



Birmingham Airport Airspace Change Proposal

**Introduction of new Standard Instrument
Departure Procedures from Runway 33**



Executive Summary

The aviation industry supports 960,000 UK jobs and makes an annual contribution of £50bn to the UK's GDP. With passenger numbers expected to reach 350 million per year by 2030 it is a key component of the UK economy. Yet the UK's airspace – the network of airways and navigation aids which safely handles over two million flights every year – has remained relatively unchanged in 50 years. This essential part of our national transport infrastructure is in urgent need of modernisation, which means moving from ground-based radio beacons to modern satellite navigation. By restructuring airspace, it is possible to improve safety, increase capacity and reduce delays whilst minimising the impact on the global environment and benefitting some communities under flightpaths.

The changes we are proposing at Birmingham Airport represent our contribution to this process, which is now underway on a national scale as part of the Future Airspace Strategy (FAS). Specifically, there are two elements of airspace modernisation which we have taken into consideration.

Firstly, flightpaths at Birmingham and elsewhere are currently based on a system known as 'VHF Omni Directional Radio Range' (VOR). This enables aircraft to fix their position and stay on course by receiving radio signals transmitted by a network of fixed ground radio beacons. This technology has been in use for decades but is being superseded by more accurate satellite-based navigation. Consequently from 2018, there are plans for some of the radio beacons, which are owned and operated by NATS, the UK's main air service navigation provider, to be withdrawn from service.

Secondly, as part of the Future Airspace Strategy, there are plans to redesign UK airspace to the north of Birmingham in a project known as the Prestwick Lower Airspace Systemisation (PLAS). Our contribution to ensuring the success of this project will be to design new flightpaths for aircraft departing Birmingham for destinations to the north, so that they fit in with the requirements of the PLAS project.

BAL's brief to its procedure design team was to replicate, as far as is practicable, the existing configuration of its flightpaths, whilst taking into account the factors listed above and Government Policy and Guidance for Environmental Objectives.

This was largely achievable. However the requirements of the FAS mean that one departure route has had to be withdrawn whilst the frequency of use of the remaining procedures will change. Also, as a result of the implementation of PBN routes there will be an increase in concentration of traffic on the nominal SID centreline.

Change to flightpaths within controlled airspace is one of the criteria established by the CAA as requiring a Sponsor Consultation to be carried out. Accordingly, BAL has conducted the necessary environmental evaluation of possible procedure design options and has undertaken an extensive consultation with Industry and Community representatives in accordance with the provisions of CAP725¹.

¹ CAP725: CAA Guidance on the Application of the Airspace Change Process.

Understandably, local communities are sensitive to the issues surrounding changes to procedures for departing aircraft and the consultation saw a high level of community response over and above that submitted by the formal consultees (i.e. those on the stakeholder list).

BAL has taken account of the feedback received from both industry and local stakeholders and used this to inform its final proposal. This is detailed within the Sponsor Consultation Report.

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1. Overview of the Airspace Change Proposal

- 1.1.1 Birmingham Airport Ltd (BAL) is required to make changes to its Standard Instrument Departures (SIDs) and MOSUN procedure for aircraft departing from runway 33 in order to meet the requirements of two projects, led by NATS which are:
- The VOR rationalisation project
 - The Prestwick Lower Airspace Systemisation (PLAS) project, which is also referred to as FASI North
- 1.1.2 The VOR rationalisation project will see the removal of the ground based navigational aids upon which BAL's current conventional procedures are predicated - the Compton, Daventy, Honiley and Trent VORs - as well as the Whitegate and Westcott Non-Directional Beacons. In order to meet this requirement the existing procedures must be replaced by RNAV1 compliant procedures.
- 1.1.3 The PLAS project must fit in with the timescales set out by NATS and Birmingham Airport is required to deliver the proposed changes, set out in this document by November 2019.
- 1.1.4 As a consequence of the projects, the new SID procedures must:
- Comply with the current CAA regulations for the design of Instrument Departure Procedures (which did not exist when the current procedures were introduced);
 - Comply with the current CAA Policy that all new Instrument Departure Procedures must be designed and introduced as Area Navigation (RNAV) procedures, with a navigation standard of RNAV-1;
 - Continue to make provision for the small fleet of aircraft that are not equipped and approved by their State of Registry for RNAV-1 operations in Terminal Airspace;
 - Have due regard of the CAA's Future Airspace Strategy (FAS)
- 1.1.5 BAL's brief to its appointed procedure design team was as follows, for each of the procedures for aircraft departing from runway 33.
- 1.1.6 Replace the RNAV1 TNT1L and WHI1L SIDs with a single RNAV SID terminating at a predefined point to meet the planned changes resulting from the Prestwick Lower Airspace Systemisation (PLAS) Project, currently called BIMBA. The redesign is also to meet the requirements of CAP1398: Birmingham International Airport Standard Instrument Departures from Runway 15: CAA decision, which is to redesign the RNAV SID to meet the track of the Noise Preferential Route centreline, as consulted upon in 2013. This will be addressed in a separate submission to CAA.
- 1.1.7 Replace existing runway 33 ADMEX, UNGAP & WCO5D conventional SIDs with RNAV SIDs in order to meet the requirements of the NATS VOR rationalisation programme.
- 1.1.8 Replicate runway 33 TNT4D conventional SID with an RNAV alternative that terminates at BIMBA to meet planned PLAS changes and the NATS VOR rationalisation programme.

- 1.1.9 Design an RNAV SID to replace the current non-standard MOSUN departure procedure from runway 33.
- 1.1.10 The current WHI4D SID will not be replaced with an RNAV SID as it does not fit in with the planned redevelopment of the airspace to the north of the airport (FASI(N)) and specifically the new reporting point LUVUM. LUVUM was given the temporary working name BIMBA throughout the consultation process and will be referred to as this in the consultation responses. Therefore, it is proposed that all traffic that currently uses the WHI4D SID will instead use the new RNAV TNT SID.
- 1.1.11 Changes to SID procedures within controlled airspace is one of the criteria established by the CAA as requiring a Sponsor Consultation to be carried out. Accordingly, BAL has conducted the necessary environmental evaluation of possible procedure design options and has conducted an extensive consultation with Industry and Community representatives in accordance with the provisions of CAP725.
- 1.1.12 Upon commencement of the Airspace Change Process and in conjunction with the Airspace Change Focus Group, BAL set out four key objectives which are:
- Design procedures which are safe, flyable by all aircraft and in line with International Civil Aviation Organisation (ICAO) and CAA standards for flight procedure design and using RNAV-1 criteria
 - Meet the requirements of the Prestwick Lower Airspace Systemisation (PLAS)
 - Design procedures which match, as closely as possible, the existing arrangements, with priority being given to ensuring that they minimise the number of new people affected by any changes, rather than the total number of people affected
 - Minimise the environmental impacts as far as possible, with the focus being on minimising the impact of noise on densely populated areas below 7000 feet
- 1.1.13 This ACP arises from the CAP725 requirement specified above. Part A of the document provides background information to give the proposal context. Thereafter the contents of the formal proposal follow the format recommended in CAP725 encompassing Operational Requirements, an Environmental Report and a Consultation Report.

PART A

INTRODUCTION

2. Birmingham Airport

2.1. Overview

2.1.1. Birmingham Airport is one of the UK's largest and most punctual airports (OAG 2017). It provides a range of services, domestic, short haul and long haul, to passengers from across the Midlands and beyond. It is the third largest regional airport in the UK, and the second largest regional airport in England.

2.1.2. In 2017, 12.9 million passengers travelled through Birmingham Airport. This is an 11.5% growth in passenger numbers since 2016. Birmingham Airport is the 7th largest airport in terms of passenger traffic, serving 12% Charter, 88% Scheduled, 18% domestic and 82% international.

2.1.3. As of 2017, Birmingham Airport offers 150+ direct routes and 250+ routes through hubs. The Airport has 50+ Airlines and catered for 112,878 Air Transport Movements in 2017.

2.1.4. Considerable investment has been made within the Airport in recent years, most notably in the runway extension project. The runway extension was granted full planning permission in 2012, subject to a Section 106 Agreement. Development was completed in 2014 and has improved the Region's connectivity by enabling direct non-stop air services to long-haul destinations in emerging markets.

