enable a safe gap (referred to as a 'departure interval') between departing aircraft of one minute or possibly less for all departures. Currently a departure from Runway 26 heading west (the SAM/KENET departure routes) requires a two minute departure interval if following one heading south (BOGNA/HARDY) and vice versa.

9.2 A one minute departure interval would make the airport more efficient in getting departures airborne, reducing delay in the busy morning period when there is high demand for departure slots. Ultimately the airspace change would enable Gatwick Airport to plan for more departures per hour. Based on current demand profiles we would expect this to mean around 2-5 more departures per hour during such periods of high demand[32]. This would make the airport more attractive to airlines and their customers. Maintaining Gatwick's competitive position in the UK and internal market is important both

[28] Referred to in air traffic terms as the CLN, DVR and LAM departure routes
[29] Referred to in air traffic terms as the KENET and SAM departure routes
[30] Referred to in air traffic terms as the BOGNA, HARDY and SFD departure routes
[31] Referred to in air traffic terms as the WIZAD, TIGER and DAGGA departure routes
[32] Because Gatwick Airport is a single runway operation, large parts of the day have equal numbers of arrival and departures, which are interweaved – reducing the gap between departures provides no additional benefit to periods when successive departures are naturally split by the need to land an arrival in between.

for the airport and for the local communities that benefit from having a commercially successful airport as a neighbour.

9.3 Safely reducing the time gaps between departures from Runway 26 can be achieved by repositioning the low altitude departure routes. There are many options for repositioning; this consultation will help us understand what factors are important to the wider stakeholder group, before developing specific solutions.

9.4 Changing the position of a departure route would mean changing the relevant NPR to match it. NPRs define a swathe around a route where noise may be expected and are a means of displaying and monitoring the areas likely to be overflown. We recognise that being within an NPR (or not) may be of interest to stakeholders and it is therefore important to note that redesigning the Runway 26 departure routes is likely to mean changes to the NPRs.

9.5 We will also seek to reduce the size of NPRs to take account of improved aircraft performance which means they can generally climb more quickly and more accurately than when today's NPRs were drawn up. As a result of PBN, aircraft will have better navigational accuracy (so the NPR can be narrower) and will reach 4,000ft more quickly (so the NPR can be shorter).

9.6 Redesigning the low altitude routes would mean a change to the areas affected by noise from departing aircraft; some areas would experience more flights overhead, and some fewer. Overall, however, we expect the effect would be to minimise noise impact by taking on board local views – see Part B for discussion and questions relating to noise management.

9.7 This consultation is seeking feedback on whether our *objective* of changing the route system to make best use of existing runways is justified, given the generic benefits and impacts described in this document.

9.8 Answering this question does not prevent you from providing information on local sensitivities in answer to the questions in Part B; for example you may support the objective of making best use of existing runways but have strong views on areas that should be avoided. Equally you may have information that we have not considered that leads you to oppose the objective of making best use of existing runways, regardless of local issues. Please use the question below to express your view on the general principle.

9.9 The current configuration for Runway 08 departures does not require redesign to enable the airport to make best use of the existing runway infrastructure and therefore we are not considering major redesign of Runway 08 departures below 4,000ft in this consultation. We are, however, still seeking feedback regarding potential noise respite options for Runway 08 departure routes (see Section 8).

Gatwick Airport is seeking to realign all Runway 26 departure routes below 4,000ft to help make best use of the existing Runway.

Please indicate the extent to which you support or oppose this *objective* to realign all Runway 26 departure routes below 4,000ft to help make best use of the existing Runway.

Please state the reasons why you support or oppose this objective.

Please go to the online questionnaire at www.londonairspaceconsultation.co.uk to give your answers to these questions

10. Effect on Fuel Efficiency for Specific Routes

10.1 While Tables G1 and G2 indicate that the overall design will produce an enabled fuel benefit, the design is not able to provide equal benefit across all routes. There are also instances where enabling the system wide fuel benefit requires changes that will make a small number of routes less fuel efficient.

