

LONDON AIRSPACE CHANGE – GATWICK LOCAL AREA CONSULTATION

Issue 1, May 2014



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1 Introduction

- 1.1 Airspace is a precious national resource, and how we use and manage it is a matter of great responsibility. The expertly controlled passage of aircraft ensures safety and keeps aircraft flowing efficiently - and the more efficient the airspace system is, the more we can potentially minimise its effect on the environment.
- 1.2 This means that, from time to time, the organisations responsible for managing our airspace will make proposals for changes to the use of existing airspace structures in order to enhance safety and improve efficiency. These proposals are usually subject to consultation and when they change the flight paths for aircraft flying at low altitudes, that consultation is open to members of the public to provide feedback.
- 1.3 This consultation follows on from the consultation that we (Gatwick Airport Ltd) ran with NATS¹ between October 2013 and January 2014; this was referred to as the London Airspace Consultation. That consultation aimed to uncover local requirements to take into account in the on-going design process. It ran relatively early in the design process, before the detailed options for route alignments had been fully considered. The consultation therefore presented the corridors within which we are seeking to position the new routes, described the potential effect of a route overhead and asked for local views on what factors should be taken into consideration in the development of the design².
- 1.4 This was an effective way of describing potential effects across a wide area and ensured that we captured local requirements across a range of options. However, it did not allow the consultation to cover all the measurable environmental analysis, known as 'environmental metrics'.
- 1.5 These environmental metrics could only be calculated after the designers have assessed the feedback from the earlier consultation. The feedback assessment has now been done, and the designers have identified a number of design options upon which the detailed environmental analysis has been performed to determine the effect of each option on these environmental metrics.
- 1.6 This follow-on consultation presents these metrics; in particular noise contours and footprints³, and population counts for the Noise Preferential Routes (NPRs⁴) which are used to ensure that aircraft fly the routes they are supposed to.

1 NATS is a separate company responsible for the network of air routes across the UK that joins airports with one another. Individual airports are responsible for the low altitude routes in their vicinity, such as those being consulted upon here.

2 The London Airspace Consultation Material and initial feedback report is available at www.londonairspaceconsultation.co.uk

3 See Section 4

4 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. They are defined in the UK AIP (see Appendix A) and Gatwick's are approved by the Secretary of State for Transport. NPRs are generally defined up to 4,000ft, above which aircraft are allowed to fly over areas outside the NPR swathe. Further detail on the format and function of NPRs is presented in Paragraphs 4.11 to 4.15.

- 1.7 These environmental metrics are affected by the route usage, which would in turn be affected by respite options. This follow-on consultation therefore also covers relevant respite options⁵.
- 1.8 This follow-on consultation also offers the opportunity to cover areas not captured in the initial design process. In particular, the feedback from local stakeholders has highlighted potential optimisation of one route segment that was beyond the original scope of the proposal, but this has since been reassessed and identified as potentially beneficial. This follow-on consultation therefore also covers some additional geographical areas.
- 1.9 Likewise, since the initial London Airspace Consultation we have identified some other potentially favourable options which would require adaptation of the Department for Transport (DfT) noise abatement requirements. These options are also presented in this consultation so that we can help ensure that interested parties have had the chance to feedback and influence all parts of the developing proposal.
- 1.10 This introduction to the follow-on consultation provides:
- An overview of the areas covered by this consultation so that you can identify which parts may be of interest to you
 - Context for the consultation, including the strategy and legislation driving the proposed changes, the legal framework determining how changes should be made, and the effects the proposed changes might have
 - A summary of the development process, describing how the proposed changes fit with on-going development of surrounding airspace; the design work so far; the consultation process and how we will use the feedback we receive; and what happens next
 - How to feedback your views on the questions presented in this consultation
- 1.11 We have endeavoured to describe the proposals in plain English, however, airspace structure and usage is a technical subject and it is therefore necessary to use some technical terms. A glossary is provided at Appendix B.

Consultation on matters affecting DfT policy

- 1.12 The Department for Transport (DfT) is responsible for the noise abatement procedures at Gatwick Airport. These were made under Section 78 of the Civil Aviation Act for the purpose of limiting or mitigating the effect of noise. This includes the definition of Noise Preferential Routes for departures, and the minimum distance from the airport at which arrivals should join final approach at night.
- 1.13 The noise abatement procedures have remained unchanged since the late 1990s. This consultation proposes potential changes to/exemptions from some of the existing policies, where we believe that modern aircraft performance and airspace design standards mean that the existing policies may not be optimal.

⁵ Respite refers to a route system where flight paths are shared across two or more routes on a predictable basis, rather than aircraft following one route all of the time. Whilst this therefore offers periods of predictable respite from noise, it does mean that more people are exposed to noise. For more background on respite and Governmental views on its application see the DfT Air Navigation Guidance (listed in Appendix A).

- 1.14 As noise abatement procedures were made under legislation, the DfT would need to exercise statutory powers in order to change them. In order to inform its consideration and decision, we intend to share any responses on relevant points with the DfT.

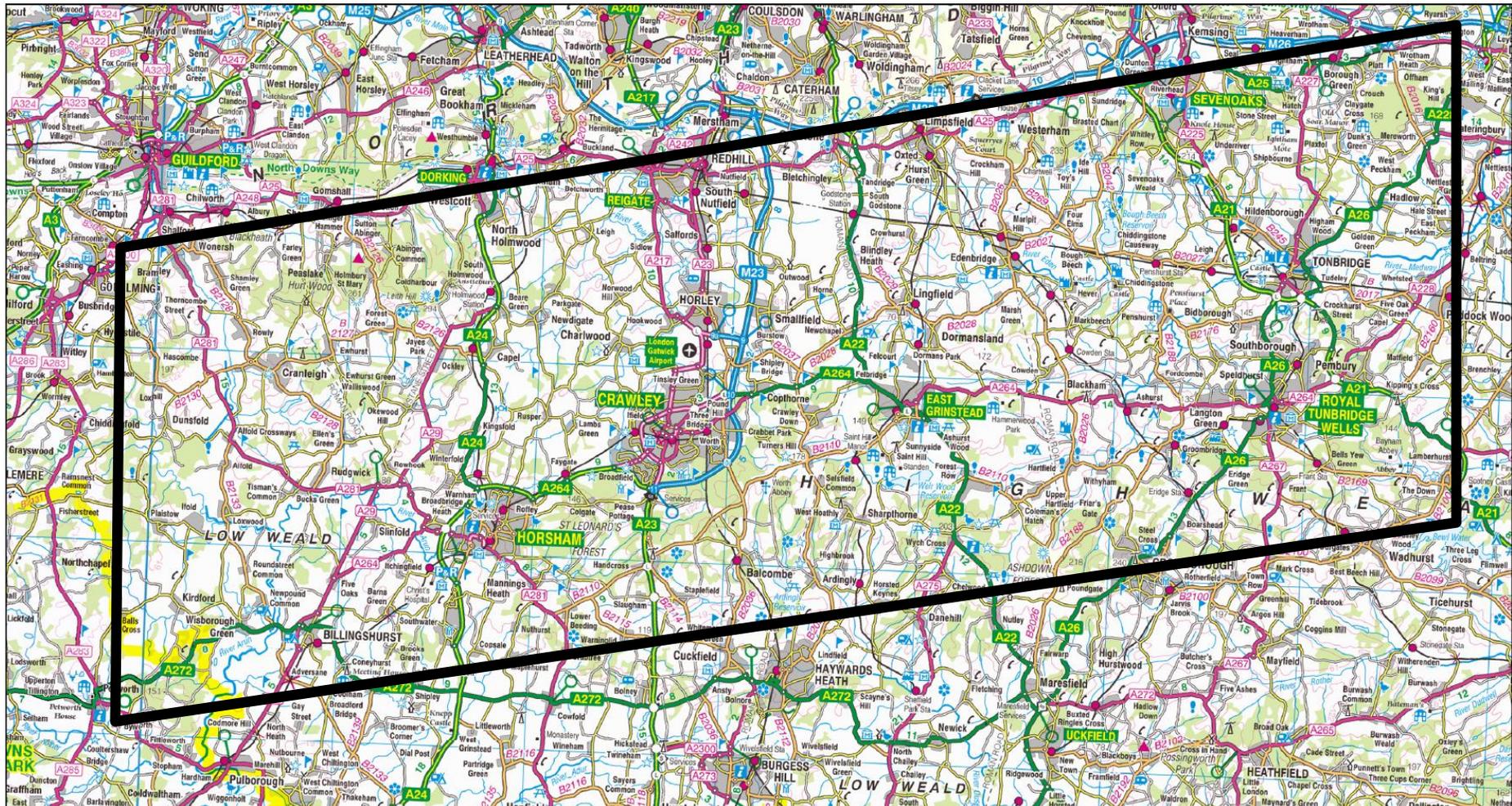
2 Consultation Overview

- 2.1 This section provides an overview of what we are consulting upon, and potentially affected areas. This is provided to help stakeholders identify areas of interest. A stakeholder is any group or individual with an interest in the proposed change.

Consultation area

- 2.2 Figure 1 overleaf shows the geographic area affected by the low altitude options being presented in this consultation. Places within the black box are all potentially affected by one or more of the options presented in this consultation. This means that more air traffic may be positioned directly overhead some places in the future, and less overhead other places.

Figure 1: Consultation area



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This is a generic consultation area covering all the locations which are *potentially* affected by the environmental metrics and noise abatement procedures discussed in this document. However, not all areas within the consultation area are directly affected, particularly around the fringe. The generic consultation area has been drawn in this way for simplicity.

3 Context and Background to the Proposal

3.1 This section describes the context for this follow-on consultation; it introduces important terminology, the objectives of the proposed changes and how this fits into the UK's Future Airspace Strategy (FAS). This section also describes the relationship between this consultation, on-going technical trials and the long-term proposals for a second runway at Gatwick. The legal framework that determines how changes should be made is presented in Appendix C.

Runway Directions

3.2 The wind direction on any given day (or hour) dictates which direction the runway is used for take-off and landing. This in turn has a major influence on the flight paths in surrounding airspace.

3.3 Our main runway is, for aviation purposes, considered as two different runways depending on the direction in which aircraft take off and land. This is because there are separate routes and procedures for the flights arriving and departing in different directions⁶; we refer to these routes by the runway direction to which they apply.

3.4 If the wind is from the west, aircraft take off and land in a westerly⁷ direction. This means that departures take off heading to the west of the airport and arrivals line up towards the airport from the east. When the runway is used in this direction it is referred to as Runway 26 (RWY26) because the heading the aircraft fly is 260°.

3.5 If the wind is from the east (less frequent), aircraft take off and land in the opposite direction using Runway 08 (RWY08). Because the prevailing wind is from the west the split in runway usage is around 73% for RWY26 and 27% for RWY08⁸.

Route Names

3.6 The system of routes used air traffic control is defined around points in the sky which have codenames made of 3 or 5 letters e.g. BOGNA, ADNID, SFD. Sometimes these codenames refer to nearby places (eg the point BOGNA is near Bognor Regis, SFD is near Seaford). Departure routes are named according to which of these points they pass through, eg the BOGNA route passes through the point BOGNA. These route names are shown in capitals when referenced in this document. The formal route definitions are found in the UK Aeronautical Information Publication – see www.ais.org.uk.

6 The same applies to the contingency runway that is used when the main runway requires maintenance. However, in the context of this consultation there is no significant difference between operations on the main runway and the contingency runway. We therefore refer only to the main runway throughout this document; but would seek to implement the changes we are consulting for both the main and the contingency runway.

7 Any wind with a westerly component, for example if it was coming from the northwest or southwest, is considered 'westerly' for the purposes of defining runway direction.

8 Source: Gatwick Master Plan, July 2012.

Future Airspace Strategy and the 'LAMP' Programme

- 3.7 Achieving operational and environmental efficiency means taking advantage of the modern technology. To ensure the UK takes full advantage of this, the CAA has been working with the aviation industry to develop the Future Airspace Strategy (FAS⁹), a blueprint for modernising the UK's airspace.
- 3.8 This proposal is part of the FAS, as it seeks to utilise modern navigation technology to improve operational and environmental efficiency.
- 3.9 Whilst we at Gatwick Airport Ltd are consulting on the changes described here in this document, they are designed to fit in with a wider programme of change referred to as the London Airspace Management Programme (LAMP) which is being run by NATS. LAMP is the FAS development of the network of routes that join Gatwick and other UK airports with each other and also to the airspace of neighbouring states.
- 3.10 The proposed changes presented in this consultation would fit in to the first phase of LAMP. Further changes may be required in the future to fit in with later phases of LAMP, and these will be developed and consulted upon separately as and when the LAMP Phase 2 design requirements are established¹⁰.