2.1.5. Birmingham Airport is one of the most important economic drivers in the region. Through the diverse range of activities at the Airport, the wide range of users of air services and through multiplier effects, the Airport supports economic activity across a number of sectors in the regional economy. In 2016 its total economic impact in the West Midlands was around £1.3 billion in Gross Value Added (GVA). It also supported around 30,000 direct and indirect jobs. This puts the Airport in a similar bracket to developments such as HS2 as an economic driver. Across the UK, where more of the Airport's economic impact is captured, its total impact is estimated at around £2 billion in GVA and around 47,700 jobs.

2.1.6. The Airport's economic impact therefore equates to £113 of GVA per passenger which reflects:

- Birmingham Airport's role as a major piece of transport infrastructure;
- Its crucial role in providing international connectivity to the region's highly significant manufacturing sector and a range of financial and business services
- Its role in supporting the visitor economy in the region.

2.1.6. The Airport are currently in the process of updating the Master Plan in order to align with the Government's emerging Aviation Strategy, increased passenger growth and the arrival of HS2 in 2026.

2.2 Current airspace arrangements

2.2.1 Birmingham Airport and its Air Traffic Management operations are wholly contained within the Birmingham Control Zone (CTR), with Control Area (CTA) stubs linking it to the Daventry CTA and thence to the en-route Airways System. The Birmingham CTR and CTA are Class D airspace, providing access to both Instrument Flight Rules

- (IFR) and Visual Flight Rules (VFR) traffic. The Daventry CTA and adjoining Airways are Class A airspace.
- 2.2.2 To the north east the Class D airspace for East Midlands Airport (CTR and CTA stubs) also adjoin the Daventry CTA and an integrated network of arrival and departure routes exists for the two Airports.
- 2.2.3 Air Traffic Services (ATS) provided comprise Aerodrome Control (ADI) together with Ground Movement Control (GMC) and Surveillance (Radar)-based Approach Control Service (APS) utilising an on airport Primary Surveillance Radar (PSR) coupled with Secondary Surveillance Radar (SSR) data provided by NATS.
- 2.2.4 Birmingham ATC interfaces with London Area Control Centre (LACC) for aircraft departing towards and arriving from the south and with the Scottish Area Control Centre (SACC) for aircraft outbound to and inbound from the north. A network of SID procedures, Standard Arrival Routes (STARs) and terminal holding patterns is established to facilitate the interface arrangements between Birmingham ATC and the respective ACCs in order to provide an integrated traffic flow for Birmingham, East Midlands traffic and other peripheral Airport operations.
- 2.2.5 The current SID procedures for Birmingham Airport, for which the runway 33 procedures are the subject of this ACP, are shown at Appendix 1 for ease of reference. Five of the procedures are conventional navigation procedures based on ground-based navigation facilities and one is a non-standard procedure published in EGBB AIP.
- 2.2.6 Once a departing aircraft has reached the specified upper limit of the Airport Noise Abatement requirements, in this case 3000ft above aerodrome level (aal), the ACC Sector or Birmingham Approach Radar is free to take the aircraft off the assigned route to facilitate the most effective integration with other traffic.

PART B

OPERATIONAL REPORT

3. Justification for change

3.1 The justification for changes to the existing SID/NPR procedures from Runway 33 stem from two different projects which are being led by NATS and detailed below.

- Prestwick Lower Airspace Systemisation project, now known as Future Airspace Strategy Implementation (FASI) North, is redeveloping all of the en-route airspace controlled by the Prestwick Centre. As a result all SIDs departing from both runway ends that use a northerly heading must terminate at a new reporting point named LUVUM.
- VHF Omni Directional Radio Range (VOR) Rationalisation project will remove the radio beacons upon which BAL's current conventional procedures are predicated upon. As a result new RNAV 1 compliant procedures must be introduced.

3.2 At the time of consultation, 5% of all runway departures use a non-standard departure procedure, which is referred to as MOSUN. The MOSUN procedure allows aircraft to exit Controlled Airspace to the west of Birmingham Airport and head over the Brecon Beacons. This allows aircraft to save circa 70 nautical track miles and avoids the congested London Airspace. Due to the nature of this procedure, its availability is limited as it requires Military Air Traffic Controllers, based at Swanwick to handle the traffic.

3.3 As such NATS are leading a separate project to introduce Controlled Airspace to allow traffic to route in this direction 24 hours a day. BAL, in conjunction with NATS, has subsequently designed a SID that will terminate at the entry point to this new airway and ends on the existing airway L151 airway. This project also fits in with the wider Future Airspace Strategy.

4. Review of current arrangements

- 4.1 For ease of reference, schematic diagrams depicting the current SID routes, NPRs and non-standard tracks (MOSUN) from runway 33 are given at Appendix 1 which give a geographical reference to the SID procedure charts at Appendix 2.
- 4.2 The implementation of the current SID/NPR procedures pre-date any records. However, they are known to have been in operation for over 28 years. The purpose of the SIDs is to deliver aircraft in to the appropriate en-route network.
- 4.3. The existing conventional SIDs were closely replicable by RNAV1 SIDs. However the greater degree of concentration offered by RNAV1 will lead to a particularly notable change for those aircraft departing runway 33, heading southbound using the ADMEX and UNGAP SIDs. This is because the current procedure requires aircraft to climb straight ahead to I-BM D2 (or 830, whichever is later) before turning right to intercept the DTY VOR R138 by DTY D26. Due to the nature of the procedure, on this turn there is a high level of dispersion dependent upon a range of factors including aircraft type, weight, meteorological conditions and coding house interpretation. The introduction of RNAV1 will reduce this swathe. However due to the nature of a 'warp around turn' there will always be a degree of dispersion, particularly in the early stages of the procedure. This can be seen in the track density plot at Appendix 3.
- 4.4 Tracks operating on northerly headings follow a much more concentrated track. This is due to the procedures having a smaller degree of track change and these can be seen in the track density plot at Appendix 4.
- 4.5 For MOSUN departures a 'non-standard' procedure is presently used whereby aircraft depart from runway 33 and "Climb straight ahead to 3 DME, then turn left cleared to leave controlled airspace on track MOSUN, climb to an altitude of 6,000 ft". As a result, there is a wide dispersion of tracks observed as different aircraft types perform differently. There is a particularly notable difference between the track flown by turbo-prop aircraft and jet aircraft, with the former turning much tighter.
- 4.6 Examination of track plots from the Airport Noise and Operations Monitoring System (ANOMS) shows the dispersion around the extended left turn (MOSUN) as referred to in 4.5. Tracks operating on northerly headings follow a much more concentrated track. This can be seen in the track density plot at Appendix 5.
- 4.7 When the existing SID procedures were initially established for Birmingham Airport, the procedure design regime was less demanding than that which exists today. Consequently the changes to the CAA's procedure design requirements mean that exact replication of the existing SIDs is unachievable.

5. Options for change

- 5.1 As noted previously there were 4 key objectives set out by BAL throughout the process which included the new procedures matching as closely as possible the existing arrangements, with priority being given to ensuring that they minimise the number of new people affected.
- 5.2 However, the removal of the VORs (as detailed in paragraph 1.1.2) requires new RNAV 1 compliant procedures to be established. This in turn means, that the new RNAV SID procedures must comply with the regulatory requirements set out in paragraph 13.
- 5.3 This requirement means that whilst existing procedures can be replicated the new RNAV SIDs will lead to a much greater level of concentration on the nominal SID centreline than that previously observed.
- 5.4 In developing a SID for the MOSUN procedure the aim was again to replicate as closely as possible the existing nominal track. However, due to the disparity between jet and turbo-prop aircraft using this procedure (as described in paragraph 5.6) there were two nominal tracks. With a requirement for RNAV1 procedures that they must be flyable by all aircraft types the design followed the track flown by the jet aircraft rather than that flown by the turbo-prop aircraft. This track also overflies less densely populated areas, including industrial estates and major transport links.
- 5.5 In developing suitable designs for SID procedures which meet the current regulatory regime, BAL engaged a CAA accredited IFP design house to develop options for consideration and consultation. In developing the new SID procedures the designers have complied with four key objectives specified by BAL, namely:
- Design procedures which are safe, flyable by all aircraft and in line with International Civil Aviation Organisation (ICAO) and CAA standards for flight procedure design and using RNAV-1 criteria
 - Meet the requirements of the Prestwick Lower Airspace Systemisation (PLAS)
 - Design procedures which match as closely as possible the existing arrangements, with priority being given to ensuring that they minimise the number of new people affected by any changes, rather than the total number of people affected
 - Minimise the environmental impacts as far as possible, with the focus being on minimising the impact of noise on densely populated areas below 7000 feet
- 5.6 In developing the definitive procedures for implementation detailed in this ACP, following the process specified in CAP725, a number of options and interpretations of the PANS-OPS have been considered and rejected. A detailed description of each option considered is given in the following paragraphs. CAP725 also requires that the “Do Nothing” option is also considered.