10.2 Tables G4 and G5 show the estimated fuel burn effect for each route based on draft design concepts. These are based on generic aircraft type groupings which are shown in Table G3 for reference.

10.3 Final alignment of routes has not yet been established so we are not able to provide definitive results relating to the fuel effect on specific routes. However, Tables G4 and G5 provide an indication as to which routes are likely to benefit from the change, and an order of magnitude of any difference. These tables provide a 50kg per flight range of results in each category; this is to capture the potential for design decisions that affect route efficiency being made after consultation (such as those discussed in paragraphs 7.41 to 7.43). The colour coding shows green for routes/types where we expect a fuel saving and red where we expect a fuel increase.

10.4 This data has been drawn from our computer based simulation modelling. This process simulates a day's worth of flights through the region, making measurements of fuel efficiency. The reliability of the results is dependent on the number of flights in the samples because the performance of a single flight will be affected by the traffic around it, and so we need to measure a number of flights in a number of traffic scenarios to produce reliable average results.

10.5 Not all routes are regularly flown by all aircraft types, and hence Tables G4 and G5 have a number of blank boxes where there were either no flights, or an insufficient number to make a reliable measurement. Likewise the Tables exclude altogether routes and aircraft types that were not represented at all in the analysis sample. The variation of results across the same route are the results of differences in typical city pairs and typical requested flight levels between the types listed. For example, Gatwick arrivals from the west will generally benefit from the changes as a consequence of Point Merge and the associated changes to the STARs feeding into it. However, the Heavy Turboprops using the route are the exception - they would not benefit because they are generally short haul with a low requested flight level. As a consequence they would not get the full benefit of the proposal which includes more efficient procedures in the upper airspace.

10.6 NATS and Gatwick Airport recognise that airlines need to know how the final designs will perform in terms of fuel. NATS will continue to liaise with airlines during the post-consultation design process.

This proposal seeks to reduce overall fuel burn across the fleet by as much as possible even if it means some individual routes may be less fuel efficient as a consequence.

Please indicate the extent to which you support or oppose this *objective*.

Please state the reasons why you support or oppose this objective.

Please go to the online questionnaire at www.londonairspaceconsultation.co.uk to give your answers to these questions

2 Eng Heavy	3 Eng Small	3 or 4 Eng Heavy	Heavy Turboprop	Medium Aircraft	Small Heavy	Small Jets	Small/Med TP	Small/Medium Jets
A332	F900	A343	AT72	A319	A306	C510	AT43	B462
A333	FA50	A345	DH8C	A320	A30B	C550	AT45	E135
B772	FA7X	A346	DH8D	A321	A310	C560	ATP	E145
B773		A388	F50	B733	B752	C750	BE20	E170
		B744		B734	B753	CL30	D328	E190
		MD11		B735	B762	CL60	E120	F100
				B736	B763	CRJ2	PAY3	J328
				B737	B764	CRJ9	SB20	RJ85
				B738		F2TH	SW4	
				B739		GL5T		
				MD82		GLF2		
				MD83		H25A		
						LJ35		
						LJ45		

Table G3: Aircraft types matrix (ICAO designators)

Arr/Dep	Direction	Route	3/4 Eng Heavy	2 Eng Heavy	Small Heavy	Medium Aircraft	Small/ Medium Jets	Heavy TurboProp	Small Jets	All Types
Arr	From North/East (Via DET)	TIMBA3B			100 to 50	30 to -20				40 to -10
Arr	From the South East (Via KUNAV)	TIMBA3E				-5 to -55			-10 to -60	0 to -50
Arr	From the West (via GIBSO)	WILLO2D	-600 to -650	-275 to -325	-245 to -295	-115 to -165		65 to 15		-230 to -280
Arr	From the West (via SAM)	WILLO3A						30 to -20		-30 to -80
Arr	From the North (via MID)	WILLO3B				-105 to -155	-120 to -170	-15 to -65		-110 to -160
Arr	From the South West (via DOMUT)	WILLO4C			-240 to -290	-130 to -180	-40 to -90	30 to -20		-120 to -170
Dep	to the South (Runway 26)	BOGNA			-20 to -70	10 to -40				10 to -40
Dep	to the South (Runway 08)	SFD			-30 to -80	0 to -50				-5 to -55