Objectives and Justification for Proposed Changes

- 3.11 The London Airspace Consultation described our objectives for changing the routes to/from Gatwick Airport; it described what we are trying to achieve and the generic benefits/impacts that would result; it then sought the views of stakeholders on these objectives. We are not re-consulting on these objectives, or on the rationale for changes already covered in the initial London Airspace Consultation; however the key elements are described here again for reference only.
- 3.12 The proposed changes covered in this consultation are seeking to utilise modern Performance Based Navigation (PBN) to optimise routes for operational and environmental benefits.
- 3.13 Operationally we at Gatwick Airport Ltd are seeking to make best use of existing runway capacity. Aircraft taking off one after another have to be separated by either one or two minutes, depending on how soon after take-off the aircraft head in different directions. Making best use of the runway means designing routes which enable us to safely use a one minute interval as often as possible. This is specifically an objective relating to routes heading west and south from RWY26, as the other route – including all from RWY08 – already enables use of a one minute interval where feasible.
- 3.14 This proposal would enable RWY26 to become as efficient as RWY08 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 us to accommodate more departures per hour from RWY26. Based on current demand profiles we would expect this to mean around 2-5 more departures per

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

10 Details of the LAMP phasing can be found in Part A of the first consultation document produced for the London Airspace Consultation, available at www.londonairspaceconsultation.co.uk

hour during such periods of high demand¹¹. 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 for the airport and for the local communities that benefit from having a commercially successful airport as a neighbour.

- 3.15 Environmentally we are also seeking to utilise PBN to improve noise management, as it provides the opportunity to refine the application of the following techniques:
- Positioning routes away from populated areas and potentially other noise sensitive areas¹²
 - Creating respite routes
- 3.16 Avoiding overflight of one area means overflight of neighbouring ones; for example avoiding overflight of a town would almost always mean flying instead over surrounding countryside which may be valued for its relative tranquillity¹³. Equally, respite routes mean shifting the impact to other areas for some of the time, increasing the overall number of people affected by noise.
- 3.17 We have continued to work on design options to address these objectives since the London Airspace Consultation. We have identified the following proposed changes that require further consultation for the reasons described in Paragraphs 1.5 to 1.9, and which are therefore described in this consultation:
- Options for RWY26 departure routes and associated NPRs for flights heading to the south (replacing today's RWY26 SFD, BOGNA and HARDY¹⁴ departure routes) – this includes options for realignment and options for respite
 - Realignment of the RWY08 departure route and associated NPR for flights initially heading to the east (replacing today's RWY08 LAM, CLN and DVR routes)
 - Night-time respite options for arrivals to RWY26 and RWY08
 - General re-centring, shortening and narrowing of existing NPRs and their associated swathes, to take account of changes to flight path concentration as a result of the switch to PBN routes implemented in November 2013.
- 3.18 Each of these is discussed in detail in Sections 6 to 10 of this document respectively; maps are provided in separate documents so that they may be considered alongside the text. The text document may be printed; however the map document is best viewed on a screen.

11 Because Gatwick Airport is a single runway operation, large parts of the day have equal numbers of arrival and departures, which are interleaved – reducing the interval between departures provides no additional benefit to periods when successive departures are naturally split by the need to land an arrival in between.

12 There is no formal definition of a 'noise sensitive area'; it is a deliberately open term as we believe a purpose of consultation is to identify if there are specific local areas for which there is a rationale for it being particularly noise sensitive, and therefore requiring special consideration in the design of low altitude routes.

13 Route positioning is limited by aircraft manoeuvrability. Aircraft fly at high speeds; this limits how tightly, and how often, aircraft can turn in order for the route to be considered flyable and safe (this is governed by international design standards); hence avoiding one sensitive area can often mean overflying another.

14 See Paragraph 3.6 for a description of the route naming convention.

- 3.19 This text document presents specific questions about the options, and we have provided an online form for you to provide feedback on each question – this can be found via our consultation website at www.gatwickairport.com/gatwickairspaceconsultation. Questions in this consultation document are highlighted with a yellow background.

The ADNID PBN Trial

- 3.20 There is an on-going trial at Gatwick to develop the technical assurance for PBN routes that diverge shortly after take-off¹⁵. This is referred to as the 'ADNID' trial and is specifically testing PBN criteria for separating aircraft on routes that diverge by 20° approximately 2 nautical miles¹⁶ after taking off.
- 3.21 This trial has so far generated enough data to enable us to develop the design options presented in this consultation. However more data is required to provide the full technical assurance required to support an implementation; therefore the trial continues to run in parallel with this consultation as further data is collected. Further details of the ADNID trial can be found on our FAQs page at www.gatwickairport.com/gatwickairspaceconsultation.
- 3.22 Whether the route option we choose to progress after considering the feedback from this consultation is similar to the trial will depend on a number of factors, including stakeholder views on which route option provides the optimal environmental solution. Community representatives that have an area of responsibility spanning all the options have a particularly important role to play, as they will be able to identify which of the options provides the best balance of effects.

Long term runway development

- 3.23 Any development of runways arising from the Airports Commission¹⁷ report (chaired by Sir Howard Davies) will eventually require further changes to the UK's airspace system. However, the development of runways does not happen quickly; the Airports Commission report is due in 2015 and any recommendations made will only be the start of the process. Adoption of any recommendations, design, assessment, planning application and construction processes all take time; if/when the Government decides to progress new runway development we assume that any new runways will not be operational before 2025.

15 Technical assurance work is often run in parallel to consultation exercises and does not pre-empt the outcome of consultation. DfT guidance allows for trials to be run in parallel with ACP processes where they are proving to be successful.

16 Aviation measures distances in nautical miles. One nautical mile (nm) is 1.852 kilometres (km). One road mile ('statute mile') is 1.609km, making a nautical mile about 15% longer than a statute mile. Aviation terms are therefore defined in nm with the exception of NPR swathes which are historically defined in km; this document follows the historical precedent and so switches between nm for air route distances and km for NPR swathes as appropriate.

17 See www.gov.uk/government/organisations/airports-commission for details

- 3.24 This consultation is about proposed changes to meet short-to-medium term demands by providing an airspace system to help the UK meet the FAS and European requirements, and making best use of our existing runway.

This consultation does not relate to, nor does it take into account, potential development of additional runways at Gatwick or any other airport.

- 3.25 The breadth of future airspace changes associated with the Airports Commission recommendations will be entirely dependent on whatever option is chosen by the UK Government. Any such changes would be the subject of their own change processes and a full public airspace consultation at a later date.

4 Airspace Change Metrics and Consultation Scope

- 4.1 The Civil Aviation Authority (CAA) publishes guidance on the process for airspace change – referred to as CAP725 (see Appendix A). This defines the noise measurements, ‘metrics’, that need to be considered when consulting and proposing changes to flight paths.
- 4.2 There are two key measures for routes at low altitude: Leq contours for assessing daytime effects, and SEL footprint for assessing night-time effects. This section provides an overview of these metrics, however for further detail see CAP725. This section also describes how we at Gatwick Airport Ltd are dealing with other environmental metrics, in particular population counts for NPR swathes.

Leq Contours

- 4.3 Leq is a measure of the average noise taking into account all Gatwick flights within the time period 07:00-23:00¹⁸.
- 4.4 Leq is represented by noise contours that show the level of average noise throughout the day; it therefore takes account of the frequency of flights as well as the extent of noise generated by individual flights. The size of the contours is generally dictated by the overall number of flights and the type of aircraft. The shape of the contours is generally dictated by the routes that these flights follow.
- 4.5 Government and CAA guidance require contours to be produced to a 57dBA level (see Appendix A for references). This level has been empirically linked with the onset of significant community annoyance, and is therefore a key decision-making metric relating to daytime noise.

SEL Footprints

- 4.6 SEL is a measure of the noise from a single aircraft.

¹⁸ This is a nominal daytime period specified for the Leq metric. Definitions of day-time and night-time operations will vary as a result of where/how the definitions are being applied and will often take into account operational constraints. There is no standard definition for day-time or night-time for use in all circumstances, and therefore this document refers to a number of different day/night-time definitions depending on the context.

- 4.7 SEL is represented by footprints which are used to assess potential noise effects at night (23:00-07:00), where the focus is on the noise from individual flights rather than the fleet as a whole.
- 4.8 CAA guidance requires footprints to be produced to a 90dBA level. This level has been empirically linked with the potential for sleep disturbance, and is therefore a key decision-making metric relating to night-time noise.

Decibels

- 4.9 The unit used for both the Leq and SEL noise metrics is the decibel (dBA). However it is important to note that whilst they both use the decibel unit, they are measuring noise in different ways and therefore it is not appropriate to compare decibel values as calculated in a noise contour with one for SEL, or vice versa.
- 4.10 The noise analysis for the London Airspace Consultation was undertaken using a further noise metric referred to as 'Lmax'; this provides an indication of the maximum noise that may be experienced from a flight directly overhead. Lmax is also measured in dBA. Like SEL, Lmax values are not directly comparable with the Leq.

Population counts for Noise Preferential Routes (NPRs)

- 4.11 NPRs currently consist of a swathe extending 1.5km either side of departure route 'centrelines'¹⁹, the total swathe being 3km wide. NPRs end as aircraft reach either 3,000ft or 4,000ft, depending on the route in question and time of day. Once the aircraft have reached the applicable altitude air traffic control may instruct aircraft onto a path that differs from the published route; this is done for reasons of safety or efficiency.
- 4.12 All NPRs are defined to 4,000ft for use at night, although some have the ceiling reduced to 3,000ft in the daytime²⁰. For simplicity this consultation focusses on the full NPR definitions up to 4,000ft. The daytime lowering of the ceiling for some routes is to ensure that air traffic control can safely manage the interaction of the Gatwick flight paths with those on neighbouring routes into and out of Heathrow. This operational requirement remains regardless of the outcome of this consultation and the development of our proposal; therefore the daytime variation in the ceiling will remain on those routes where it applies today.

¹⁹ The NPR *centrelines* is defined as a single line which in principle should match the published route that aircraft are required to fly. Public interest tends to focus on the NPR *swathe*, which is the area defined around the centreline within which aircraft would normally be expected to fly whilst below 4,000ft. This swathe accounts for a degree of variation in the flight paths because of factors such as different navigational capabilities and the effects of weather.

²⁰ The 4,000ft ceiling applies:

(a) between 23:30 and 06:00 hours (local time) to all take-offs, and

(b) between 06:00 and 23:30 hours (local time) to:

(i) all departures from Runway 26, other than those routing via KENET or SAM.

(ii) take-offs from Runway 08 routing via SFD.

Between 06:00 and 23:30 hours (local time) a 3,000ft ceiling applies to aircraft which have taken off from RWY26 via SAM/KENET or from RWY08 on all routes other than SFD. This definition is adapted from the conditions in the UK Aeronautical Information Publication – (see Appendix A).

- 4.13 Each NPR has an associated swathe defined around it which is a means of displaying and monitoring the areas likely to be overflown. As such they give an indication of where noise impact is likely to be most significant. However note that NPR swathes do not indicate a limit to potential noise impact – noise from aircraft within the NPR swathe can travel to areas beyond its boundaries. The extent to which this is significant can vary with weather conditions, geography and the individual circumstances of the person hearing the noise. Areas beyond the NPR swathe may also experience noise from aircraft overflying above 4,000ft.
- 4.14 Our NPRs are defined in the noise abatement procedures laid down by the Secretary of State for Transport. We at Gatwick Airport Ltd monitor all departure flight paths below 4,000ft to check that they stay within the NPR swathes. Flights that routinely go outside the NPR swathe are identified and we contact the airlines involved so that they can investigate the cause, and revise their operations to ensure compliance to the NPR in the future.
- 4.15 Aircraft climb at different rates, so the length of the NPR is defined by the latest theoretical point that an aircraft may reach 4,000ft; most aircraft reach 4,000ft somewhat earlier. For these reasons there are many flight paths (above 4,000ft) that can be seen outside the NPR swathe in the maps presented alongside this document.
- 4.16 We are seeking to reduce the width and length of NPR swathes to take account of technical benefits of PBN, modern aircraft climb performance and the benefits of the wider airspace redesign that would enable aircraft on some routes to climb more continuously. This all means that aircraft will have better navigational accuracy (so the NPR can be narrower) and are more likely to reach 4,000ft earlier (so the NPR can be shorter).
- 4.17 The Gatwick routes have recently been updated to take account of the modern PBN systems that almost all aircraft now have on board, and which the CAA will mandate in the near future. However, the NPRs and their associated swathes have not been updated and remain as they have for a since the 1990's.
- 4.18 The NPRs at Gatwick Airport are defined by the DfT, who are considering how to update them to take account of the modern PBN routes now in place here (and, soon, at other airports too). We are presenting data in this consultation to determine stakeholder views on the appropriate definition for Gatwick NPRs. In order to inform its consideration and decision on NPR policy, we intend to share any responses on this point with the DfT (see Paragraph 1.13 - 1.14).
- 4.19 Work to date by the CAA on behalf of the DfT suggests that an NPR swathe width of 1.5km in total (750m each side of the route centreline) appropriately captures the track variances seen on PBN routes - half the width of the existing NPR swathes. This is, however, work in progress and so DfT may yet decide on a definition that is wider or narrower than 1.5km.
- 4.20 The spread of flight paths around the route centreline varies greatly depending on whether the route is going around a turn or is on a straight leg. A swathe of around 750m either side of the route centreline would be expected to cover most aircraft making large turns (90° or more). However on straight segments or shallow turns (e.g. 20°), PBN means that flight path variations are covered by a swathe that can be as little as 100m either side of the route. We therefore present data showing the change to the population count for a range of

potential NPR swathe definitions for proposed new routes, and for existing PBN routes with which the historic NPR definitions are no longer consistent.