- 5.7 The consideration of procedures to serve aircraft which are not equipped or approved by their State of Registry for RNAV-1 operations in Terminal Airspace is addressed separately in Section 13.

6. Northbound procedures

6.1 Introduction

6.1 This section details the options considered in the development of RNAV SID procedures to replace the current conventional SID procedures for the TNT and WHI routes. The NPRs are organised 1.5km either side of the SID up to 3000 feet and are therefore considered together.

6.2 Option 1: Do Nothing

6.2.1 In any ACP, CAP725 specifies that the “Do Nothing” option must be considered in all cases.

6.2.2 In this case, the “Do Nothing” option is taken to mean retention of the currently published procedures referenced to the current ground based infrastructure and current design of the northern airspace.

6.2.3 This option is not feasible due to the removal of the ground based infrastructure (VORs) upon which the SIDs are predicated. In addition to this, the redesign of the northern airspace requires all traffic to be delivered to a new reporting point to the north of Lichfield names LUVUM (referred to as BIMBA in the consultation documentation). Due to the location of LUVUM the retention of the Whitegate SID would not be achievable.

6.2.4 The “Do Nothing” Option is therefore not available.

6.3 Option 2: Replicate the existing nominal ground tracks

6.3.1 It has already been established that the existing Whitegate procedure could not be retained due to changes to the upper airspace that are being proposed through the FASI(N) project, led by NERL. BAL, however, maintained its commitment to replicate as closely as possible the track flown by aircraft using the existing Trent procedure.

6.3.2 In the first work package delivered by the procedure designers, the initial turn on the proposed SID was later than that flown by aircraft today. BAL raised this with the designers and asked that it be reviewed in order to understand if the turn could be made earlier, in-line with that flown by aircraft today.

6.3.3 In the second work package delivered by the procedure designers this amendment was successfully made and the proposed track now replicates, as closely as possible, that flown today.

6.4 Conclusions

6.4.1 The changes to the upper en-route airspace mean that the current Whitegate SID cannot be retained in any form. In addition to this, the removal of the ground-based infrastructure upon which the Trent SID is predicated means a new SID must be created that is RNAV1 compliant. Following work carried out by BAL’s appointed procedure designers, an RNAV1 compliant SID has been created that will replicate as closely as possible the current Trent conventional procedure.

- 6.4.2 This procedure was therefore selected as Birmingham Airport's preferred option as it meets both regulatory design criteria and the objectives set out by BAL at the start of the process.
- 6.4.3 Schematic diagrams showing the nominal route and NPR of the proposed LUVUM 1D SID are shown in Appendix 6.
- 6.4.4 Following consultation, BAL has reviewed responses from consultees and has considered the issues raised. On balance BAL has concluded that there are no operational or environmental issues which preclude the adoption of the LUVUM 1D SID for implementation. Therefore, the procedure configuration of LUVUM 1D, as detailed in Draft AIP Chart format Appendix 7 of this ACP, is submitted in this ACP for CAA approval and implementation for northbound departing flights.

7. Southbound procedures

7.1. Introduction

7.1.1 This section details the options considered in the development of RNAV SID procedures to replace the current conventional SID procedures for the ADMEX, UNGAP and WCO routes. These procedures share a common NPR regime for the “close-in” segments of the procedures (up to 3000 feet from the Airport) and are therefore considered together.

7.1.2 It has long been recognised by BAL that the NPR and the procedure actually flown by aircraft do not align, resulting in many aircraft turning tight within the NPR swathe. BAL has however previously worked with a number of airlines to ‘code’ the coordinates of the NPR so that they flew that track. When BAL came to design the new procedures it was decided that both the existing published NPR and the mean track flown by aircraft today would be designed, with the former referred to Option 1 and the later referred to as Option 2.

7.1.3 BAL presented both Options 1 and 2 to the Airspace Change Focus Group with Option 2 as its preferred Option. This was due to the fact that the majority of operations flew this track as opposed to the published NPR. Option 2 also proved to be favourable when carrying out the Environmental Impact Assessment which is discussed in detail in section 18 of this report. This was recognised by the group and was subsequently the Option put forward for consultation.

7.2. Option 1: Do Nothing

7.2.1. As detailed in the Northbound case at paragraph 6.2.3, the “Do Nothing” Option is not achievable due to the removal of the ground-based infrastructure (VORs). The infrastructure upon which the southbound SIDs are predicated upon will be removed by December 2019.

7.2.2. Therefore the “Do Nothing” Option is not available.

7.3. Option 2: Replicate the existing nominal ground tracks

7.3.1. The replication, where possible, of the existing SIDs was a key objective set out by BAL. However, as referred to in paragraph 7.1.2 there is a large dispersion of tracks flown by aircraft operating using this turn. It was when agreed that BAL would proceed using the nominal track, flown by aircraft using the existing published procedure.

7.3.2. During the consultation BAL, received significant feedback from the community of Curdworth requesting that the nominal SID centreline be moved further North and positioned over J9 of the M42. BAL agreed that it was reasonable to move the nominal centreline and instructed the appointed procedure designers to make these changes.

7.3.3. It is however important to note that the change took place outside of the Noise Contours, and still flies a track that is flown by aircraft today. In addition BAL has made it clear that due to the nature of the turn, there will be a degree of dispersion

and subsequently aircraft are still likely on occasion to directly overfly Curdworth, which is located within the NPR swathe.

7.4. Conclusions

- 7.4.1. The removal of the VORs, coupled with the CAA's regulatory requirements, the international criteria for the safe design of IFPs and the requirement to adopt RNAV procedures for departing aircraft, mean that the existing SID procedures cannot be maintained.
- 7.4.2. BAL has however been able to replicate the nominal track flown by aircraft using the existing procedure with an RNAV1 design. It is however acknowledged that the implementation of this procedure will lead to a greater concentration of overflight for those residents beneath the nominal SID centreline.
- 7.4.3. Following feedback from local stakeholders a minor track amendment has been made and subsequently incorporated into this proposal. The amendment moved the nominal SID centreline, approximately 0.4km north in the vicinity of Curdworth.

8. MOSUN procedure

8.1 Introduction

- 8.1.1 This section details the options considered in the development of an RNAV SID to replace the existing non-standard departure procedure, commonly referred to as MOSUN.
- 8.1.2 The existing non-standard MOSUN procedure is a set of written instructions, published in the EGBB AIP. The instructions are, “Climb straight ahead to 3 DME, then turn left cleared to leave controlled airspace on track MOSUN, climb to an altitude of 6,000 ft”. This procedure will then take aircraft into Class G Airspace, over the Brecon Beacons. Due to the Airspace required for this procedure it is only available for jet aircraft Monday to Friday between 1700 – 1000 (Local) and it is unrestricted during the weekend. It is available for turbo-prop aircraft without restriction.
- 8.1.3 The MOSUN procedure is used by aircraft heading to destinations such as the Canary Islands, Portugal and Southern Ireland and saves aircraft approximately 70 nautical miles.
- 8.1.4 NATS approached BAL in November 2016 detailing plans to implement controlled airspace to the south-west of the Birmingham CTA. This would remove the requirement for aircraft to fly through Class G Airspace and subsequently allow for it to be in operation 24 hours a day, regardless of aircraft type. NATS had stated that they intended to deliver the project during Reference Period (RP) 2 which concludes at the end of 2019. Since the formal Public Consultation closed, NATS has subsequently advised BAL that this project is now not likely to be delivered until RP 3 (post 2019). This still aligns with BAL’s consultation material which, anticipated the airways would be available by 2023.
- 8.1.5 In recognition of the implementation of additional controlled Airspace, BAL designed a SID that would replace the existing MOSUN procedure for aircraft departing from runway 33. The proposed SID, referred to as MOSUN throughout the consultation material will terminate at new waypoint, named UMLUX, which is located on L151 and will subsequently feed in to any new controlled Airspace. Until the Airspace becomes available aircraft would only be able to use the SID with the same restrictions as those currently in place for the non-standard MOSUN procedure.