Table G4: Enabled fuel benefit (or disbenefit) by route for Gatwick Airport traffic (kg fuel per flight)

Negative values denote a fuel saving – the greater the negative number, the more fuel would be saved. Savings are shown in green; fuel increases are shown in red

Arr/Dep	Direction	Route	Small/ Medium Jets	Heavy TP	Small Jets	Small/Med TP	All Types
Arr	From the South East (via SOVAT)	ALKIN3D	-20 to -70				-10 to -60
Arr	From the South West (via WAFFU)	ALKIN3F	-85 to -135				20 to -30
Arr	From the East (via TRIPO)	SPEAR1B	-50 to -100	-5 to -55		10 to -40	-20 to -70
Arr	From the North (via DTY)	SPEAR1K		90 to 40			90 to 40
Arr	From the North (via WAL)	SPEAR1L	-70 to -120				-70 to -120
Arr	From the North (via MCT)	SPEAR1M	20 to -30			65 to 15	40 to -10
Dep	To the South East	DVR	-90 to -140	25 to -25			-60 to -110
Dep	To the South	LYD	-70 to -120	40 to -10	-40 to -90		-40 to -90

Table G5: Enabled fuel benefit (or disbenefit) by route for London City Airport traffic (kg fuel per flight)
Negative values denote a fuel saving – the greater the negative number, the more fuel would be saved. Savings are shown in green; fuel increases are shown in red

11. Effect on Other Airports

11.1 The LAMP remit is to improve overall network efficiency; hence it focusses on the routes for the larger London airports whose flows dictate the overall system efficiency[33].

11.2 This proposal also addresses airspace used by traffic flows into and out of smaller regional airports. The effect of the proposal on these airports is described below.

Farnborough

11.3 TAG Farnborough Airport is developing its route structures. These changes are beyond the scope of LAMP phase 1 and the airport is progressing them independently. Their changes will, however, affect some of the same geographic areas covered in this London Airspace Consultation, and we would encourage you to go to www.tagfarnborough.com for details of proposals being generated by Farnborough Airport, in addition to considering/responding to this Consultation. While the design and consultation processes are separate, NATS has coordinated with Farnborough Airport to ensure that the proposed Farnborough airspace and routes will work alongside the LAMP concepts.

London Southend

11.4 LAMP Phase 1 includes some changes to Southend arrival routes in network airspace above 7,000ft where they are coincident with the proposed London City arrival route system. London Southend airport is developing a separate airspace change proposal focussed on re-establishment of controlled airspace in the vicinity of the airport; consultation on their plans is on-going. Their consultation affects some of the same geographic areas covered in the London Airspace Consultation, and we would encourage you to go to www.southendairport.com for details of proposals being generated by London Southend Airport, in addition to considering/responding to this consultation.

11.5 While the design and consultation processes are separate, NATS has coordinated with Southend Airport to ensure that the LAMP design concepts complement their proposals. Should local changes at Southend require further design/consultation in intermediate or network airspace it will be captured in LAMP Phase 2, or progressed by the airport independently in the meantime.

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[33] On the basis of traffic volume and geographic positioning, the key airports for network efficiency are: Heathrow, Gatwick, Stansted, Luton and London City. This LAMP consultation addresses Gatwick and London City arrivals and some departures; the remainder of the departures and changes at Heathrow, Stansted and Luton will be subject to further development and consultation work at a later stage.