Respite options and NPR swathe population counts

- 4.21 The London Airspace Consultation sought stakeholder views on the principle of providing respite routes, which share the impact of air traffic across different geographic areas.
- 4.22 The feedback from the London Airspace Consultation indicated that opinion was fairly evenly divided, between those seeking to see it applied and those against exposing more areas to noise. In general those areas already exposed to noise favoured respite options, and those that are less exposed to noise were more likely to be against.
- 4.23 Because respite options mean more routes and therefore more NPRs, they mean higher NPR swathe population counts than options where there is a single route used all the time. This consultation is therefore presenting some specific respite options along with population count data to gain an understanding of stakeholder views of the balance between offering respite and increasing the number of people living within NPR swathes.

Respite Options for arrivals

- 4.24 In this consultation we also present options for night-time respite on arrivals. The final approach to the airport is very predictable, aircraft lining up with the runway and flying consistent flight paths down to it. Flights generally join final approach at altitudes between 3,000ft and 5,000ft. This final approach is fixed, as the technology most aircraft currently rely on requires aircraft to establish and stabilise on a path lined up with the runway for safety reasons.
- 4.25 Before joining the final approach, flight paths for arrivals are inherently more variable than those for departures. The introduction of PBN routes for arrivals would result in arrivals being more concentrated than they are today. However, unlike departures the effect of PBN on arrivals is expected to be much more subtle at low altitudes; controllers would still need to manually direct aircraft from the PBN arrival routes to ensure safety and a steady stream of arrivals to the runway. As a consequence there are no NPRs defined for arrivals and no consistent basis for performing population counts; hence none are presented in this consultation.
- 4.26 The DfT noise abatement procedures (see Paragraph 1.12-1.13) include a requirement between the hours of 23:30 and 06:00 not to join the extended runway centreline below 3,000ft or closer than 10nm from touchdown. The intent of this requirement was to prevent aircraft flight below 3,000ft until established on the final approach, whenever a continuous descent approach (CDA) could not be achieved - the closer to the runway an aircraft joins the final approach, the lower an aircraft would be whilst in level flight.
- 4.27 As part of the on-going design work in response to the London Airspace Consultation, Gatwick Airport Ltd and NATS (who are responsible for the network of routes beyond the immediate vicinity of the airport) are developing an arrival route system based on PBN. The main arrival routes being developed following the London Airspace Consultation meet the above DfT requirements.

- 4.28 In response to London Airspace Consultation feedback we have also developed options for providing a night-time respite for communities under the main concentration of arrival flight paths. However the respite options would mean joining final approach within 10nm of touchdown, and would therefore require adaptation of the DfT noise abatement procedures. We believe this is justified because at night there are fewer aircraft in the sky and therefore the airspace system is inherently more flexible; this means that CDA is normally achievable. In addition, the proposed PBN arrival routes would mean a more predictable flight path which would facilitate flight crew in planning a CDA. For these reasons we believe that the DfT requirements with respect to joining final approach at night are an unnecessary limitation to future route design. Specifically this would limit our ability to implement night-time arrival respite routes that may be favoured by local communities.
- 4.29 As this joining point requirement is a noise abatement procedure made under legislation (section 78 of the Civil Aviation Act – see Appendix A), the DfT would need to exercise statutory powers to remove or amend it for the proposed night-time respite operation. We therefore present the night-time respite options in this consultation, and ask whether we should request the DfT to make the necessary changes required to enable us to operate them. Any such request would be made with our assurance that we would monitor track keeping performance of the night-time respite routes, and also continue to monitor and encourage high compliance with CDA.

Environmental metrics not covered in this consultation: Lmax and CO₂

- 4.30 In the previous London Airspace Consultation we provided Lmax figures which provide an indication of the maximum noise that may be experienced from a flight directly overhead. That consultation presented the Lmax for wide areas to help stakeholders assess the potential impact in terms of maximum noise.
- 4.31 Unlike noise, CO₂ effects do not have a local focus. The changes to one route can have an impact on the CO₂ efficiency of its neighbours and the effects are generally measured for the system, including route segments that can be hundreds of miles long (extending into airspace over mainland Europe). The range of potential effects for the wider change with reference to fuel and CO₂ were therefore covered in the London Airspace Consultation.
- 4.32 With one exception, the low altitude changes presented in this document fall within the below-4,000ft consultation areas presented in the London Airspace Consultation, and so the potential impacts in terms of fuel/CO₂ and Lmax were fully consulted on in that exercise; therefore this follow-on consultation does not cover consultation areas above 4,000ft, Lmax figures or the fuel/CO₂ effects.
- 4.33 The exception is the proposed realignment of the RWY08 departure route; additional Lmax and fuel/CO₂ information is provided for this part of the consultation.
- 4.34 The London Airspace Consultation material remains available at: www.londonairspaceconsultation.co.uk. Once we have concluded this consultation and determined which design options to take forward for our low altitude routes, we at Gatwick Airport Ltd will join with NATS to propose an overall design for Gatwick routes at all altitudes. We aim to jointly publish this proposed design in winter 2014/15.

5 Next Steps

- 5.1 The period of consultation commenced on 23/05/2014 and closes at midnight on 14/08/2014– a period of 12 weeks.

Who are we consulting?

- 5.2 We have notified the Gatwick Consultative Committee (GATCOM), MPs, County Councils and District Councils in the areas potentially affected. We have also notified all respondents to the London Airspace Consultation who provided a valid return address. In addition this consultation is open to anyone who feels they have information to help us determine the appropriate design options.

Responding to the consultation

- 5.3 You are invited to respond to this consultation via the online form available from our consultation webpage;
www.gatwickairport.com/gatwickairspaceconsultation
- 5.4 This form provides the opportunity to answer the specific questions in the consultation document, or to submit additional information via email.
- 5.5 If it is not possible to submit your response online, you may do so by post to the following address:
- Freepost RSLG ATKL LBAE
Gatwick Consultation
Ipsos MORI
Research Services House
Elmgrove Road
Harrow
HA1 2QG
- 5.6 Please be aware that we cannot guarantee responses submitted directly or indirectly by any other means of delivery will be accounted for in the consultation exercise.
- 5.7 Online responses to the consultation will be automatically acknowledged. Responses sent by post will not be acknowledged. If confirmation of receipt is required, please use a recorded delivery service.
- 5.8 We will not enter into correspondence with individual respondents on issues relating to this consultation.
- 5.9 Late responses received after the close of the consultation will be logged and stored but not analysed.
- 5.10 A summary of the issues raised in the consultation, and further details of next steps, will be provided in a feedback report published approximately two months after the end of the consultation. No personal details of respondents will be included in that document. The feedback report will be available on the Gatwick Airport Ltd and NATS websites. This report will also provide an update on subsequent steps in the development process.

Analysis of consultation feedback

- 5.11 Gatwick Airport Ltd will consider all relevant feedback, taking into account guidance from the Government and the CAA. All the feedback from the consultation will be made available to the CAA and DfT (see Paragraphs 1.12 to 1.14) as part of our airspace change proposal; this will allow them to assess independently whether we have drawn appropriate conclusions from the responses received.
- 5.12 Responses will be treated with due care and sensitivity by us and by the CAA. If you do not wish your personal data (e.g. name/full address) to be forwarded to the CAA, please make it clear at the beginning whether you wish us to make your submission anonymous to them. We undertake not to disclose personal data to any other party without prior permission. All information passed to the CAA is bound by the Data Protection Act.
- 5.13 It will be the CAA's decision whether or not to approve any proposal that we at Gatwick Airport Ltd generate following this consultation. The legal framework for the airspace change process, including the CAA's obligations, is presented in Appendix C.

Compliance with the consultation process

- 5.14 Comments regarding our compliance with the consultation process as set out in the CAA's guidelines for airspace change (see Appendix A for references) should be directed to the CAA at:

Airspace Business Coordinator – Airspace, ATM and Aerodromes
Re: Gatwick Airspace Change SID Consultation
Safety and Airspace Regulation Group, CAA House
45-59 Kingsway, London WC2B 6TE

Email: airspace.policy@caa.co.uk

NOTE: These CAA contact details must not be used for direct response to this consultation: doing this will make it unlikely that your views will be considered.

6 Options for RWY26 departures heading to the south

- 6.1 We have developed and assessed a range of options for changing RWY26 Standard Instrument Departure routes (SIDs) and their associated NPRs with a view to making best use of the existing runway infrastructure whilst also minimising environmental impact.
- 6.2 Each option involves ensuring that the routes to the west (referred to as the SAM and KENET SIDs) and the routes to the south (referred to as SFD, BOGNA and HARDY SIDs) diverge from one another by at least 20° approximately 2nm from the end of the runway or earlier. This is the minimum criterion for safely diverging routes being developed by Gatwick and NATS as part of the FAS programme (see Section 3 for details of FAS and the ADNID trial).
- 6.3 Map 1 in the separate map document shows today's PBN departure routes from RWY26. Map 2 and Map 3²¹ show today's NPR swathes and plots of aircraft flight paths for aircraft taking off from RWY26. Paragraphs 4.11 to 4.17 describe NPRs and their relationship to flight paths. It is particularly common for flights using today's southbound SIDs to be directed off the route once above 4,000ft. This is because in today's airspace the paths of these SIDs pass beneath a holding area for arriving flights. Rather than keeping the departures low, air traffic control tends to direct them further west past the hold so that they can continue climbing.
- 6.4 Note that Gatwick Airport currently has both PBN and 'conventional' versions of each departure route – the latter being the historic routes, based on outdated navigational systems. The vast majority of flights from Gatwick (more than 95% and rising) have the PBN capability and therefore can fly the PBN route versions. We therefore intend to remove the conventional alternatives along with the proposed changes covered in this consultation. Whilst the majority of flights today utilise the PBN versions of the departure routes, a percentage still use the conventional routes and so the maps showing today's flight paths and flight densities will include both.
- 6.5 Appendix D summarises the assessment of options we have considered for this runway, from which we have identified six options to bring forward into this consultation. Each of these options would have a different effect on the noise contours and footprints, and the population counts within the NPR swathe. The options and the effects are discussed in the remainder of this section.
- 6.6 In all cases the proposed routes would fit with the development of a network of PBN routes above 4,000ft, as consulted on in the London Airspace Consultation. This network development would ensure that arrival and departure routes are safely separated. In turn this would mean that aircraft on the departure routes

21 The data plots in Map 2 and Map 3 show traffic from 02/01/2014 to 09/01/2014. This sample was chosen as it was the only week during which there was consistent operation on RWY26 between the introduction of the PBN SIDs at Gatwick in November 2013 and the introduction of the ADNID trial in February 2014. Winter operations have fewer flights than the summer peak, however the pattern of flight paths in this sample has been assessed as being representative of both winter and summer operations. Furthermore, the colour key for the density plot in Map 3 has been scaled up to match the volume of flights seen in summer operations (as shown in the density plots presented in the London Airspace Consultation).

are less likely to be directed off the route once above 4,000ft, and so flight paths would be less spread out than shown in Map 2 and Map 3.

RWY26 Departures Option A

- 6.7 This option would put all traffic that currently flies the SFD and BOGNA/HARDY SIDs onto a new route that matches the 'ADNID' PBN trial (see Paragraph 3.20).
- 6.8 Option A is shown in Map 4 and Map 5, and forecast route usage is shown in Table 1 below. The centreline of this route has been designed to provide both the required 20° divergence and to avoid being directly overhead Rusper, Kingsfold, Winterfold and Warnham. Although the route would not be directly overhead these villages, the departures to the south would be nearer to these villages than they are on the existing BOGNA/HARDY route shown in Maps 1 to 3, and would therefore generally be more audible (as demonstrated by the ADNID trial, which Option A matches) .
- 6.9 Map 6a-d show the potential widths of the NPR swathe around Option A (see Paragraphs 4.11 to 4.17 for explanation of the range of widths shown). Given that the initial turn is only 20° we would expect flight paths up to 4,000ft to be within approximately 100m of the centreline in normal circumstances²². See Paragraph 6.27 for the resultant effect on population counts.
- 6.10 Map 7 and Map 8 show the forecast effects of Option A on the Leq for the years 2016 and 2020, and Map 9 shows the effect of Option A on the SEL footprint. The SFD and BOGNA/HARDY SEL footprints are shown as the baseline scenarios, as Option A would replace both routes. See Paragraph 4.3 onwards for a description of these noise metrics and see Paragraph 6.27 for the resultant effect on population counts.

22 Based on preliminary observations from the ADNID trial.

		RWY26 Option A		RWY26 Option A with respite	
Period	Route	2016	2020	2016	2020
Daytime average (0600-2300)	Existing SFD/BOGNA/HARDY SID	0	0	0	0
	Option A (SFD/BOGNA/HARDY replacement)	7	7	7	7
Nighttime average (2300-0600)	Existing SFD/BOGNA/HARDY SID	0	0	2	2
	Option A (SFD/BOGNA/HARDY replacement)	2	2	0	0
Peak hour average (0700-0800)	Existing SFD/BOGNA/HARDY SID	0	0	0	0
	Option A (SFD/BOGNA/HARDY replacement)	16	17	16	17

Table 1: Forecast average hourly route usage for Option A and Option A with Respite

Notes:

- Traffic Growth Assumptions are presented in Appendix E
- These figures relate to periods when RWY26 is in use – this is approximately 73% of the time (see Paragraph 3.5 on page 5)
- Today’s SFD/BOGNA/HARDY routes share the same initial track as traffic on the SAM/KENET routes, the latter of which would remain in use with this Option. Therefore some departures would still be seen in this area.
- If no change was made all the flights shown would remain on the existing SFD/BOGNA/HARDY routes²³.