8.2 Option 1: Do Nothing

- 8.2.1 Unlike the Northbound and Southbound procedures the MOSUN departure procedure does not require a DVOR but instead uses an en-route waypoint. However, as part of the Future Airspace Strategy there is a requirement to develop CAS to the west of Birmingham Airport which will be implemented by 2023. In order to feed in to this new airway Birmingham Airport has had to develop a new SID for departures from runway 33.
- 8.2.1 Therefore, to ensure the future availability of the routing the “do nothing” option is not available.

8.3 Option 2: Replicate the existing nominal ground tracks

- 8.3.1 As detailed in the northbound case at paragraph 5.5, the replication, where possible of the existing SIDs was a key objective set out by BAL. However, as referred to in paragraph 5.4, there is a large dispersion of tracks as aircraft use the left hand turn. In this dispersion, there are however two distinct sets of tracks with turbo-prop aircraft making a tighter turn and jet aircraft making a more sweeping turn. It was agreed that BAL would proceed using the nominal track, flown by aircraft using the existing published procedure.
- 8.3.2 Following consultation with BAL's appointed procedure designers, it was determined that the nominal track flown by jet aircraft would be the most appropriate track to replicate. In addition to this BAL also requested that the SID Centreline overflies the Gravely Hill Interchange (also known as Spaghetti Junction). This is a heavily industrialised area, with high background noise levels and relatively little residential housing. The appointed Procedure Designers produced a design meeting these requirements.
- 8.3.3 The runway 33 focus group was presented with the design prior to consultation and were in agreement that it met BAL's design criteria whilst also overflying industrialised areas.

8.4 Conclusions

- 8.4.1 The removal of the VORs, coupled with BAL's desire to link in with the new controlled airspace proposed by NATS means that the existing MOSUN procedure will not be available.
- 8.4.2 BAL has however been able to closely replicate the nominal track flown by jet aircraft in the early stages using the existing non-standard procedure with an RNAV1 design. It is however acknowledged that the implementation of this procedure will lead to a greater concentration of overflight for those residents residing beneath the nominal SID centreline.

9. Vertical profile of the procedures

- 9.1 It is a CAA procedure design requirement that all IFPs in UK controlled airspace must be contained at least 500ft above the base of any controlled airspace segments.
- 9.2 The upper limit of the ADMEX, UNGAP, LUVUM and UMLUX SID procedures from Birmingham Airport is 6000ft ALT. This facilitates the effective integration of arriving and departing flights in the Birmingham CTA/CTR and the Daventry CTA and beyond in accordance with current ATC practice.
- 9.3 The upper limit of 6,000ft on the UMLUX SID means that an aircraft will leave controlled airspace when it crosses out of CTA-5 and will be beneath the base of CTA-7. This is outlined in the Controlled Airspace Containment Policy published on 17th January 2014 by the Safety and Airspace Regulation Group (SARG) as something that will be considered on a case by case basis. Whilst in reality aircraft will rarely leave controlled Airspace at this point as they will climb at a greater rate than 3.3%. Further to this aircraft have flown this route for many years without issue. The safety case carried out by BAATL ATC can be found in Appendix 8 and is further detailed in the NATS RNAV SID Procedures Report 4.0 submitted with this report.
- 9.4 All SID Procedures incorporate Minimum Altitude specified points (currently defined by VOR/DME positions) to ensure that aircraft remain at least 500ft above the base of the Birmingham CTA segments and the Daventry CTA. Minimum aircraft climb gradient to achieve the specified minimum altitudes range is 3.3% for the ADMEX, UNGAP, LUVUM and UMLUX SIDs and is in-line with that published on the existing SIDs. This is well within the capabilities of all aircraft using the procedures.

10 Navigation infrastructure for RNAV operations

- 10.1** The required information relating to the infrastructure for RNAV operations is covered in detail in section 1.4 of the NATS RNAV SID Procedures Report 4.0 submitted with this report.

11. Aircraft not approved for RNAV-1 operations

- 11.1** Whilst the CAA Performance-Based Navigation (PBN) Policy published in 2010 requires all new SID procedures to be designed and promulgated as RNAV procedures, with a minimum navigation standard of RNAV-1 for terminal airspace operations, there is, as yet, no mandate placed upon aircraft operators to be so equipped and approved. Nor is there an ATC operational requirement for RNAV-1 mandated operations in the Midlands airspace area.
- 11.2** In the absence of such a mandate and operational requirement, and in accordance with the CAA PBN Policy, BAL is required to give consideration to the continued operation of those aircraft which are not equipped and approved for RNAV-1 operations in terminal airspace but, nonetheless, require access to the Airways System which remains an RNAV-5 environment.
- 11.3** BAL has conducted a survey of aircraft operators using Birmingham Airport to ascertain the equipage and approval status of the current aircraft fleets. This was done by analysing the uptake of the RNAV-1 routes that are currently in place for departing aircraft from runway 15. This has identified that in 2017 98.5% of operations from runway 15 on a southerly heading used the RNAV-1 procedure. Of the remaining 1.5%, 48.7% were RJ1H aircraft which were removed from service by the operator in August 2017 and replaced with RNAV-1 equipped aircraft.
- 11.4** However, cognisant of the fact that there will be a small number of operations that are not RNAV equipped, BAATL will individually co-ordinate each of these movements with the relevant sector.

12. SID designators

- 12.1.1 SID procedures in the UK are designated in accordance with the requirements specified in ICAO Annex 11 Appendix 3, as detailed in CAP778. As well as a Basic Indicator indicating the SID termination point (at which linkage with the en route ATS Route structure is established) and a Validity Indicator (indicating the current version of the procedure), a Route Indicator suffix is included to distinguish between two or more routes which relate the same Basic Indicator. This preserves the uniqueness of the SID Designator and ensures that procedures from different airports or runways to the same ATS Route linkage point (Basic Indicator) do not have the same designation.
- 12.1.2 As detailed in CAP778 Chapter 3 paragraph 6, the Designation of SIDs is the responsibility of SARG (formerly DAP) in order that procedures from different airports are not allocated the same SID Designator.
- 12.1.3 The new series of RNAV SIDs would be designated:
- ADMEX 2E; UNGAP 2E; LUVUM 1D; UMLUX 1D.

Accordingly, BAL requests the allocation of an additional Route Indicator for allocation to the new RNAV SIDs from runway 33.

13. RNAV Notification

- 13.1 The UK AIP at GEN 1.5 specifies the aircraft equipage and approval requirements for RNAV operations in UK airspace. However, notwithstanding the extant UK Policy that all new SID procedures must be designed and designated as RNAV SIDs with a navigation standard of RNAV-1, the section at GEN 1.5. paragraph 3.3 detailing the requirements for Precision RNAV (P-RNAV, nowadays known as RNAV-1) is still to be developed.
- 13.2 The Air Navigation Order (ANO) at Articles 124 and 125 specifies the aircraft equipage requirements for operations by UK registered aircraft and non-UK registered aircraft respectively for operations in airspace designated as RNP airspace. Although the airspace as a whole, within which the proposed RNAV-1 SID procedures will be embedded, is not designated as RNP airspace (or any other more modern PBN oriented designation) nonetheless, historically all Trial RNAV Routes have been notified, as routes rather than as airspace, for the purposes of Articles 124 and 125 of the ANO.
- 13.3 BAL anticipates that, eventually, it will be the intention of the CAA to specify on a UK-wide basis, the requirements for aircraft equipage and approval for RNAV-1 operations in UK terminal airspace and on procedures designated as RNAV-1 procedures, irrespective of the background airspace specification.
- 13.4 In the interim, BAL proposes to add a notification statement to the EGBB AD2.20 Section of the UK AIP as follows:
- 13.5 RNAV SID Procedures: The RNAV SID procedures published at AD2-EGBB-6 are hereby notified for the purposes of Articles 124 and 125 of the Air Navigation Order 2010.