Southampton/Bournemouth

11.6 The proposed changes at Gatwick and London City airports would have no effect on Southampton and Bournemouth operations.

London Biggin Hill

11.7 London Biggin Hill Airport uses the same arrival route system as London City. This will remain the case under the LAMP proposal.

11.8 London Biggin Hill has been involved in the Stakeholder Engagement Process throughout LAMP, is aware of the RNAV1 localised mandate for London City arrivals and is content for airways arrivals to route via the proposed Point Merge system over the Thames Estuary.

Manston

11.9 Manston ATC has been involved in the Stakeholder Engagement Process throughout LAMP. Manston has assessed the en-route CAS required over the Thames Estuary for the Point Merge arrival structures and concluded it will have negligible impact on their operation. The LAMP team is continuing engagement with Manston and procedures to safeguard their operation given potential LAMP impacts on their holding facilities are being considered as part of the on-going design process.

12. Effect on Military Airspace Users

12.1 The wide areas illustrated in other parts of the consultation document are largely contained within existing CAS boundaries and so we expect the changes to have no significant effect on military operations. The only exceptions are lowered CAS over the English Channel, the Thames Estuary and part of Kent (see paragraphs 13.2-13.3). NATS has liaised with military stakeholders; the key operating requirements of military airspace users have therefore been considered and accommodated where possible within the proposal.

13. Effect on General Aviation

13.1 This proposal has the potential to affect General Aviation (GA) in two ways: by revising CAS boundaries and by restricting GA access to CAS.

Revision of Controlled Airspace Boundaries

13.2 The proposal is largely contained within existing CAS. However, there are two areas where it is proposed to lower the controlled airspace, shown in Figure G4 and G5. Figure G4 shows lowered airspace over the Selsey Bill and the English Channel; this is required to enable Gatwick arrivals from the south to turn towards the airport earlier. This additional CAS is being consulted on by LAMP for Gatwick arrivals; however, a wider area that also incorporates this proposed LAMP CAS is being considered for development by Farnborough airport. This is part of a separate proposal to change the airspace and routes utilised by their traffic. Stakeholders are therefore encouraged to go to www.tagfarnborough.com for details of proposals being generated by Farnborough Airport, in addition to considering/responding to this LAMP consultation.

13.3 Figure G5 shows lowered airspace required to accommodate the Point Merge system for London City. Additional CAS in the Southend area is being considered as part of a separate consultation being undertaken by London Southend Airport. Stakeholders are therefore encouraged to go to www.southendairport.com for details of proposals being generated by them, in addition to considering/responding to this LAMP consultation.

13.4 Given that this lowered airspace is largely surrounded by existing Class A airspace at similar or lower altitudes, we are proposing to make it Class A as this will minimise the complexity of the airspace structure. GA has been engaged through NATMAC[34] representatives throughout the development process and as a result of this engagement NATS does not expect these areas to have a significant impact on GA operations. However, we are open to considering a lower classification of airspace if there is justification for the additional complexity; we therefore encourage any users of this airspace to respond to the consultation with details of the type and frequency of operation that may be affected.

13.5 We are seeking to ensure that the GA community also benefit from the implementation of PBN. To achieve this aim we will seek to rationalise existing controlled airspace boundaries and release some areas of CAS to a Class G classification where appropriate, given the requirement to ensure the safety and efficiency of the controlled airspace structure. As this consultation is being undertaken before the detailed design has been finalised (see Part A) we are not yet able to determine what areas may be released. NATS will liaise with the GA user groups represented on NATMAC and with relevant local units during the post-consultation design process. This liaison will continue for both LAMP Phase 1 and Phase 2, to ensure that any surplus CAS is released.

13.6 There are no proposed changes to Class D airspace.

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[34] National Air Traffic Management Committee – see www.caa.co.uk/NATMAC

This proposal is seeking to lower some areas of controlled airspace to accommodate arrival flows

To what extent would the proposed changes affect General Aviation (GA) operations? Would they have a large impact, a medium impact, a small impact or no impact at all?