²³ The SFD route is separate from the BOGNA/HARDY route and is specifically defined for night-time use 23:00-06:00 (local). However the alignments are similar for the portion of the routes flown below 4,000ft therefore for simplicity we have considered them together for the purposes of Tables 1, 2 and 3.

RWY26 Departures Option A with night-time respite

- 6.11 There is an option to have the southbound route aligned as per Option A for use during the day between 06:00 and 23:00^{24, 25}, but to maintain the existing BOGNA SID below 4,000ft and its NPR for use in the core night-time period, between 23:00 and 06:00. The effect of the respite option on route usage is shown in Table 1.
- 6.12 Compared to Option A without night-time respite, this option would have the following effect on the environmental metrics:
- Leq – no difference. The Option A route would still be used in the Leq period of 07:00 to 23:00.
 - SEL – instead of switching from the SFD/BOGNA/HARDY footprints to the Option A footprint, the respite option would mean that both the Option A and the existing BOGNA footprints would be relevant. The existing BOGNA footprint shown on Map 9 would remain relevant for the period 2300 to 06:00, while the Option A alternative footprint would be relevant at other times.
 - NPR – as per the SEL, both NPRs would remain, although note that the existing BOGNA NPR could be reduced in size as described in Section 10.
- 6.13 See Paragraph 6.27 for the resultant effect of respite options on population counts.

RWY26 Departures Option B

- 6.14 Option B is a variation on Option A, with the first left turn initiated later to take the route further from Warnham and Rusper than Option A.
- 6.15 This option is shown in Map 10 and Map 11 and forecast route usage is shown in Table 2. The centreline of the route has been designed to provide both the required 20° divergence and to take aircraft further from Rusper and Warnham than Option A. This would, however, mean direct overflight of Kingsfold, Winterfold and Rowhook.

24 This period has been identified as the night-time respite period because the busy period for morning departures, where the reduced departure separation is of particular benefit, starts between 06:00 and 07:00.

25 All times stated in this consultation refer to local time, rather than 'UTC' time which is used in the technical definition of airspace routes and usage restriction. It is not necessary for local stakeholders to understand the distinction in order to respond to this consultation.

		RWY26 Option B		RWY26 Option B with respite	
Period	Route	2016	2020	2016	2020
Daytime average (0600-2300)	Existing SFD/BOGNA/HARDY SID	0	0	0	0
	Option B (SFD/BOGNA/HARDY replacement)	7	7	7	7
Nighttime average (2300-0600)	Existing SFD/BOGNA/HARDY SID	0	0	2	2
	Option B (SFD/BOGNA/HARDY replacement)	2	2	0	0
Peak hour average (0700-0800)	Existing SFD/BOGNA/HARDY SID	0	0	0	0
	Option B (SFD/BOGNA/HARDY replacement)	16	17	16	17

Table 2: Forecast average hourly route usage for Option B and Option B with respite

Notes:

- Traffic Growth Assumptions are presented in Appendix E
- These figures relate to periods when RWY26 is in use – this is approximately 73% of the time (see Paragraph 3.5).
- Today’s SFD/BOGNA/HARDY routes share the same initial track as traffic on the SAM/KENET routes, the latter of which would remain in use with this Option. Therefore some departures would still be seen in this area
- If no change was made all the flights shown would remain on the existing SFD/BOGNA/HARDY routes²⁶.

6.16 Maps 12a-d show the potential widths of the NPR swathe around Option B (see Paragraphs 4.11 to 4.17 for explanation of the range of widths shown). Given that the initial turn is only 20° we would expect flight paths up to 4,000ft to be within approximately 100m of the centreline in normal circumstances²⁷. See Paragraph 6.27 for the resultant effect on population counts.

6.17 Map 13 and Map 14 show the forecast effects of Option B on the Leq for the years 2016 and 2020, and Map 15 shows the effect of Option B on the SEL footprint (note that the difference in footprints on Map 15 is almost imperceptible). The SFD and BOGNA/HARDY SEL footprints are shown as the baseline scenarios, as Option B would replace both routes. See Paragraph 4.3

²⁶ See footnote 23 on page 20

²⁷ Based on preliminary observations from the ADNID trial.

onwards for a description of these noise metrics and see Paragraph 6.27 for the resultant effect on population counts.

RWY26 Departures Option B with night-time respite

6.18 There is an option to have the southbound route aligned as per Option B, but to maintain the existing BOGNA SID and its NPR for use in the core night-time period, between 23:00 and 06:00²⁸. The effect of the respite option on route usage is shown in Table 2.

6.19 Compared to Option B this option would have the following effect on the environmental metrics:

- Leq – no difference. The Option B route would still be used in the Leq period of 07:00-23:00.
- SEL – instead of switching from the SFD/BOGNA/HARDY footprints to the Option B footprint, the respite option would mean that both the Option B and the existing BOGNA footprints would be relevant. The existing BOGNA footprint shown on Map 15 would remain relevant for the period 23:00 to 06:00, while the Option B alternative footprint would be relevant at other times.
- NPR – as per the SEL, both NPRs would remain, although note that the existing BOGNA NPR could be reduced in size as described in Section 10.

6.20 See Paragraph 6.27 for the resultant effect of respite options on population counts.

RWY26 Departures Option C

6.21 Option C involves turning the replacement BOGNA/HARDY route at the same point as Option B but by only 12°. The required 20° divergence is achieved by also turning the SAM/KENET route at the same point by 8° towards the north.

6.22 This option is shown in Map 16 and Map 17 and forecast route usage is shown in Table 3. Turning the BOGNA/HARDY replacement route by a smaller angle would keep it further from Warnham than either Options A or B. It would also avoid direct overflight of Rusper, Kingsfold, and Winterfold, but would mean more overflight of Rowhook. In addition the realignment of the SAM/KENET SID would reduce direct overflight of Okewood Hill and Ellen's Green by eastbound departures²⁹, but would increase over-flight of Walliswood and Alfold.

28 See footnote 24 and 25 on page 20

29 These villages would still be under the final approach for RWY08 arrivals.

		RWY26 Option C		RWY26 Option C with respite	
Period	Route	2016	2020	2016	2020
Daytime average (0600-2300)	Existing SFD/BOGNA/HARDY SID	0	0	0	0
	Option C (SFD/BOGNA/HARDY replacement)	7	7	7	7
	Existing SAM/KENET SID	0	0	0	0
	Option C (SAM/KENET replacement)	4	4	4	4
Nighttime average (2300-0600)	Existing SFD/BOGNA/HARDY SID	0	0	2	2
	Option C (SFD/BOGNA/HARDY replacement)	2	2	0	0
	Existing SAM/KENET SID	0	0	0	0
	Option C (SAM/KENET replacement)	0	0	0	0
Peak hour average (1000- 1100)	Existing SFD/BOGNA/HARDY SID	0	0	0	0
	Option C (SFD/BOGNA/HARDY replacement)	16	17	16	17
	Existing SAM/KENET SID	7	7	0	0
	Option C (SAM/KENET replacement)	0	0	0	0

Table 3: Forecast average hourly route usage for Option C and Option C with Respite

Notes:

- Traffic Growth Assumptions are presented in Appendix E
- These figures relate to periods when RWY26 is in use – this is approximately 73% of the time (see Paragraph 3.5 on page 5)
- If no change was made all the flights shown would remain on the existing SFD/BOGNA/HARDY routes³⁰.

6.23 Maps 18 a-d show the potential widths of the NPR swathe around Option C (see Paragraphs 4.11 to 4.17 for explanation of the range of widths shown). Given that the initial turn is less than 20° we would expect flight paths below 4,000ft to be within approximately 100m of the centreline in normal circumstances³¹. See Paragraph 6.27 for the resultant effect on population counts.

6.24 Map 19 and Map 20 show the forecast effects of Option C on the Leq for the years 2016 and 2020. Map 21 shows the effect of Option C on the SEL footprint for traffic to the south (SFD and BOGNA/HARDY) and Map 22 shows the effect of Option C on the SEL footprint for traffic to the west (SAM/KENET). The SFD and BOGNA/HARDY SEL footprints are shown as the baseline scenarios, as Option C would replace both routes (note that the difference in footprints on Map 15 is almost imperceptible). See Paragraph 4.3 onwards for a description of these noise metrics and see Paragraph 6.27 for the resultant effect on population counts.

RWY26 Departures Option C with night-time respite

6.25 There is an option to have the southbound route aligned as per Option C, but to maintain the existing BOGNA SID, and the existing SAM/KENET SIDs and their NPRs, for use in the core night-time period, between 23:00 and 06:00³². The effect of the respite option on route usage is shown in Table 3.

6.26 Compared to Option C, this option would have the following effect on the environmental metrics:

- Leq – no difference. The Option C route would still be used in the Leq period of 07:00-23:00.
- SEL – instead of switching from the SFD/BOGNA/HARDY footprints to the Option C footprint, the respite option would mean that both the Option C and the existing BOGNA footprints would be relevant; likewise for the Option C alternative and existing SAM/KENET footprints. In both cases the footprint for today's route would be relevant for the period 23:00 to 06:00, while the Option C alternative footprint would be relevant at other times.
- NPR – as per the SEL, both NPRs would remain, although note that the existing BOGNA NPR could be reduced in size as described in Section 10.

30 See footnote 23 on page 20

31 Based on preliminary observations from the ADNID trial.

32 See footnote 24 and 25 on page 20

Population count metrics for RWY26 Options A, B and C

6.27 Tables 4-6 show the effects of RWY26 Options A, B and C on population count metrics.

6.28 Table 4 compares the population counts within a range of NPR swathes for RWY26 Options A-C with the existing BOGNA/HARDY NPR swathe. This shows that all the options would reduce the number of people within the NPR swathe, in particular Options B and C. Compared to Option A, Options B and C would also have fewer newly-affected people (i.e. people not currently within the NPR swathe that would be within the realigned swathe).

6.29 Tables 5 and 6 show that the effect of the options on the noise metrics are relatively minor, with most showing minor reductions in the number of people affected. Note that we are showing only the SEL tables for the noisiest aircraft type for Gatwick (B757E) and not the most common type A319, as the analysis indicated no significant difference in the footprints and no difference in the population counts for this type.

		Population counts				
		3km wide	2km wide NPR	1.5km wide NPR	1km wide NPR	500m wide NPR
Existing BOGNA/HARDY	Total	3900				
RWY 26 Option A (SFD/BOGNA/HARDY replacement: Map6a-d)	Net change		-1200	-2400	-3100	-3400
	Newly affected		1600	900	400	200
RWY 26 Option B (SFD/BOGNA/HARDY replacement: Map12a-d)	Net change		-2400	-2900	-3100	-3500
	Newly affected		700	500	400	100
RWY 26 Option C (SFD/BOGNA/HARDY replacement: Map18a-d)	Net change		-2700	-3100	-3400	-3800
	Newly affected		400	200	100	<50
Existing SAM/KENET	Total	3600				
RWY 26 Option C (SAM/KENET replacement: Map18a-d)	Net change		-1600	-2000	-2700	-3400
	Newly affected		300	200	<50	0

Table 4: NPR population changes for RWY 26 departure options

Notes

- All figures have been rounded to the nearest 100, values below 50 are shown as '<50' rather than being rounded to 0.

- Negative values for net changes denote that fewer people would be affected by the proposed option³³.
- 'Newly affected' shows the population within the new NPR that are not within the historic NPR.
- We have not analysed reduced NPRs for the existing routes; this is because we are seeking to implement a package including both changed routes and revised NPRs; revising the NPRs on the existing routes does not achieve the operational requirements and is therefore not an option we have analysed.

Leq Contour		Population counts (see Notes)					
		57 dBA	60 dBA	63 dBA	66 dBA	69 dBA	72 dBA
Year 2016 baseline		4,500	1,500	500	200	100	0
RWY 26 Departure Option A	Total change	-100	-100	0	0	0	0
	Newly affected	100	< 50	0	0	0	0
RWY 26 Departure Option B	Total change	-100	< -50	0	0	0	0
	Newly affected	< 50	0	0	0	0	0
RWY 26 Departure Option C	Total change	-100	< -50	0	0	0	0
	Newly affected	0	0	0	0	0	0
Year 2020 baseline		5,000	1,600	500	200	100	0
RWY 26 Departure Option A	Total change	-100	< -50	0	0	0	0
	Newly affected	0	0	0	0	0	0
RWY 26 Departure Option B	Total change	-100	0	0	0	0	0
	Newly affected	0	0	0	0	0	0
RWY 26 Departure Option C	Total change	< 50	0	0	0	0	0
	Newly affected	< 50	0	0	0	0	0

Table 5: Leq population changes for RWY 26 departure options

Notes

- All figures have been rounded to the nearest 100, values below 50 are shown as '<50' rather than being rounded to 0.
- Negative values for net changes denote that fewer people would be affected by the proposed option³⁴.
- 'Newly affected' shows the population within the new NPR that are not within the historic NPR.

³³ The total population for each option can be calculated by adding the net change for the option to the total shown for the extant SID (note that adding a negative number is the same as subtracting it).