14. Supporting infrastructure and resources

- 14.1 The required information relating to the infrastructure for RNAV operations is covered in detail in section 1.4 of the NATS RNAV SID Procedures Report 4.0 submitted with this report.

15. Impact on Airspace User Groups

15.1 General

- 15.1.1 The introduction of RNAV (GNSS) SID procedures by BAL from runway 33 is required to meet the requirements of two NATS led projects, namely the VOR rationalisation programme and FASI(N) project. Various airspace user categories are major stakeholders in, and are supportive of, these policies and strategies.
- 15.1.2 RNAV-1 procedures are already in place for aircraft departing from runway 15. This has enabled analysis to be carried out of the uptake of these procedures by operators using the Aerodrome for the calendar year 2017. This has shown that 98.5% of aircraft used the RNAV-1 procedures, with further information available in section 11.3. Therefore the introduction of the proposed procedures will provide these operators with properly designed and compliant RNAV procedures and eliminate the need to use “RNAV Overlay” interpretations of complex, non-compliant, conventional navigation procedures. This will improve and simplify the operation of the aircraft in the critical stages of flight immediately after departure. Speed control measures designed into the procedures will provide a greater assurance of adherence to the NPR requirements of BAL.
- 15.1.3 For the small residual fleet of non-RNAV-1 compliant commercial aircraft (less than 1.5% following the removal of the RJ1H), there will be a non-standard departure procedure published in order to allow access to the en-route airway. This is detailed further in section 11.
- 15.1.4 For corporate General Aviation (GA) operators, most modern aircraft types are equipped and approved for RNAV-1 operations in terminal airspace. However, for the few aircraft that are not equipped, the non-standard departure procedure referenced above will also be available.
- 15.1.5 For the lighter-end GA and Sport & Recreation (S&R) airspace users, very few of those operating from Birmingham Airport require access to the Airways System. The SID procedures are therefore, in general, not relevant to these airspace users. Furthermore, the dimensions of the controlled airspace in the vicinity of Birmingham Airport do not change so this ACP has no operational impact on these airspace users.
- 15.1.6 For military airspace users, the transport aircraft fleets that use Birmingham Airport are fully equipped and approved to modern commercial aircraft standards and will therefore be able to use the RNAV SID procedures. BAL has observed that military aircraft use the RNAV-1 procedures when departing from runway 15.

15.2. Impact on ATC

- 15.2.1 In terms of routine ATM operations, the minor changes to the nominal ground tracks of both the RNAV and the non-RNAV SID procedures will be transparent to ATC. Separation standards and the co-ordination and integration of traffic between controllers and between Birmingham ATC and other ATSU's will not change.
- 15.2.2 Birmingham ATC will issue departing aircraft an RNAV SID unless advised otherwise by the pilot. In this event ATC will provide alternative procedures.
- 15.2.3 For non-RNAV flights the interface between Birmingham ATC and the appropriate ACC sectors may need to be adapted to reflect the limited route availability for access to the Airways System. Any changes to the ATS arrangements in this respect are under consideration by NATS and will be developed in accordance with the appropriate NATS Safety Management requirements. It is anticipated that specific routing requirements for non-RNAV-1 aircraft from the SID end points into the wider en route structure will be published by NATS in their SRD for flight planning purposes.

16. Safety Management

- 16.1.1. Safety Management is an intrinsic element of any change to the airspace arrangements or IFPs. BAL has an obligation to provide an ATS and IFPs which are safe. The ANSP – BAATL – operates a Safety Management System (SMS) which meets the requirements specified by the CAA in CAP670 – “ATS Safety Requirements”.
- 16.1.2. In developing this ACP, sound safety management principles have been applied throughout, including in the consideration of options. The proposal has been subject to a Hazard Identification (HAZID) referred to as a HARP Form.
- 16.1.3. The initial HARP identified an issue with the LUVUM 1D SID which ended at FL080. These issues are detailed in the HARP form which can be found in Appendix 9. As a result BAL asked the procedure designers to amend the LUVUM SID to end at an altitude of 6,000ft common with all other SIDs. This was reassessed in a second HARP form which can be found at Appendix 8 and the issues were resolved.
- 16.1.4. A specific Safety Case has been developed by NATS for the proposed RNAV (GNSS) SID procedures in accordance with the CAA requirements for the introduction of RNAV procedures. This is submitted as a separate document.
- 16.1.5. Safety benefits will accrue to airspace users as a result of this ACP as it will enable the use of correctly designed RNAV SID procedures coded directly into navigation databases instead of “RNAV overlays” of complex, non-compliant, conventional navigation procedures.

PART C

ENVIRONMENTAL REPORT

17. Introduction

- 17.1.** CAP725 requires the consideration of environmental impacts as a result of any airspace change proposal.
- 17.2.** In this case, the planned removal of the ground based infrastructure and PLAS project dictates that changes to procedures must be introduced. The design of the procedures is dictated by current CAA Policies for IFP design, the CAA PBN Policy and FAS which did not exist when the current procedures were established. There is no pre-existing operational airspace management requirement or local environmental requirement which drive the change.
- 17.3.** In developing the necessary SID procedures to fit in with the VOR Rationalisation Programme and PLAS Project, the BAL objective at the outset was to, where possible, replicate the existing mean track flown when compared to the existing SID procedures, whilst giving due regard to CAP725 the technical criteria contained within the various documents set out in Annex 1 to Appendix A. For Environmental considerations this is Department for Transport (DfT), Guidance to the Civil Aviation Authority on Environmental Objectives relating to the exercise of its Air Navigation Functions, Department for Transport, Local Government and the Regions, January 2002. This has also been considered together with the latest Government Policy for Aviation, the Aviation Policy Framework (March 2013).
- 17.4.** Detailed examination revealed that the requirements of PANS OPS could be met whilst replicating the mean track, in the early stages of all SIDs that are to be retained.
- 17.5.** Throughout the development of this ACP, BAL has been conscious of the competing environmental objectives of the Airspace Change Process detailed in CAP725. Environmental assessment of feasible procedure design options has been carried out in accordance with BAL established practice, which reflects the CAA methodologies outlined in CAP725 and previously accepted by the CAA.
- 17.6.** In addition to the evaluation of the noise impact of the changes to SID procedures, BAL has also taken due regard of the potential impact on Carbon Emissions, Local Air Quality and Tranquillity and Visual Intrusion. These considerations are detailed in the following paragraphs.
- 17.7.** When the existing SID procedures were initially established for Birmingham Airport, the procedure design regime was less demanding than that which exists today. Due to the changes to the CAAs procedure design requirements it has been vital that BAL demonstrates compliance with existing policy. It should be noted that the date of implementation Birmingham Airport's existing runway 33 SIDs is unknown. It is however known to predate 1990.

18. Noise

18.1. Introduction

- 18.1.1. In carrying out its evaluation of the potential noise impact of changes to the new SIDs, BAL commissioned the Environmental Research and Consultancy Department (ERCD) of the CAA Directorate of Airspace Policy (DAP) to produce independent noise modelling.
- 18.1.2. The noise contours produced were based on Noise Energy Equivalent (Leq) which combines the noise levels of aircraft with the forecast number of aircraft over a peak daytime summer period (16th June to 15th September inclusive). In addition, Sound Exposure Level (SEL) footprints were produced for both the most frequent and the noisiest aircraft that operated at night in 2016. CAP725 requires the use of SEL Footprints when the proposed change includes changes to the distribution of flights at night below 7000ft agl.
- 18.1.3. Both the L_{eq} contours and the SEL footprints have been produced with details showing the area (in km²) and population and households encompassed. Both the population and household tables are generated to the nearest 100, as quoted in the Tables shown in Appendix 10.
- 18.1.4. When developing an amendment to the southbound turn following feedback from the Public Consultation, the requirement to commission further noise contours was assessed. Due the amendment taking place outside of the noise contour areas it was confirmed that no further noise modelling was required.