If you believe it would have an impact, please describe the operation that would potentially be affected.

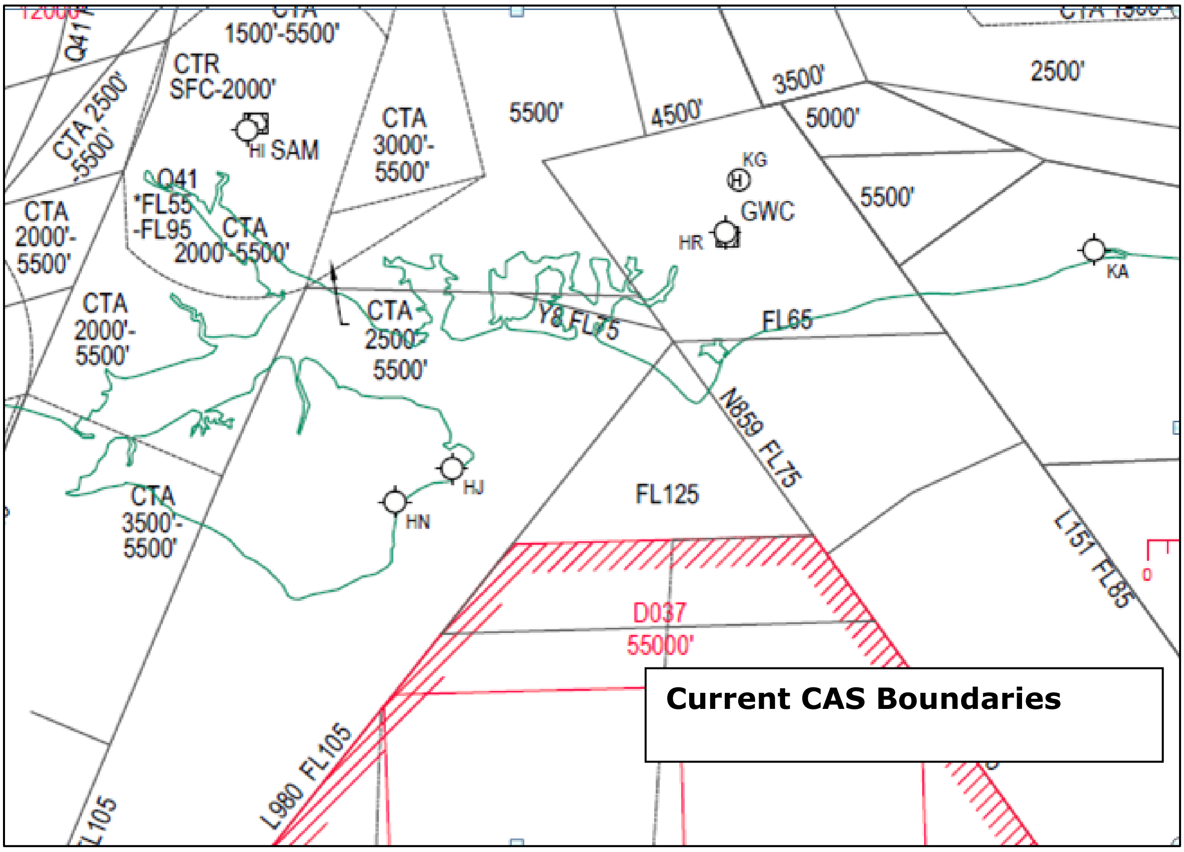
Please go to the online questionnaire at www.londonairspaceconsultation.co.uk to give your answers to these questions

Access to CAS

13.7 It is expected that the CAA will issue a local area mandate for Gatwick Airport and London City traffic to be RNAV1 certified (see Section 5). However, aircraft wishing to transit CAS in the vicinity of these airports, but not inbound or outbound to the airports, will not be affected by the RNAV requirements.