³⁴ See footnote 33 on page 27

SID		Population counts (see Notes)		
		Existing SFD	Existing BOGNA/HARDY	Existing SAM/KENET
SEL		90 dBA	90 dBA	90 dBA
Existing pop count		< 50	< 50	< 50
RWY 26 Departures Option A	Total change	0	< -50	N/A
	Newly affected	0	0	N/A
Option A with respite	Total change	0	0	N/A
	Newly affected	0	0	N/A
RWY 26 Departures Option B	Total change	0	< -50	N/A
	Newly affected	0	0	N/A
Option B with respite	Total change	0	0	N/A
	Newly affected	0	0	N/A
RWY 26 Departures Option C	Total change	0	< -50	< -50
	Newly affected	0	0	0
Option C with respite	Total change	0	0	0
	Newly affected	0	0	0

Table 6: Noisiest type (B757E) SEL population changes for RWY 26 departure options

Notes

- All figures have been rounded to the nearest 100, values below 50 are shown as '<50' rather than being rounded to 0.
- Negative values for net changes denote that fewer people would be affected by the proposed option³⁵.
- 'Newly affected' shows the population within the new NPR that are not within the historic NPR.
- Figures are not provided for the most common type in operation (A319) as the analysis showed no discernible change to the 90dBA footprints or the related population counts.

35 See footnote 33 on page 27

Question 1a: Which ONE of the SIX alternative proposed options, if any, do you believe provides the best balance of benefits for RWY26 departures?

Option A

Option A with night-time respite

Option B

Option B with night-time respite

Option C

Option C with night-time respite

None of these, Don't know

Question 1b: Which, if any, noise concerns do you believe to be the most important for us to consider when determining the best option for RWY26 departures heading to the south?

Noise in the day that impacts my quality of life

Noise at night that disturbs my sleep

Noise in the day that affects my business or company / the business or company within which I work

Noise at night that affects my business or company / the business or company within which I work

Noise in the day that affects a community facility (e.g. hospital)

Noise at night that affects a community facility (e.g. hospital)

Noise over the countryside in the daytime

Noise over the countryside at night

Noise over populated areas in the daytime

Noise over populated areas at night

Noise over Areas of Outstanding Natural Beauty or National Parks

Noise that impacts my health

Potential noise impact on house prices

Potential noise impact on local tourism

Other – please specify

None of these, Don't know

Question 1c: If we were to implement the proposed route, what width NPR swathe do you think is most appropriate?

2km, 1.5km, 1km, 500m, Other – please specify, Don't know

Question 1d: If you answered question 1c, what were the reasons for your choice?

NPR swathes should only cover areas that are likely to be directly over-flown

NPR swathes should indicate potential noise impact from over-flights of nearby areas

NPR swathes affect house prices

NPR swathes affect the local economy/investment in the area

NPR swathes affect tourism

Other – please specify

None of these, Don't know

Question 1e. What, if any, comments or suggestions do you have about the options put forward for RWY26 departures heading to the south?

7 Option for RWY08 departures heading to the east/northeast

- 7.1 At the time we set up the London Airspace Consultation we were not considering significant changes to low altitude departure routes from RWY08. However, engagement with local community representatives during this consultation has identified an option to change the departures heading east and northeast to help reduce environmental impacts near the airport. This is outside the scope of the earlier London Airspace Consultation, so we are covering the details of this new option here in this follow-on consultation.
- 7.2 Map 23 in the separate map document shows today's departure routes from RWY08. Map 24 and Map 25³⁶ show today's NPR swathes and plots of flight paths for aircraft taking off from RWY08. Paragraphs 4.11 to 4.16 describe NPRs and their relationship to flight paths; see also Paragraph 6.4 for a description of the existing mix of PBN and conventional routes.
- 7.3 These maps show that there are two SID route alignments out to the east: the LAM track that turns northeast over Lingfield, and the BIG, DVR and CLN routes that head almost due east over Dormansland.
- 7.4 Map 25 highlights that, in reality, very few LAM flights follow the designated route. This is because the turn to the northeast points this climbing traffic towards a busy route for descending Heathrow arrivals, and in particular a Heathrow hold in the vicinity of Biggin Hill.
- 7.5 The Gatwick departures are therefore generally instructed by air traffic control to climb straight ahead, following the BIG/DVR/CLN NPR. This causes an offshoot of concentrated flight paths, shown in Map 25 passing south of Edenbridge and over Hever Castle, and when above 4,000ft they are turned to the north in a broad swathe stretching from Edenbridge to Tonbridge. This broad swathe occurs because air traffic control then selects flight paths for each aircraft based on the particular position of westbound Heathrow arrivals descending ahead of them at that time.
- 7.6 This flexibility of flight paths once past Edenbridge is vital in this area - to keep the Gatwick departures clear of the Heathrow arrivals, and to allow them to climb more quickly than when following the LAM route. However, we have an opportunity to change the route structure to better avoid direct overflight of the villages to the east of Gatwick, in particular Lingfield, Dormansland, Hever, Markbeech and Penshurst. This route alignment could be used for both the LAM departures and the BIG/DVR/CLN departures that currently head to the east.
- 7.7 Map 26 and Map 27 show the alignment that has been drawn up on the basis of feedback from stakeholder engagement in the London Airspace Consultation exercise. Forecast route usage is shown in Table 7.

36 The data plots in Map 24 and Map 25 show traffic from 17/03/2014 to 23/03/2014. This sample was chosen because it was the latest week during which there was consistent operation on RWY08, since the PBN SIDs at Gatwick were introduced in November 2013. Winter operations have fewer flights than the summer peak, however the pattern of flight paths in this sample has been assessed as being representative of both winter and summer operations. Furthermore, the colour key for the density plot in Map 25 has been scaled up to match the volume of flights seen in summer operations (as shown in the density plots presented in the London Airspace Consultation).

		RWY08 Option	
Period	Route	2016	2020
Daytime average (0600-2300)	Existing LAM	0	0
	Existing DVR/CLN/BIG	0	0
	RWY 08 Option (DVR/CLN/BIG + LAM replacement)	12	12
Nighttime average (2300-0600)	Existing LAM	0	0
	Existing DVR/CLN/BIG	0	0
	RWY 08 Option (DVR/CLN/BIG + LAM replacement)	1	1
Peak hour average (0900- 1000)	Existing LAM	0	0
	Existing DVR/CLN/BIG	0	0
	RWY 08 Option (DVR/CLN/BIG + LAM replacement)	19	20

Table 7: Forecast average hourly route usage for RWY08 realignment of routes to the east/northeast

Notes:

- Traffic Growth Assumptions are presented in Appendix E
- These figures relate to periods when RWY08 is in use – this is approximately 27% of the time (see Paragraph 3.5 on page 5)
- If no change was made all the flights shown would remain on the existing DVR/CLN/BIG and LAM routes; flights on the LAM route would, in reality follow the DVR/CLN/BIG NPR swathe as described in Paragraphs 7.4 to 7.6.

7.8 This alignment would take all eastbound traffic on a single track in between Lingfield and Dormansland, in between Hever Castle and Markbeeceh, and in between Penshurst and Penshurst Station. The route to the northeast would then go south and east of Tonbridge. Aircraft left on this route would be above

7,000ft by the time they pass Tonbridge³⁷, and in reality they would still need to be given tactical instructions to head northeast based on the Heathrow traffic in the area. Therefore the broad spread of over-flights above 4,000ft heading generally northeast shown in Map 25 would not be expected to change.

7.9 Map 28a-d show the potential widths of the NPR swathe around the proposed realigned route to the east (see Paragraphs 4.11 to 4.17 for explanation of the range of widths shown). Given that this route has minimal turns we would expect flight paths up to 4,000ft within approximately 100m of the centreline in normal circumstances³⁸. The resultant effect on population counts is shown in Table 8. All versions of the NPR swathe show a significant reduction in people overflowed compared to the existing DVR/BIG/CLN NPR swathe. A relatively small number of people would be newly affected (i.e. newly within an NPR swathe as a result of the change, where they were not previously within an NPR).

		Population counts				
		3km wide	2km wide NPR	1.5km wide NPR	1km wide NPR	500m wide NPR
Existing DVR/BIG/CLN	Total	10199	n/a	n/a	n/a	n/a
RWY 08 Option	Net change	n/a	-3700	-5200	-7500	-9300
	Newly affected	n/a	300	200	100	0

Table 8: NPR population changes for proposed RWY08 departure change

Notes

- All figures have been rounded to the nearest 100, values below 50 are shown as '<50' rather than being rounded to 0.
- Negative values for net change denote that fewer people would be affected by the proposed option³⁹.
- 'Newly affected' shows the population within the new NPR that are not within the historic NPR.
- We proposed that a revised DVR/BIG/CLN route would also replace the existing LAM route. Therefore the existing LAM NPR swathe would no longer be required. This would mean 2,500 people within the existing LAM NPR would no longer be within an NPR.

7.10 Map 29 and Map 30 show the effect of this proposed change on the Leq for the years 2016 and 2020, and Map 31 shows the effect on the SEL footprint. Both the LAM and DVR/BIG/CLN SEL footprints are shown as the baseline scenario. See Paragraph 4.3 onwards for a description of these noise metrics. The resultant effect on population counts is shown in Tables 9 and 10.

37 The published SID would have a lower defined level at this point; however, these published levels are, in practice only for emergency situations where the aircraft lose contact with air traffic control as a result of radio failure. This kind of occurrence is very rare, a few times per decade. In normal circumstances the aircraft are climbed past 7,000ft by air traffic control.

38 Based on preliminary observations from the ADNID trial.

39 See footnote 33

Leq Contour		Population counts (see Notes)					
		57 dBA	60 dBA	63 dBA	66 dBA	69 dBA	72 dBA
Year 2016 baseline		4,500	1500	500	200	100	0
Realigned RWY08 routes to east/northeast	Total change	0	< 50	0	0	0	0
	Newly affected	< 50	< 50	0	0	0	0
Year 2020 baseline		5,000	1,600	500	200	100	0
Realigned RWY08 routes to east/northeast	Total change	< 50	0	0	0	0	0
	Newly affected	0	0	0	0	0	0

Table 9: Leq population changes for proposed RWY08 departure change

SID	Population counts (see Notes)	
	Existing LAM	Existing CLN/DVR/BIG
SEL	90 dBA	90 dBA
Existing pop count		100
Realigned RWY08 routes to east/northeast	Total change	< 50
	Newly affected	< 50

Table 10: SEL population changes for proposed RWY08 departure change

Notes for Table 9 and Table 10

- All figures have been rounded to the nearest 100, values below 50 are shown as '<50' rather than being rounded to 0.
- Negative values for net change denote that fewer people would be affected by the proposed option⁴⁰.
- 'Newly affected' shows the population within the new NPR that are not within the historic NPR.
- Figures are not provided for the most common type in operation (A319) as the analysis showed no discernible change to the 90dBA footprints or the related population counts.

7.11 The RWY08 departure option extends beyond the scope of the original London Airspace Consultation and was therefore not covered in the fuel/CO₂ calculations

⁴⁰ See footnote 33

presented. However this option involves only a minor extension of the DVR/CLN/BIG route (220 metres), and aims to match the flight paths actually flown by the LAM departures, both of which mean that the changes in fuel and CO₂ as a result of this proposed option would be negligible in the context of the wider CO₂ impacts consulted on by the London Airspace Consultation.

- 7.12 Furthermore, the focus of this change is on better route alignment to reduce noise impacts below 4,000ft. DfT guidance clearly states that noise is the determining environmental factor for changes below 4,000ft (see Appendix B).
- 7.13 The London Airspace Consultation provided Lmax noise information covering swathes where our proposals would potentially affect over-flights. For the RWY08 option we present our Leq and SEL detailed noise metrics and propose a new NPR swathe. These depict noise and overflight impacts below 4,000ft.
- 7.14 Although the RWY08 option involves realigning the route centreline above 4,000ft in an area not covered by the London Airspace Consultation, we expect flights on this new route to be directed by air traffic control across a wide swathe that is no different from that seen today. The changes above 4,000ft are therefore technical changes that would not affect local noise – therefore we present no additional noise information for the route above 4,000ft.

Question 2a: Compared with today's routes, do you believe the proposed realignment for RWY08 departures to the east/northeast of Gatwick Airport is better or worse? The proposed realignment is...

- Much better
- Somewhat better
- Somewhat worse
- Much worse
- None of these, Don't know

Question 2b: Which, if any, factors do you believe to be the most important for us to consider when determining whether to realign the RWY08 departures to the east/northeast?

- Noise in the day that impacts my quality of life
- Noise at night that disturbs my sleep
- Noise in the day that affects my business or company /the business or company within which I work
- Noise at night that affects my business or company / the business or company within which I work
- Noise in the day that affects a community facility (e.g. hospital)
- Noise at night that affects a community facility (e.g. hospital)
- Noise over the countryside in the daytime
- Noise over the countryside at night
- Noise over populated areas in the daytime
- Noise over populated areas at night
- Noise over Areas of Outstanding Natural Beauty or National Parks
- Noise that impacts my health
- Potential noise impact on house prices
- Potential noise impact on local tourism
- Other – please specify
- None of these, Don't know

Question 2c: If we were to implement the proposed route, what width NPR swathe do you think is most appropriate?

- 2km, 1.5km, 1km, 500m, Other – please specify, Don't know

Question 2d: If you answered question 2c, what were the reasons for your choice?

- NPR swathes should only cover areas that are likely to be directly over-flown
- NPR swathes should indicate potential noise impact from over-flights of nearby areas
- NPR swathes affect house prices
- NPR swathes affect the local economy/investment in the area
- NPR swathes affect tourism
- Other – please specify
- None of these, Don't know

Question 2e: What, if any, comments or suggestions do you have about the proposals for the realignment for RWY08 departures to the east/north east?