18.2. Scenario modelling

- 18.2.1. In order to assess the noise impact of the proposed changes to the departure routes a number of different scenarios were modelled. When looking at forecast years, after 2018 but before 2023 it is assumed that additional controlled airspace will be delivered through a separate project led by NATS. This additional airspace will allow for the unrestricted use of the MOSUN airway and has been reflected in the 2023 noise modelling.
- 18.2.2. The base case: contours for the year 2016:
- 18.2.3. with the proposed SIDS and with the existing SIDS.
- 18.2.4. Year of planned implementation – 2018: using traffic forecasts.
- 18.2.5. with the proposed SIDS and with the existing SIDS.
- 18.2.6. A future case - 2023: using traffic forecasts with the MOSUN airway permanently available.
- 18.2.7. with the proposed SIDS and with the existing SIDS.

- 18.2.8. Business Plan Forecast traffic data for the has been used in all forecast scenarios to show the impact of the proposed change to procedures. It should be noted that with the permanent availability of the MOSUN SID by 2023, additional traffic will route on this SID that would previously have used the Southbound SIDs.
- 18.2.9. The noise contours produced by ERCD, which were displayed on the BAL website during the period of the consultation, are reproduced at Appendices 11 to 16.
- 18.2.10. For the SEL footprints, ERCD used the noisiest aircraft (Airbus 321 with EA321C engines) that used the Airport at night in 2016 and the most frequent aircraft type that used the airport at night in 2016 (Airbus 321 with EA321V engines). Footprints were produced at 90dBA levels.
- 18.2.11. The SEL footprint charts, which were displayed on the BAL website during the period of consultation, are reproduced at Appendices 17 to 22.

18.3. Noise Study Results – L_{eq} contours

- 18.3.1. The aircraft noise study concludes that in all scenarios modelled (2016, 2018 & 2023) there is a modest increase in the population exposed to aircraft noise when comparing the proposed flightpaths to the existing flightpaths. This is attributable to the removal of the Whitegate SID leading to an increased usage of the proposed LUVUM SID.
- 18.3.2. There is also an increase in the number of Air Transport Movements forecast in the years leading up to 2023 which has contributed towards the modest increase observed. This increase in movements is likely to occur regardless of any changes made to the SIDs.
- 18.3.3. The following paragraphs detail the changes to the impact on communities as a consequence of the procedures detailed in this ACP. The Tables showing the analysis of the L_{eq} contours are given at Appendix 10.

18.4. 2016 Noise Contours - Summary of Results

- 18.4.1. The 2016 scenario shows that there would be no difference in the number of households, or in the population within noise contours, between 72 and 63 dB(A). In the 60 dB(A) noise contour, the proposed flightpaths result in a slight reduction in the population count of 100, with no changes to the number of households. Results for the 57 to 54 dB(A) noise contour show a population increase of 900 and an increase in the number of households of 500.
- 18.4.2. There is a change in the shape of the contours observed towards the North, where there is a marginal shift to the north east of the airfield. This results in a change to the 57 dB(A) noise contour bringing in properties located near to the Old Clock Garage on Newport Road, Castle Bromwich. There is also a change to the 54 dB(A) noise contour, incorporating properties located just to the east of Spitfire Island, at the intersection of the Chester Road, A47 Fort Parkway and the entrance to the Castle Vale estate.

18.5. 2018 Noise Contours - summary of results

- 18.5.1. The 2018 scenario shows that overall the proposed airspace change produces no difference in the number of households or in the population within noise contours between 72 and 63 dB(A). However, there is a population increase in the 60 dB(A) contour of 100 and an increase in the number of households of 100. In the 57 dB(A) contour there is a population increase of 500 and a household increase of 200. In the 54 dB(A) contour there is also a population increase of 800 and a household increase of 300.
- 18.5.2. Again, there is a marginal shift in the noise contours towards the north east of the airfield. This has led to a very modest change to the 60 dB(A) noise contour incorporating some properties located near to Rivermead Park, Cole Hall Lane. There is also a change to the 57 dB(A) noise contour incorporating properties located just to the north of the Old Clock Garage on Newport Road, Castle Bromwich. Again, there is a change to the 54 dB(A) noise contour to include some properties located just to the east of Spitfire Island, at the intersection of the Chester Road, the A47 Fort Parkway and the entrance to the Castle Vale estate.

18.6. 2023 Noise Contours - summary of results

- 18.6.1. The 2023 scenario shows that overall the proposed airspace change produces no difference in the number of households or in the population within noise contours between 72 and 63 dB(A). However, there is a population increase in the 60 dB(A) contour of 300 and an increase in the number of households of 100. In the 57 dB(A) contour there is a population increase of 400 and a household increase of 200. In the 54 dB(A) contour there is a reduction of the total population located within the contour of 300, whilst the total number of households remains the same.
- 18.6.2. Again, there is a marginal shift in the noise contours towards the north east of the airfield. This has led to a very modest change to the 60 dB(A) noise contour to incorporate properties located near to Rivermead Park, Cole Hall Lane. There is also a change to the 57 dB(A) noise contour which incorporates properties located just to the north of the Old Clock Garage on Newport Road, Castle Bromwich.
- 18.6.3. A reduction of the population within the 54 dB(A) contour is observed when comparing the proposed flightpaths to the existing flightpaths, due to an increased utilisation of the proposed MOSUN flightpath. An increase in the use of this flightpath is anticipated when the airspace it feeds aircraft into becomes permanently available by 2023. The early part of the track of this procedure is similar to that of the Whitegate flightpath, which it is proposed to be removed altogether. These changes have caused the contours to move slightly west when compared to 2016 and 2018.

18.8. Southbound Option 1 vs Option 2

- 18.8.1. There were two options considered for aircraft departing from runway 33 on a southerly heading. Option 1 closely replicated the published NPR centreline which is

flown by a small number of airlines, whilst Option 2 (BAL's proposed option) replicated the mean track flown. The noise results show that for Option 2 in the 72 to 60 dB(A) noise contours there was no difference in either the numbers of population or households that were overflown. However, in the 57 db(A) contour there was a population decrease of 100. Whilst this is a modest decrease it is a discernible difference in the contour which is determined by existing government policy as the 'onset of community annoyance'.

18.9. SEL footprints results

18.9.1. The Tables showing the results of the SEL footprint analysis are given at Appendix 10.

Southbound

18.9.2. The results show that for the most frequent night time aircraft type assessed there would be no change to the number of people and households within the 90dBA.

18.9.4. For the noisiest night time aircraft type assessed, there would be an increase in population of 100 and an increase in households of 100 encompassed within the 90dBA banding.

Northbound

18.9.2. The results show that for the most frequent night time aircraft type assessed, there would be a decrease in population of 300 and decrease in households of 100 encompassed within the 90dBA banding.

18.9.4. For the noisiest night time aircraft type assessed, there would be a decrease in population of 100 and decrease in households of 100 encompassed within the 90dBA banding.

MOSUN

18.9.2. The results show that for the most frequent night time aircraft type assessed, there would be a decrease in population of 100 and decrease in households of 100 encompassed within the 90dBA banding.

18.9.4. For the noisiest night time aircraft type assessed, there would be an increase in population of 100 and increase in households of 100 encompassed within the 90dBA banding.