Please provide any other information that you feel is relevant to the on-going development of the airspace covered by this consultation.

Please go to the online questionnaire at www.londonairspaceconsultation.co.uk to give your answers to these questions



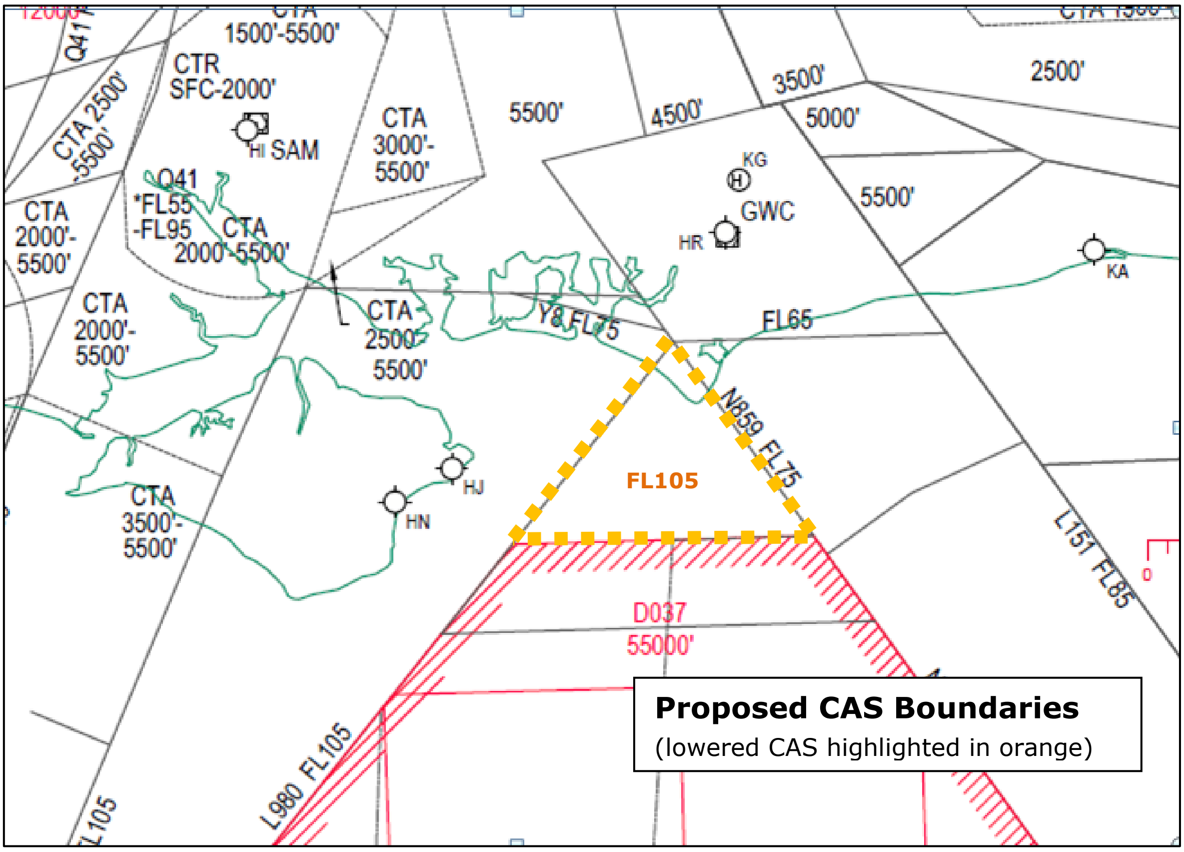


Figure G4: Current and Proposed CAS for Gatwick Arrivals over the English Channel and Selsey Bill