8 Night-time respite option for RWY26 arrivals

- 8.1 Today's RWY26 arrivals are shown in Map 32 and Map 33.
- 8.2 The introduction of PBN routes for arrivals would result in arrival flight paths being more concentrated than they are today. However, unlike departures the effect of PBN on arrivals is expected to be much more subtle at low altitudes, as controllers would still need to manually direct aircraft from the PBN arrival routes to ensure a safe and steady stream of arrivals to the runway⁴¹.
- 8.3 During the on-going design process, we have been developing a more detailed design that can accommodate this flexibility. In general, arrivals would still be seen across the same swathe as they are today, but the spread of flights within that swathe would differ. More flight paths would be concentrated towards the centre of the swathe, and fewer towards the periphery. This is in line with the response received from key council authorities during the London Airspace Consultation which highlighted reducing the number of flights that stray over Royal Tunbridge Wells and Tonbridge as a priority.
- 8.4 In our developing design for arrivals, aircraft would tend to establish on final approach more consistently around 11-15nm from the airport. The resultant area in which the concentration of aircraft would join final approach is shown in Map 34 and Map 35.
- 8.5 The noise impact from aircraft that are already established on final approach tends to be less than that from aircraft making the turn onto final approach. The proposed route would mean aircraft consistently join final approach to the east of Hever Castle so that they are established on final approach by the time they pass the castle.
- 8.6 This should, therefore, benefit Hever and areas to the south of Hever. More flights would already be established on final approach by this point, and fewer would be making the turn onto final approach in the vicinity of Hever.
- 8.7 In addition we have developed an alternative option for use in the core night-time period. We are still working on what is feasible with regards to exact timings of night-time respite options for arrivals (see Paragraph 8.9-8.10 for a description of the limiting factors); however we expect it to be within the period from midnight to 06:00.
This option is designed to turn the majority of night flights onto final approach west of Hever Castle as shown in Map 34 and Map 35.
- 8.8 In particular this respite route would benefit those areas directly under, and to the south of, the main daytime route, such as Chiddingstone, Penshurst and further south to Langton Green.

⁴¹ Air traffic control must ensure that aircraft on final approach have been organised into an efficient stream or 'sequence' for landing. An efficient sequence is where aircraft are safely spaced, ensures the runway is fully utilised and that flights are not unnecessarily delayed in the air. Ensuring optimal spacing between aircraft reduces holding; in turn this minimises delay, CO₂ emissions and the visual/noise impact of circling aircraft.

- 8.9 However, as noted above, managing arrivals requires operational flexibility. Therefore whilst this respite option would mean most aircraft joining final approach to the west of Hever during the night, it would also be expected to mean more aircraft turning directly over Hever than would otherwise occur with the main arrival route joining further to the east (as described in Paragraphs 8.4 to 8.6).
- 8.10 This respite route is not operationally feasible outside the core night period because outside this period the skies are busier and the design of the arrival route becomes an important factor in managing delay⁴². However in the core night period air traffic control has much more flexibility, as the skies are less congested; therefore they could accommodate the required descent profile for this night-time alternative.
- 8.11 Neither the main arrival route nor the respite option would affect the Leq contour at 57dBA or higher, nor the SEL footprint at 90dBA, as these do not extend out as far as either joining point. In addition there are no NPRs for arrivals and so there are no relevant population metrics.
- 8.12 However, the respite option does require an adaptation to existing noise abatement procedures. This DfT policy requires that night flights join final approach at least 10nm from the airport, and at a minimum of 3,000ft altitude; this is to help ensure CDA compliance. We believe this requirement is not needed for night time CDA compliance at Gatwick Airport, hence we have developed the respite option (see Paragraph 4.24 - 4.29 for the rationale). This would mean some aircraft joining between 9 and 10nm final, which, given standard descent profiles means they could be 2,700ft-3,000ft.

42 Specifically, the route between the point merge system and the runway is used to get the correct spacing between successive arrivals. If this is too short more aircraft have to be delayed in the 'point merge system' or the overflow 'holds'. For further information on these terms see the London Airspace Consultation material available at www.londonairspaceconsultation.co.uk. This additional information is provided for background information, It is not necessary to understand the holding implications of using the respite option in the daytime as we are not proposing, or consulting on daytime use as it would have unacceptable operational consequences.

Question 3a: Should we seek changes to the current DfT noise abatement requirements, so that the proposed night-time arrival respite route for RWY26 could be implemented (as shown in Map 34 and Map 35)?

Yes – definitely

Yes – probably

No – probably not

No – definitely not

Don't know

Question 3b: Which, if any, factors do you believe to be the most important for us to consider when determining whether to seek changes to the current DfT noise abatement requirements, so that the proposed night-time arrival respite route for RWY26 could be implemented?

Noise in the day that impacts my quality of life

Noise at night that disturbs my sleep

Noise in the day that affects my business or company /the business or company within which I work

Noise at night that affects my business or company / the business or company within which I work

Noise in the day that affects a community facility (e.g. hospital)

Noise at night that affects a community facility (e.g. hospital)

Noise over the countryside in the daytime

Noise over the countryside at night

Noise over populated areas in the daytime

Noise over populated areas at night

Noise over Areas of Outstanding Natural Beauty or National Parks

Noise that impacts my health

Potential noise impact on house prices

Potential noise impact on local tourism

Other – please specify

None of these

Don't know

Question 3c: What, if any, comments or suggestions do you have about the proposals for us to seek changes to the current DfT noise abatement requirements, so that the proposed night-time arrival respite route for RWY26 could be implemented?

9 Night-time respite option for RWY08 arrivals

- 9.1 Today's RWY08 arrivals are shown in Map 36 and Map 37.
- 9.2 The introduction of PBN routes for arrivals would result in arrival flight paths being more concentrated than they are today. However, unlike departures the effect of PBN on arrivals is expected to be much more subtle at low altitudes, as controllers would still need to manually direct aircraft from the PBN arrival routes to ensure a steady stream of arrivals to the runway.
- 9.3 During the on-going design process, we have been developing a more detailed design that can accommodate this flexibility. In general, arrivals would still be seen across the same swathe as they are today, but the spread of flights within that swathe would differ; more flight paths would be concentrated around the centre of the route. As the centre of the route would be positioned to avoid direct overflight of Billingshurst, the proposed design would mean fewer flights straying over Billingshurst.
- 9.4 In our developing design for arrivals, aircraft would tend to establish on final approach more consistently around 11-15nm from the airport. The resultant area in which the concentration of aircraft would join final approach is shown in Map 38 and Map 39.
- 9.5 In addition we have developed an alternative option for use in the core night-time period. We are still working on what is feasible with regards to exact timings of night-time respite options for arrivals (see Paragraph 8.9-8.10 for a description of the limiting factors); however we expect it to be within the period from midnight to 06:00.
This option is designed to turn the majority of night flights onto final approach east of Alfold as shown in Map 38 and Map 39.
- 9.6 In particular this respite route would benefit those areas directly under, and to the south of, the daytime joining point, such as Plaistow, Ifold and areas to the south.
- 9.7 This route is not operationally feasible during the daytime as the skies are busier and the design of the arrival route becomes an important factor in managing delay⁴³. However at night air traffic control has much more flexibility as the skies are less congested; therefore they could accommodate the required descent profile for this night-time alternative.
- 9.8 Neither the main arrival route nor the respite option would affect the Leq contour at 57dBA or higher, nor the SEL footprint at 90dBA, as these do not extend out as far as either joining point. In addition there are no NPRs for arrivals and so there are no relevant population metrics.
- 9.9 However, the respite option does require an adaptation to an existing noise abatement procedure for arrivals. This DfT policy requires that night flights join final approach at least 10nm from the airport, and at a minimum of 3,000ft altitude; this is to help ensure CDA compliance. We believe this requirement is not needed for night time CDA compliance at Gatwick Airport, hence we have

43 See footnote 42

developed the respite option (see Paragraph 4.24 - 4.29 for the rationale). This would mean some aircraft joining between 9 and 10nm out, which, given standard descent profiles means they could be 2,700ft-3,000ft.

Question 4a: Should Gatwick Airport seek changes to the current DfT noise abatement requirements, so that the proposed night-time arrival respite route for RWY08 could be implemented (as shown in Map 38 and Map 39)?

Yes – definitely
Yes – probably
No – probably not
No – definitely not
Don't know

Question 4b: Which, if any, factors do you believe to be the most important for Gatwick Airport Ltd to consider when determining whether to seek changes to the current DfT noise abatement, so that the proposed night-time arrival respite route for RWY08 could be implemented?

Noise in the day that impacts my quality of life
Noise at night that disturbs my sleep
Noise in the day that affects my business or company /the business or company within which I work
Noise at night that affects my business or company / the business or company within which I work
Noise in the day that affects a community facility (e.g. hospital)
Noise at night that affects a community facility (e.g. hospital)
Noise over the countryside in the daytime
Noise over the countryside at night
Noise over populated areas in the daytime
Noise over populated areas at night
Noise over Areas of Outstanding Natural Beauty or National Parks
Noise that impacts my health
Potential noise impact on house prices
Potential noise impact on local tourism
Other – please specify
None of these
Don't know

Question 4c: What, if any, comments or suggestions do you have about the proposals for Gatwick Airport Ltd to seek changes to the current DfT noise abatement requirements, so that the proposed night-time arrival respite route for RWY08 could be implemented?

10 Reduction and re-centring existing NPR swathes for RWY26 and RWY08 departures

10.1 Map 3 and Map 25 show today's NPRs for all routes. Notwithstanding the changes presented earlier in this document, we are seeking to reduce and re-centre the existing NPR swathes for the departure routes not covered by previous options. This is so that they complement the PBN routes that have been in place since November 2013.

Reducing the size of NPR swathes

10.2 Reducing the size of NPR swathes is being considered in two ways.

10.3 Firstly, they could be narrowed due to improved navigational performance, because aircraft can now fly the routes more accurately (see Paragraphs 4.11 to 4.17).

10.4 Secondly, there is an option to shorten them. The historic NPR swathe lengths were designed to capture all aircraft climb performance in all weather conditions⁴⁴. This means that, for the vast majority of today's modern fleet, the NPRs are unnecessarily long. This does not affect aircraft operations in any way as those aircraft that climb more quickly exit the 4,000ft (or 3,000ft see Paragraph 4.12) ceiling of the NPR, from where they can be directed as required by air traffic control. However, it does mean that the NPRs themselves, which may be considered to have a negative impact on perception of potential noise blight, extend into areas where there are in reality rarely any over-flights below the NPR ceiling.

10.5 In this consultation we therefore present two options for the length of the NPR swathes. In both, we take account of any current or proposed restrictions to the operation of a route, where the restriction means that all aircraft are required to be at 4,000ft significantly before the end of the existing NPR (specific cases are discussed in Paragraph 10.22).

10.6 If there are no such changes, the first option (referred to as the full length option) is to match the existing length of the NPR's swathe. For the reasons described above, this gives a false impression of the regular extent of flights below 4,000ft.

10.7 The second option is to shorten the NPR swathe based on the point that most aircraft reach 4,000ft. We believe the latter is a much more relevant definition which matches the underlying principle being developed for the narrowing of the NPRs.

10.8 We have undertaken an analysis that indicates that 99%⁴⁵ of flights on all SIDs with unrestricted climb to 4,000ft will have reached 4,000ft by 9nm from the start of the existing NPR (see Appendix F). We have therefore undertaken a population analysis on NPRs shortened to 9nm, for all but one of the NPR

44 Aircraft climb performance is reduced in temperatures above 30°C.

45 We have chosen 99% on the basis that it is a fair representation of where overflight would *normally* be experienced. We could use a lower percentage and further reduce the length of the NPR; however any shortening would first have to be approved by the DfT.

swathes. The exception is the NPR swathe for the RWY08 SAM/KENET SID, which has a restriction at 3,000ft because there are often Heathrow departures flying above. Therefore the existing NPR length remains appropriate for this SID.

- 10.9 Note that the DfT is not currently considering methodologies for shortening NPRs; should this consultation indicate that stakeholders favour the shortened NPR rationale, we will present the evidence from the consultation to the CAA and DfT for their consideration as part of our airspace change proposal.

Re-centring NPR swathes

- 10.10 Re-centring the NPR swathe is necessary because the historic NPRs were established many decades ago, and are not all in line with modern design standards for departure routes, nor modern aircraft performance. In most cases this shift is negligible given the narrowing of the NPR swathe that is possible as a result of PBN (as described above); exceptions are highlighted in the text below.

NPR swathe options

- 10.11 Map 40a-c and Map 41 show re-centred full length NPRs narrowed to 2km wide for all RWY26 and RWY08 departure routes respectively, including those we are seeking to change as per the options presented in previous sections. Versions a-c of Map 40 represent the three options for RWY26 departures, including retention of existing NPRs for respite purposes, as discussed in Section 6. These can be compared to Map 3 and Map 25 respectively.
- 10.12 As discussed in Paragraphs 4.11 to 4.17 we are awaiting guidance from the DfT on the required width of NPRs; initial work suggest NPR width of 1.5km is likely, however to cover the risk that the final DfT decision is for a slightly wider definition we are showing the NPR and associated population changes for 2km wide NPR swathes. For simplicity we are showing only this width of NPR – a narrower definition would reduce the population counts for the new NPR swathes accordingly.
- 10.13 Map 42a-c and Map 43 show the equivalent NPR swathes that have been shortened as described in Paragraph 10.7 – Table 11 and Table 12 shows the population changes for the full length and shortened NPRs. A table showing the comparison for individual NPRs is provided at Appendix F).
- 10.14 Note that for each of the RWY26 options we have shown in Map 40a-c and Map 42a-c, and the associated calculations in Table 11, are for RWY26 Options A to C with respite. This means that reduced NPR swathes for the existing BOGNA/HARDY and SAM/KENET (Option C only) SIDs are included in the count. Should we progress with any of Options A to C without respite, then the population count within the combined NPR swathe would reduce further.