18.10. Conclusions

- 18.10.1. In developing acceptable departure procedure designs meeting the requirements of both the VOR rationalisation and PLAS projects, BAL has conducted appropriate impact evaluations as specified in CAP725 using noise contours and SEL footprints.
- 18.10.3. As a result of the requirement for BAL to fit in with the redesigned airspace as part of the PLAS project it is proposed to withdraw the Whitegate SID. As such this has altered the Leq contour shape to the north of the airfield and subsequently led to a modest overall increase in the number of people located within Birmingham Airport's noise contours. It should however be noted that the implementation of the proposed MOSUN airway will help to mitigate some of this increase. This is due to the redistribution of flights to the west and then southwest of the airfield, reducing demand for the southbound turn.
- 18.10.4. BAL has responded to community concerns and developed an amended southbound SID which avoids the nominal SID centreline directly overflying the community of Curdworth. It should however be noted that this change took place outside of the noise contours and it is not anticipated to bring a discernible difference in the noise climate.

19. NPR swathes

- 19.1.** NPRs are routes established in the vicinity of aerodromes where it is desirable that aircraft avoid overflying noise-sensitive areas as far as is practicable.
- 19.2.** NPRs must be compatible with the initial stages of SID procedures and vice versa. The design of NPRs should ensure that flight along them does not require excessive navigational skill on the part of pilots, nor should they be beyond the operating parameters of automated aircraft operating systems. Additionally, they should not put the aircraft into a state that approaches its minimum safe operation with regard to speed or changes in direction.
- 19.3.** An NPR should also specify an upper height limit. Once the aircraft has reached the upper limit of the NPR the air traffic controllers can redirect aircraft on a tactical basis to fit in with other aircraft in the vicinity and the requirements of the air traffic management system.
- 19.4.** Birmingham Airport currently has three NPRs for aircraft taking off from runway 33: one for aircraft which will head north-west after take-off to join the en-route airways system using the Whitegate (WHI) SID. There is a second NPR for aircraft departing in a more northerly or north-easterly direction using the Trent (TNT) SID. There is then a third NPR used by aircraft on a southerly direction using the ADMEX, UNGAP and Westcott (WCO) SIDs. The upper limit of the Birmingham NPRs is currently 3000ft. The current NPRs for Birmingham Airport are shown in Appendix 1. The distribution of departing traffic between the three NPRs is typically 16% using the Whitegate SID, 13% using the Trent SID and 66% using the southbound SIDs. The remaining 5% of traffic departs from runway 33 using the MOSUN procedure which does not have an NPR. Runway 33 is typically in use for 60% of the time (annually).
- 19.5.** An important element in the establishment of NPRs is the objective that the aircraft should adhere as closely as possible to the nominal ground track. However, using current procedures there will always be a degree of dispersion around the nominal ground track of the procedure, particularly during turns. To account for the anticipated dispersion of flights a “swathe” either side of the nominal track is used for monitoring the track-keeping performance of aircraft.
- 19.6.** The width of the swathe currently used by Birmingham Airport for the NPRs is 1.5km either side of the nominal track. This is in line with the swathe used by the Department for Transport (DfT) for monitoring track-keeping performance at Heathrow, Gatwick and Stansted Airports and by most other airport operators. Its historic configuration was established by the DfT (or its predecessors) in the 1960s.
- 19.7.** It should be noted that BAL’s existing NPR for aircraft departing from runway 33 on a southerly heading does not align with the conventional SID procedure. As a result many aircraft make a tighter right turn, which can be perceived as ‘cutting the corner’. The proposed NPR swathes match the nominal track of the SID and therefore this discrepancy will not occur in the future.
- 19.8.** Whilst aircraft navigation techniques and performance have improved through the implementation of RNAV1 procedures, there will still be some dispersion either side of the nominal track. This is particularly apparent on ‘wrap around turns’ and is

something that BAL observed when implementing RNAV1 departure procedures from runway 15. Birmingham Airport uses the Airport Noise and Operations Monitoring System (ANOMS) which uses NATS SSR data to monitor track-keeping performance.

- 19.9.** Therefore, coincidental with the introduction of the new SID procedures, revised NPRs will be implemented which are coincident with the nominal track of the RNAV1 SIDs. BAL proposes to retain NPRs that are 1.5km either side of the nominal track. It is also proposed that the NPRs will have a ceiling of 3,000 feet for the LUVUM and UMLUX procedures. BAL does however intend to raise the ceiling of the ADMEX and UNGAP NPRs to 4,000 feet.
- 19.10.** The decision to raise the ceiling of the NPR on the ADMEX and UNGAP SIDs has been taken following requests from local stakeholders, most notably in the Castle Bromwich area. By raising the NPR ceiling to 4,000 feet this community feels that it will prevent aircraft from being put on headings at 3,000 feet and in turn, directly overfly the community. Birmingham Airport is supportive of this request and the proposed NPR swathes are depicted in the schematic diagram at Appendix 23.

20. Carbon assessment and climate change

20.1. BAL commissioned NATS to undertake an assessment of the impact of the new SID procedures on CO₂ emissions.

20.2. The current and proposed SIDs, together with the forecast information, including aircraft types were, modelled using the NATS Fuel Burn Model (KERMIT) to produce fuel burn and CO₂ figures for each SID for the forecast scenarios (as detailed below). The results were compared for current and proposed SIDs, including an assessment of the proposed Conventional SIDs, for the following years:

- a base case – 2016 (using actual data) to show the current situation;
- the year of implementation – 2018 (using the forecast data)
- a future case - 2023 (using the forecast data)

20.3. The tables below summarise the annual estimated fuel burn and CO₂ for the SIDs collectively with and without this airspace change proposal. The data period used is the 92 day summer period (16th June to 15th September inclusive), which is the same as that used for the production of the noise contours.

Table 1. Annual Estimated Fuel Burn and CO₂ Emissions

Year	Total Movements (Departures from Runway 33)	With Airspace Change		Without Airspace Change	
		Total CO ₂ (Tonnes)	Total Fuel (Tonnes)	Total CO ₂ (Tonnes)	Total Fuel (Tonnes)
2016	9,941	36,727	11,549	38,081	11,975
2018	10,867	41,056	12,911	42,227	13,279
2023	12,037	39,264	12,347	40,540	12,748

Table 2. Overall Changes in Fuel Burn and CO₂ Emissions by Year with this airspace change

Year	Total Movements (Departures from Runway 33)	Total CO ₂ Change (Tonnes)	Total Fuel Change (Tonnes)
2016	9,941	-1,354	-426
2018	10,867	-1,171	-368
2023	12,037	-1,276	-401

20.4. There is predicted to be an increase in CO₂ emissions between 2016 and 2018. This is directly attributable to the predicted overall increase in air transport movements as the Airport grows, rather than a direct result of this airspace change proposal. In fact, as the above table shows, overall there is a modest measurable reduction in CO₂ emissions with this airspace change proposal if one assumes the same growth were to occur whether it was implemented or not. This is attributable to the fact that the new flightpaths for the Westcott, TRENT and Whitegate flightpaths are shorter than the existing ones, resulting in a reduction in aircraft track miles flown. In some scenarios they also allow for the aircraft to climb to a higher altitude than the restrictions on the current SIDs. Aircraft operate more efficiently at higher altitudes, burning less fuel and in turn releasing less CO₂.

21. Local air quality

- 21.1.** In the early stages of an aircraft's departure from the Airport, the proposed flightpaths will precisely replicate the existing ones. The point at which any change occurs is above 1000 feet attitude; therefore it is assumed that there will be no change to local air quality as a result of the proposed changes to flightpaths. Further to this the introduction of the new SIDs will not lead to any changes in fleet mix or traffic volumes.
- 21.2.** Furthermore the CAA's guidance document for airspace change, CAP 725, requires an Air Quality Assessment to be carried out only where there is a possibility of pollutants breaching legal limits at a local level and acknowledges that it is unlikely that these limits will be approached or breached for any but the UK's largest airports. Birmingham Airport monitors its Air Quality impact 365 days a year by means of an Air Quality Monitoring Station located on the airfield and the results consistently show that it operates well within the limits set by government for NO₂ and PM₁₀. Air quality under the flightpath is also monitored by dedicated Air Quality Monitoring Stations managed by Birmingham City Council (BCC).