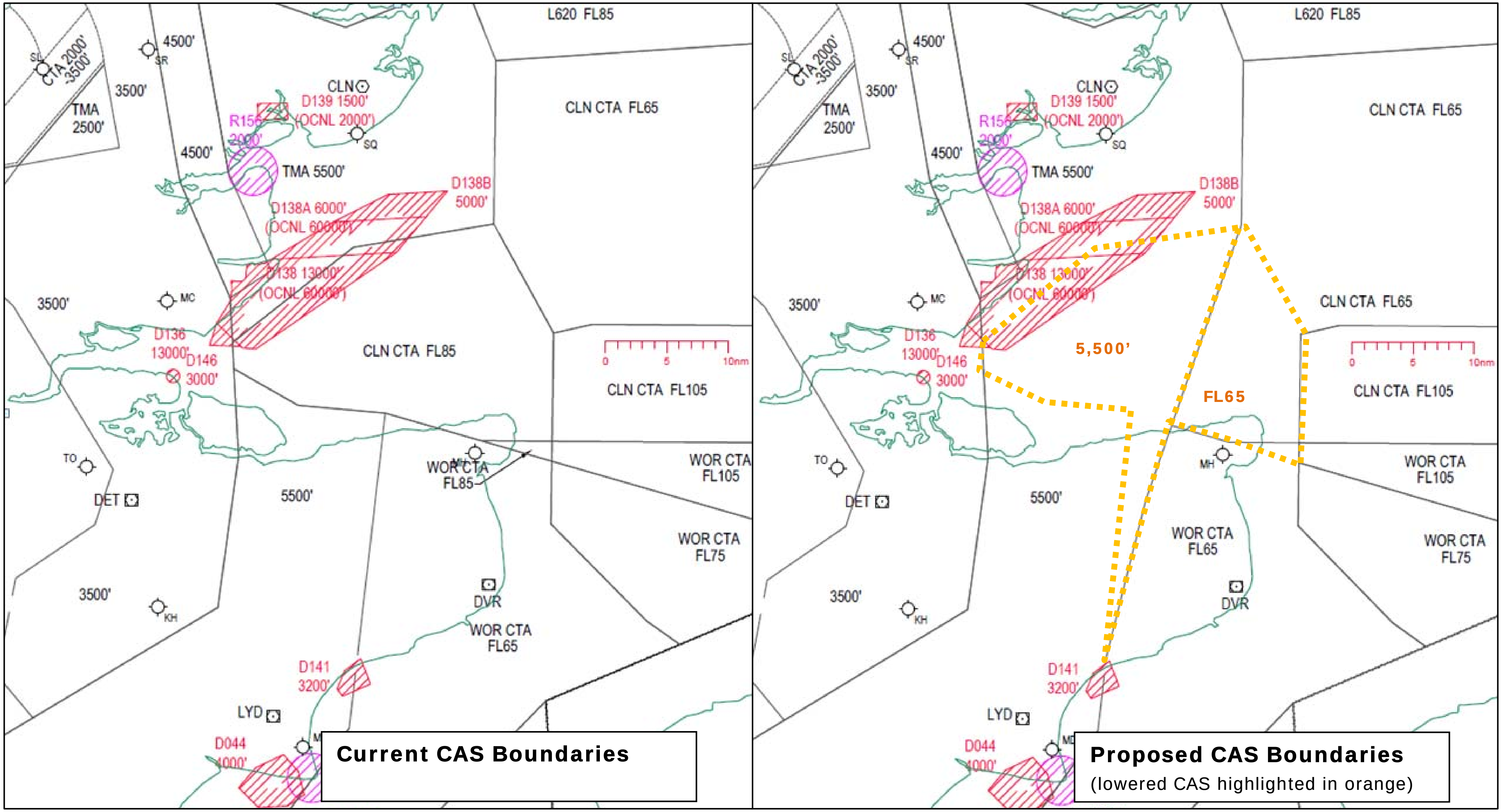


Figure G5: Current and Proposed CAS for London City Point Merge over the Thames Estuary

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