		Population counts (see Notes)	
Existing 3km full length NPR (Map 3)		Total	40300
Proposed Full Length, 2km Wide NPRs	All RWY 26 plus Option A with respite (Map 40a)	Net change	-10400
		Newly affected	8700
	All RWY 26 plus Option B with respite (Map 40b)	Net change	-11700
		Newly affected	7700
	All RWY 26 plus Option C with respite (Map 40c)	Net change	-10800
		Newly affected	7800
Proposed Shortened, 2km Wide NPRs	All RWY 26 plus Option A with respite (Map 42a)	Net change	-19900
		Newly affected	2700
	All RWY 26 plus Option B with respite (Map 42b)	Net change	-21100
		Newly affected	1800
	All RWY 26 plus Option C with respite (Map 42c)	Net change	-20800
		Newly affected	1700

Table 11: Total NPR population changes for all RWY26 departures including options

		Population counts (see Notes)	
Existing 3km full length NPR (Map 25)		Total	40600
RWY08 Proposed Full Length, 2km Wide NPRs with proposed realignment of DVR/BIG/CLN/LAM (Map 41)		Net change	-13600
		Newly affected	300
RWY08 Proposed Shortened, 2km Wide NPRs with proposed realignment of DVR/BIG/CLN/LAM (Map 43)		Net change	-14600
		Newly affected	0

Table 12: Total NPR population changes for all RWY08 departures including options

Notes for Table 11 and Table 12:

- All figures have been rounded to the nearest 100, values below 50 are shown as '<50' rather than being rounded to 0.
- Negative values for net change denote that fewer people would be affected by the proposed option⁴⁶.
- 'Newly affected' shows the population within the new NPR that are not within the historic NPR.

⁴⁶ See footnote 33

10.15 All the revised NPR swathe options show significant reductions in the overall number of people with the NPR boundaries. The relatively large values for newly affected people for RWY26 NPRs are the consequence of re-centring the NPR for the existing route to CLN/DVR/BIG (see Paragraph 10.16 to 10.18).

Question 5a: Should Gatwick Airport Ltd re-centre and narrow the published NPRs to take account of aircraft performance on the modern PBN routes in place at Gatwick Airport?

- Yes – definitely
- Yes – probably
- No – probably not
- No – definitely not
- Don't know

Question 5b: Which, if any, factors do you believe to be the most important for us to consider with respect to re-centring and narrowing published NPRs to take account of aircraft performance on the modern PBN routes?

- NPR swathes should only cover areas that are likely to be directly over-flown
- NPR swathes should indicate potential noise impact from over-flights of nearby areas
- NPR swathes affect house prices
- NPR swathes affect the local economy/investment in the area
- NPR swathes affect tourism
- Other – please specify
- None of these
- Don't know

Question 5c: What, if any, comments or suggestions do you have about the proposals for Gatwick Airport Ltd to consider re-centring and narrowing published NPRs to take account of aircraft performance on the modern PBN routes (please provide any views you have on what the optimal width for NPR swathes should be)?

Question 6a: Should we implement shortened NPRs to take account of the observed climb performance of the flights at Gatwick Airport?

- Yes – definitely
- Yes – probably
- No – probably not
- No – definitely not
- Don't know

Question 6b: Which, if any, factors do you believe to be the most important for us to consider when determining whether to implement shortened NPRs to take account of the observed climb performance?

- NPR swathes should only cover areas that are likely to be directly over-flown
- NPR swathes should indicate potential noise impact from over-flights of nearby areas
- NPR swathes affect house prices
- NPR swathes affect the local economy/investment in the area
- NPR swathes affect tourism
- Other – please specify
- None of these
- Don't know

Question 6c: What, if any, comments or suggestions do you have about the proposals for Gatwick Airport Ltd to consider when determining whether to implement shortened NPRs to take account of the observed climb performance of the flights at the Airport?

RWY 26 NPR to the north/northeast

10.16 The RWY26 DVR/BIG/CLN routes which turn right and fly to the north of the airport before heading east were updated in November 2013 to modern PBN standards.

10.17 Most modern aircraft have performance characteristics that make it difficult to follow the tight turn of the existing NPR whilst still flying in an efficient manner. As a consequence the flight paths of aircraft on this route have gradually shifted to the north over a number of years; this gradual shift means that many flight paths are now outside the historic NPR swathe. This shift was formalised in November 2013 when the new PBN route was drawn, because the PBN design criteria take modern aircraft performance capabilities into account.

10.18 Correcting this anomaly by re-centring and narrowing this one route to 2km causes a net increase of approximately 200 people within the full length NPR swathe (from 10,400 to 10,600 see Table 13). Whilst this is only a small net change there is a significant shift in terms of populations affected; with 7,200 newly affected with the full length NPR whereas 7,000 who were in the historic NPR would no longer be so. This is because the NPR re-centring takes it from overhead parts of Newdigate, Parkgate, Norwoods Hill, and the northern edge of Horley, instead covering the southern edge of Reigate.

		Population counts	
		3km wide	2km wide NPR
Existing RWY26 DVR/BIG/CLN/LAM	Total	10400	
Narrowed, full length RWY 26 DVR/BIG/CLN/LAM	Net change		200
	Newly affected		7200

Table 13: NPR population changes for existing RWY 26 DVR/BIG/CLN/LAM route

Notes:

- All figures have been rounded to the nearest 100, values below 50 are shown as '<50' rather than being rounded to 0.
- Positive values for net change denote that more people would be affected by the proposed option⁴⁷.
- 'Newly affected' shows the population within the new NPR that are not within the historic NPR.

10.19 This and the other revised NPRs would not affect where aircraft fly in any way; as NPRs are a method of monitoring aircraft track-keeping rather than a formal route that aircraft follow. The NPRs shown in Map 40 and Map 41 do, however, accurately represent the current PBN routes as published in the UK Aeronautical Information Publication (see Appendix A).

10.20 The values for the full length NPR population change figures shown in Table 11 all include the 7200 'new people affected' as a consequence of realigning the

47 See footnote 33

RWY26 CLN/DVR/BIG to match the published route. The remainder of the new people affected are the result of the RWY26 options discussed earlier in this document (see Table 4).

10.21 Because re-centring this one NPR is the reason for a large proportion of the newly affected people, Question 7a-c are specific question to re-centring and narrowing for this particular route. This is in addition to general questions 5a-c which relate to re-centring and narrowing NPR swathes for all the routes.

Question 7a: The existing PBN route for RWY26 DVR/CLN/LAM departures means that aircraft fly outside the NPR; should we re-centre and narrow the published NPR to correct this anomaly?

Yes – definitely

Yes – probably

No – probably not

No – definitely not

Don't know

Question 7b: Which, if any, factors do you believe to be the most important for us to consider, with respect to correcting the published NPR for the RWY26 DVR/CLN/LAM route, so that it captures where aircraft actually fly?

NPR swathes should only cover areas that are likely to be directly over-flown

NPR swathes should indicate potential noise impact from over-flights of nearby areas

NPR swathes affect house prices

NPR swathes affect the local economy/investment in the area

NPR swathes affect tourism

Other – please specify

None of these

Don't know

Question 7c: What, if any, comments or suggestions do you have about the proposals for us to consider, with respect to correcting the published NPR for the RWY26 DVR/CLN/LAM route, so that it captures where aircraft actually fly?

Shortened 'full length' NPRs to the south

- 10.22 The full length NPRs show both the NPRs to the south as being shorter than the historic definition. These NPRs are shown as being shorter because existing or planned airspace restrictions mean that aircraft are required to be at 4,000ft before the end of the historic NPR. For the RWY26 departures the current route requires aircraft to be above 4,000ft by a point roughly alongside Rowhook
- 10.23 For RWY08 departures, the proposed changes to the south of the airport presented in the London Airspace Consultation would mean that aircraft likewise would have to be above 4,000ft by a point roughly southwest of East Grinstead⁴⁸.

Variable width NPR swathes

- 10.24 Paragraph 4.19 describes how the variation of flight paths differs depending on whether aircraft are flying a straight or curved section of a route. This suggests that an NPR swathe that accurately describes the area within which flight paths are normally expected to be, should be narrower on straight parts of the route and wider in the turns.
- 10.25 As described in Paragraph 4.19, an NPR swathe of 1.5km total width may be appropriate for the turns, with a much narrower definition on the straight segments. More accurately depicting the areas over which aircraft normally fly is a potential benefit because NPR swathes affect the perception of potential noise. A definition that is wider than necessary, given actual aircraft performance (for example on straight legs), means that some areas may be perceived to be subject to more noise than they actually experience.
- 10.26 Variable width NPRs at their most complex would widen and narrow according to the route characteristics, however this would require further work to develop that is outside the timescale of this project. However, a more straightforward solution would be to maintain a uniform width⁴⁹ for each NPR swathe, but specify that width based on the route characteristics. For example, for routes where the maximum turn below 4,000ft is 25° or less the NPR width may be set to a uniform 500m as this would capture all track variations, whereas NPRs where there is a sharper turn of more than 25° would be wider, for example 1.5km, to capture the greater variation in the turn.

48 Note that the very end of this NPR also shows a turn. This is a turn at 4,000ft onto a new route above 4,000ft which is being developed as part of the wider LAMP network development. This part of the route was covered in the London Airspace Consultation – see www.londonairspaceconsultation.co.uk for details.

49 Uniform width in this definition excludes the tapered start, in all NPR definitions we would seek to maintain the tapered start to the NPR that is in place today.

Question 8a: Should Gatwick Airport Ltd consider NPR swathes with variable widths, dependant on sharpness of turns on each route, as a more accurate portrayal of where aircraft actually overfly?

Yes – definitely
Yes – probably
No – probably not
No – definitely not
Don't know

Question 8b: Which, if any, factors do you believe should be the most important for us when considering NPR swathes with variable widths, dependant on sharpness of turns on each route, as a more accurate portrayal of where aircraft actually overfly?

NPR swathes should only cover areas that are likely to be directly over-flown
NPR swathes should indicate potential noise impact from over-flights of nearby areas
NPR swathes affect house prices
NPR swathes affect the local economy/investment in the area
NPR swathes affect tourism
Other – please specify
None of these
Don't know

Question 8c: What, if any, comments or suggestions do you have about whether we should consider NPR swathes with variable widths as a more accurate portrayal of where aircraft actually overfly?

Question 9: What, if any, additional comments do you have that are relevant to this consultation and that you would like to make?

Appendix A: References

References 1-5 below are the documents that make up the guidance framework that airspace change sponsors have to consider, in order to progress airspace changes

1. Transport Act 2000 – Part 1 Air Traffic
2. The Civil Aviation Authority (Air Navigation) Directions 2001 (incorporating Variation Direction 2004)
3. Department for Transport Guidance to the Civil Aviation Authority on Environmental Objectives relating to the exercise of its Air Navigation Functions (Jan 2014)
4. CAP724 Airspace Charter (30 Jan 2009)
5. CAP725 CAA Guidance on the Application of the Airspace Change Process (30 March 2007)

Other referenced documents

6. UK Aeronautical Information Publication, www.ais.org.uk
7. The Civil Aviation Act 1982 – Section 78

Appendix B: Glossary of Terms

Airports Commission	A commission set up by the Government to look into options for the development of runway infrastructure in the South East
Altitude	The distance in feet, above mean sea level. Due to variations in terrain, air traffic control measure altitudes as above mean sea level rather than above the ground. If you are interested in the height of aircraft above a particular location to assess potential noise impact, then local elevation should be taken into account when considering aircraft heights; for example an aircraft at 3,000ft above mean sea level would be 2,500ft above ground level if the ground elevation is 500ft. All altitudes in the consultation document are defined as above mean sea level
AMSL	Above mean sea level
AONB	Area of Outstanding Natural Beauty
ATC	Air traffic control
BIG	A route to the east from RWY 26 or RWY 08 as defined in the UK AIP (see Appendix A)
BOGNA/HARDY	A route to the south from RWY 26 as defined in the UK AIP (see Appendix A)
CAA	Civil Aviation Authority
Capacity	A term used to describe how many aircraft can be accommodated within an airspace area or by a without compromising safety or generating excessive delay
Centreline	The nominal track for a published route (see Route)
CLN	A route to the north east from RWY 26 or RWY 08 as defined in the UK AIP (see Appendix A)
CO ₂	Carbon dioxide
Concentration	Refers to a density of aircraft flight paths over a given location; generally refers to high density where tracks are not spread out; this is the opposite of Dispersal
Consultation swathe	This is the broad area within which we will need to position a route
Continuous climb	A climb that is constant, without periods of level flight – referred to as steps
Continuous decent	A descent that is constant, without periods of level flight – referred to as steps
Controlled airspace	Generic term for the airspace in which an air traffic control service is provided as standard; note that there are different sub classifications of airspace that define the particular air traffic services available in defined classes of controlled airspace Usually abbreviated to CAS
Conventional navigation	The historic navigation standard where aircraft fly with reference to ground based navigation aids
Conventional routes	Routes defined to the conventional navigation standard
Davies Commission	See Airports Commission
Departure Interval	The time interval required between successive departures taking off from the same runway

Dispersal	Refers to the density of aircraft flight paths over a given location; generally refers to low density – tracks that are spread out; this is the opposite of Concentration
DVR	The route to the east from either RWY26 or RWY08 as defined in the UK AIP (see Appendix A)
Easterly operation	When an runway is operating such that aircraft are taking off and landing in a easterly direction; see Runway 08 for definition of easterly operations at Gatwick Airport
FAS	See Future Airspace Strategy
Final approach path	The final part of a flight path that is lined up with the runway; aircraft usually join final approach between 10nm and 15nm from the runway
Flight paths	The tracks flown by aircraft when following a route, or when being directed by air traffic control
Ft	Feet, the standard measure for vertical distances used in air traffic control
Future Airspace Strategy	The CAA's blueprint for modernising the UK's airspace. The CAA explains the background to FAS here: www.caa.co.uk/default.aspx?catid=2408
GAL	Gatwick Airport Ltd
General Aviation	All civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire. General aviation flights range from gliders and powered parachutes to corporate jet flights
Holds/Holding Area/ Holding Stacks	An airspace structure where aircraft circle above one another at 1,000ft intervals when queuing to land
km	Kilometre
LAM	A route to the east from RWY 26 or RWY 08 as defined in the UK AIP (see Appendix A)
Leq	See 'noise contour'
Low altitude airspace	Airspace in the vicinity of the airport containing arrival and departure routes below 4,000ft. Airports have the primary accountability for this airspace, as its design and operation is largely dictated by local noise requirements, airport capacity and efficiency
NATS	The UK's licenced air traffic service provider for the en route airspace that connects our airports with each other, and with the airspace of neighbouring states
Nautical Mile	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.
nm	See Nautical Mile

Noise contours	The depiction of noise across a period of the day as a series of contours around the airport; major airports annually publish the noise contours for the 'daytime' period of 07:00-23:00; these are referred to as the Leq(16 hours) noise contours
Noise footprints	The depiction of noise from a single aircraft as a 'footprint' around the airport
NPR	Noise Preferential Route
NPR Swathe	An area defined around an NPR within which aircraft below 4,000ft are required to stay. Today's NPR Swathes start narrow at the runway and widen to a maximum of 3km. Their length is based on the distance it would take a slow climbing aircraft to reach 4,000ft. NPRs for future 'PBN' routes are likely to be narrower and shorter to represent improved navigation accuracy and climb performance of modern aircraft
PBN	See Performance Based Navigation
Performance Based Navigation	Referred to as PBN; a generic term for modern standards for aircraft navigation capabilities (as opposed to 'conventional' navigation standards). See www.eurocontrol.int/navigation/pbn for details
Point Merge	A route system for organising arrivals into an efficient landing 'sequence'
PRNAV	Precision 'RNAV', otherwise referred to as 'RNAV1' (both these terms are defined in this glossary)
Respite route	Additional routes established to spread traffic in a predictable way, so that areas beneath the original track get predictable periods of respite
RNAV	Short for aRea NAVigation. This is a generic term for a particular specification of Performance Based Navigation
RNAV1	See RNAV. The suffix '1' denotes a requirement that aircraft can navigate to within 1nm of the centreline of the route 95% or more of the time
RNAV1 Transition	The part of an arrival route, defined to the RNAV1 standard, between the last part of the hold (or Point Merge structure) and the final approach path to the runway
RNP1	Required Navigation Performance 1. An advanced navigation specification under the PBN umbrella. The suffix '1' denotes a requirement that aircraft can navigate to within 1nm of the centreline 95% or more of the time
Route	Published routes that aircraft plan to follow. These have a nominal centreline that gives an indication of where aircraft on the route would be expected to fly; however, aircraft will fly routes and route segments with varying degrees of accuracy based on a range of operational factors such as the weather, ATC intervention, and technical factors such as the PBN specification

Route system or route structure	The network of routes linking airports to one another and to the airspace of neighbouring states
Runway 08 (RWY08)	The name given to the main runway at Gatwick when operating in an 'easterly' direction (i.e. taking off and landing on the easterly heading of 080°)
Runway 26 (RWY26)	The name given to the main runway at Gatwick when operating in a 'westerly' direction (i.e. taking off and landing on the westerly heading of 260°)
RWY	Runway
Sequence	The order of arrivals in a queue of airborne aircraft waiting to land
SAM/KENET	A route to the west from RWY 26 or RWY 08 as defined in the UK AIP (see Appendix A)
SEL	See Noise footprint
SFD	A route to the south from RWY 26 or RWY 08 as defined in the UK AIP (see Appendix A)
SID	See Standard Instrument Departure
Stacks / Stack holds	See Holds
Standard Arrival Route	The published routes for arriving traffic. In today's system these bring aircraft from the route network to the holds, from where they follow ATC instructions rather than a published route. Under PBN the published arrival route would go all the way to the runway
Standard Instrument Departure	Usually abbreviated to SID; this is a route for departures to follow straight after take-off as specified in the UK's Aeronautical Information Publication – see www.ais.org.uk
STAR	See Standard Arrival Route
Statute mile	A standard mile as used in normal day to day situations (e.g. road signs) but not for air traffic where nautical miles are used
Stepped climb	A climb that is interrupted by periods of level flight required to keep the aircraft separated from another route in the airspace above
Stepped descent	A descent that is interrupted by periods of level flight required to keep the aircraft separated from another route in the airspace below
'Tactical' air traffic control	Air traffic control methods that involve air traffic controllers directing aircraft off the established routes structure for reasons of safety or efficiency
Westerly operation	When a runway is operating such that aircraft are taking off and landing in a westerly direction; see Runway 26 for definition of westerly operations at Gatwick Airport

Appendix C: Legal framework for airspace change

Once the sponsors have submitted their Airspace Change Proposal (ACP), the CAA decides whether it should be approved. To do this, they are required to consider a framework of legislation and guidance. This sets out the CAA's obligations, and the factors that it must take into account when assessing the merits of an ACP. These are outlined below.

The CAA's primary obligation is to exercise its air navigation functions so as to maintain a high standard of safety in the provision of air traffic services. This duty, which is imposed on the CAA by the Transport Act 2,000 (the 'Transport Act'), takes priority over all of the CAA's other duties.

The Transport Act also directs the CAA to exercise its air navigation functions in the manner it thinks best calculated to:

- secure the most efficient use of airspace consistent with the safe operation of aircraft and the expeditious flow of air traffic
- satisfy the requirements of all airspace users
- take account of Government guidance on environmental objectives

In addition to the duties imposed by the Transport Act, the CAA is obliged, by the Civil Aviation Authority (Air Navigation) Directions 2001, to take into account the need to reduce, control and mitigate as far as possible the environmental impacts of civil aircraft operations, and the need for environmental impacts to be considered at the earliest possible stages of planning, designing, and revising, airspace procedures and arrangements.

Gatwick Airport Ltd has sought to reflect these duties and objectives, and the framework as a whole, in our development of this proposal and its consultation. We also take into account Government guidance on environmental objectives set out in the Department for Transport's document 'Guidance to the Civil Aviation Authority on environmental objectives relating to the exercise of its air navigation functions' (see Appendix A).

Sponsors must also take into account the guidance published by the CAA entitled 'CAP725 CAA Guidance on the Application of the Airspace Change Process' (see Appendix A). This guidance states that the environmental impact of a change must be considered from the outset, which we have done and continue to do.

Appendix D: Development of RWY26 departure options

The options presented in Section 6 of the consultation document were developed from a range of potential alignments for the routes to the south (BOGNA/HARDY replacement) and the routes to the west (SAM/KENET replacement). The aim of this work was to identify the options that best minimises environmental impact whilst maintaining safety and achieving 20° divergence between routes to the south and routes to the east (see Section 6).

This Appendix provides an overview of the alignments considered and the rationale for selecting the options presented in Section 6 of the consultation document. The following descriptions refer to the route alignments shown (and labelled in Map D1 and D2 (see separate Maps documents)).

A 20° divergence between routes to the south (BOGNA/HARDY) and the routes to the west (SAM/KENET) can be achieved by a number of different combinations of these route alignments.

Combinations that do not change the existing SAM/KENET route were initially considered (i.e. leaving the SAM/KENET alignment on the track that it follows today – marked **z** in Map D1 and D2). In these cases the 20° divergence would be achieved by realigning the BOGNA/HARDY route to alignment **d**, **e** or **f**. Alignments further south were not considered as this would put them over the major population centre of Horsham.

Alignments **e** and **f** were discounted on the basis that they would mean direct overflight of Warnham.

Further work was undertaken to adjust this route to avoid direct overflight of residences and residential areas, resulting in 'Option A' as presented in Section 6 of this consultation. 'Option A' is also the alignment currently being trialled.

This further work also identified the possibility of making the initial turn slightly later, resulting in a further option, and parallel to alignment **d** to the north. The 20° divergence between the routes to the south and those to the west must occur approximately 2nm from the runway or earlier. Option A turns approximately half a nm within the limit. Option B was therefore developed to put this turn as far out as it could go whilst still enabling reduced separation between flights on the routes to the south and those to the west.

Turning the BOGNA/HARDY routes by less than 20° requires a complementary turn on the SAM/KENET SID to provide the 20° divergence. i.e.:

- alignment **c** in Maps D1 and D2 turns the BOGNA/HARDY replacement by 15° and so a complementary turn of 5° is required on the SAM/KENET route taking it to alignment **y**.
- alignment **b** in Maps D1 and D2 turns the BOGNA/HARDY replacement by 10° and so a complementary turn of 10° is required on the SAM/KENET route taking it to alignment **x**.
- alignment **a** in Maps D1 and D2 turns the BOGNA/HARDY replacement by 5° and so a complementary turn of 15° is required on the SAM/KENET route taking it to alignment **w**.

Assessment of the alignments for the SAM/KENET route highlighted safety concerns with the second turn. Whilst the initial right turn would take the aircraft on this route away from aircraft on the BOGNA/HARDY route, the subsequent left turn to put them

back onto the existing SAM/KENET route alignment would be turning back towards the BOGNA/HARDY flights at a stage before the routes were sufficiently separated. This is a particular problem for alignments **w** and **x** where the turn is early. The turn back needs to occur before aircraft have gone too far north of the existing route centreline (alignment **z**), this is because there is an area busy with descending Heathrow arrivals to the northwest, and so alignments that send the Gatwick departures climbing too far to the north would present a potential safety issue. These alignments were therefore not considered further.

However, further work was undertaken on a combination of alignments **y** and **z** for the SAM/KENET route. This work identified the possibility of an alignment in between **x** and **y** (approximately 8°) and a later turn back which is late enough to ensure the required separation. It also would keep the replacement route within the existing NPR swathe.

To complement this route a further alignment option for the BOGNA/HARDY route was developed that diverges at approximately 12° from the existing track thereby giving the required divergence of 20° (12°+8°). The initial turn point on both the SAM/KENET and BOGNA/HARDY replacement was also moved out as far as possible, in line with Option B; the result is Option C as presented in Section 6 of this consultation.

Appendix E: Traffic growth assumptions

The table below shows the traffic growth assumptions from a 2012 base year.

These growth rates are based on airline demand and apply equally to the change and no-change scenarios assessed in this consultation. The RWY26 changes presented in this consultation that would affect departure routes would result in more airlines being able to depart in the hour of their choosing, rather than affecting the overall number of flights.

Note that this forecast has been updated since the London Airspace Consultation, as a result of the periodic reforecasting exercises we undertake.

Year	forecast growth from 2012
2016	14.5%
2020	21.0%

Table E1: Traffic growth assumptions

Appendix F: Altitude analysis for Gatwick departures

Map E1 (see separate Maps documents) shows a density plot analysis for 1 week of flights from 09-16 June 2013, up to 3,900ft. A summer sample was used for this analysis rather than the winter samples used elsewhere in this consultation document because higher temperatures can negatively affect climb performance. The introduction of the PBN route in November 2013 would not have affected climb performance and so, with respect to climb performance, this data set is applicable to current operation.

3,900ft was used as the cut-off point because aircraft that are level at 4,000ft will, in fact, vary by a few feet either side, for example an aircraft that has levelled at 4,000ft may in fact be fluctuating between 3,950ft and 4,050ft. Air traffic control generally use 100ft intervals, so aircraft that are in level flight slightly either side of 4,000ft would be considered to be at 4,000ft, and therefore be considered to have reached the NPR ceiling.

In each of the traffic flows to the east and to the north there are approximately 1,000 flights.

The extent of the dense red area shows where approximately 99% of aircraft have passed 3,900ft on each route. The blue lines mark the end of the dense red areas. The blue line to the north is at 8.3nm along the route from the start of the NPR and the blue line to the west is at 8.7nm from the start of the NPR. Note that this traffic flow to the west includes all the departures to the south. The route to the south is not apparent because all the aircraft in the sample passed 3,900ft before they turn to the south.

Our shortened NPR calculations rounded up to 9nm for the shortened NPR definitions.

The faded red shows that occasional flights (<1%) are below 4,000ft beyond the blue lines. However, most flights reach 4,000ft significantly before this.

The extent of the dense black area shows the point by which approximately 95% of flights have passed 3,900ft.

Intentionally blank