22. Tranquillity and visual intrusion

- 22.1.** Tranquillity can be defined as a 'state of calm or quietude', and CAA guidance recommends that when airspace changes are required, consideration is given to issues of tranquillity. The measurement of tranquillity is not well developed, but the Council for the Protection of Rural England did commission research and produced tranquillity maps in 2006.
- 22.2.** A desk top study has considered the effects of both the current and the proposed flightpaths, to an altitude of 7,000 feet, on Sites of Special Scientific Interest (SSSI), Areas of Outstanding Natural Beauty (AONB) and National Parks. The study found that either beneath, or adjacent to, the existing flightpaths there are currently five SSSIs including one which is also a National Nature Reserve (Sutton Park). The introduction of the proposed flightpaths would reduce the number of SSSIs affected to two and would also mean the National Nature Reserve was no longer beneath a flightpath. This results from the removal of the Whitegate flightpath which currently overflies the SSSIs at Sutton Park, Hay Head Quarry and Daw End Railway Cutting.
- 22.3.** The two remaining SSSIs that would lie beneath the proposed new flightpaths are Edgbaston Pool and Whitacre Heath, both of which are already overflowed by aircraft operations today
- 22.4.** There are no Areas of Outstanding Natural Beauty (AONB) or National Parks within or adjacent to either the existing or the proposed flightpaths (to 7000 feet). At a wider scale, the proposed flightpaths further out from the Airport (where aircraft are significantly higher and therefore less likely to disturb tranquillity or create visual intrusion) substantially replicate the existing routes.
- 22.5.** The proposed changes would not, it is believed, have a significant effect on tranquillity or visual intrusion. Indeed, it may be argued that that the proposed changes would improve Tranquillity and reduce Visual Intrusion through the removal of the SSSIs referred to above from beneath the flightpath.

PART D

CONSULTATION REPORT

23. Executive Summary

23.1. Overview

23.1.1. This Part of the ACP document outlines the Consultation phase of the process. It is supported by a number of separately provided documents, as detailed in paragraph 25.1 below. The supporting documents provide the detail required as specified in CAP725 for this element of the ACP.

23.1.2. BAL carried out its consultation between 3rd July 2017 and 16th November 2017 in accordance with the principles set out in the Cabinet Office Code of Practice on Consultation.

23.1.3. The consultation invited responses to four key proposals, namely:

- To formalise the existing MOSUN procedure through the development of a newly designed RNAV SID.
- The removal of the existing Whitegate SID.
- An RNAV re-design of the existing Trent SID (identified in the interim as BIMBA) and the transfer of traffic currently using Whitegate onto the new Trent/BIMBA SID.
- A newly-designed RNAV SID for traffic on the southbound turn, based on the current mean track of aircraft on this routeing.

23.1.4. In total, responses were received from 22, or 9% of formal consultees. Of the 22 consultees who responded, 12 (55%) supported the proposals or had no objection to the proposed procedures. 2 consultees (9%) either stated they had no comment to make or made comments without specifically stating they were supportive or objected to the proposals. 8 consultees (36%) objected to the proposals.

23.1.5. During the consultation period 492 submissions were received from members of the public or other organisations that were not consultee stakeholders. 36 submissions (7%) supported the proposals. 451 (92%) objected to the proposals, while 5 responses (1%) did not make it clear if they were in support of, or objecting to the proposals.

23.1.6 The issues raised by all stakeholders objecting to aspects of the proposals including those from the wider community, have been carefully considered by BAL throughout the consultation period to ensure that all points raised have been considered and addressed prior to submitting the formal proposal to the CAA.

23.1.7. BAL has fully considered the results of the consultation alongside environmental and operational assessments in determining the details of the ACP it will submit to the CAA.

- 23.1.8.** In the case of one of the three procedures - that referred to as the southbound turn - BAL intends to submit a modified design which, in response to direct feedback from consultees and communities received during the consultation, will shift the SID centreline north of the village of Curdworth and closer to Junction 9 of the M42.
- 23.1.9.** BAL will submit the remaining two procedures as specified in the initial consultation document as they offer, in BAL's view, the best balance between the competing needs of communities in close proximity to the Airport whilst, at the same time, ensuring compliance with the CAA procedure design regulatory and policy requirements.

24. Supporting Documents

- 24.1.1.** Due to their size, the following documents supporting this part of this ACP are submitted separately:
- 24.1.2.** Minutes and supporting documents of the Airspace Change Focus Group;
- 24.1.3.** The Consultation Document - detailing the consultation itself and the options considered in the development of the proposals and the preferred options submitted for consultation;
- 24.1.4.** The Report of the Sponsor Consultation - detailing the statistical results of the consultation, analysis of issues raised by consultees and others throughout the consultation and BAL's response to the issues raised;
- 24.1.5.** All responses from, and correspondence with, consultees and submissions from other interested parties.
- 24.1.6.** Birmingham Airports RNAV SID Procedures Report 4.0 – detailing the technical SID Charts

25. Conduct of the Sponsor Consultation

25.1. Introduction

25.1.1. An essential element of the airspace development process is that the Change Sponsor must carry out an extensive consultation with those airspace users who may be directly or indirectly affected by the change and with organisations representing those who may be affected on the ground by the environmental impact of the change.

25.1.2. BAL carried out its consultation between 3rd July 2017 and 16th November 2017 in accordance with the principles set out in the Cabinet Office Code of Practice on Consultation.

25.1.3. BAL is aware of proposed changes to the process of developing and submitting an Airspace Change Proposal. It sought and received clarification from the CAA that its ACP, including this consultation, would be considered under the requirements of the existing process.

25.2. Consultation methodology

25.2.1. A comprehensive Sponsor Consultation Document was prepared by BAL to meet CAA requirements. It was posted at a discrete page on the Birmingham Airport website (www.birminghamairport.co.uk) on 3rd July 2017. On the same day, notifying letters were sent to consultees by e-mail and by post, detailing the consultation, how to access the documentation and how to respond. Hard copies of the documentation were made available to consultees on request.

25.2.2. To promote awareness and engagement, BAL made use of Public Notices, Social Media accounts, personal and small group briefings and local TV and Newspaper coverage. Hard copies of the documentation and response form were distributed on request and via a local library.

25.2.3. Notwithstanding that the consultation was targeted primarily at the listed stakeholder consultees, BAL gave widespread community publicity to this consultation and an initial series of 12 'roadshow' events or public meetings was advertised and staged. These took the form of a presentation of the proposals, followed by the opportunity for members of the public to engage in one-to-one and small group discussions with BAL staff, offering an opportunity to learn more about the implications of the proposed changes for their particular locality. In response to community requests, an additional event was staged at two venues.

25.2.4. The Cabinet Office Code of Practice on Consultation and the CAA requirements specify a minimum period of 12 weeks for consultation. Recognising that the consultation would take place during the busy summer holiday period, BAL extended this to 14 weeks. Therefore the Consultation began on 3rd July 2017 and was initially intended to close 9th October 2017. However, an oversight resulted in the elected representatives of a number of local council wards in Birmingham not being advised of the consultation at its launch and consequently, BAL took the decision to extend the consultation period to 16th November 2017.

- 25.2.5.** Submissions from individuals who were not listed stakeholder consultees were welcome and have been considered by BAL
- 25.2.6.** Within the consultation period consultees, and any other individuals who wished to participate, were asked to consider the proposal and submit a response to BAL, either through a discrete link on the Birmingham Airport website or in writing. In addition, consultees were given the opportunity to seek clarification of any aspect of the consultation or the proposed airspace design. Where consultees had difficulty in accessing the consultation material this was provided individually by e-mail or by hard copy.
- 25.2.7.** A number of consultees and members of the public sought additional information or clarification of the consultation material and this was provided where appropriate. However, in some cases the information sought was beyond that required for the design of the procedures or that required for consultation; in some cases these requests could not be met.
- 25.2.8.** A number of face-to-face meetings were held with consultees who expressed concerns on behalf of their constituents. These meetings were constructive and included detailed technical discussions of the concerns raised.
- 25.2.9.** Likewise, when it became clear that an oversight on BAL's part had resulted in some consultees receiving late notification, a decision was taken to address consultees concerns over a lack of time to sufficiently consider the proposals by extending the consultation period by five weeks.
- 25.2.10.** In order to promote maximum response from consultees, BAL was proactive throughout the consultation process in urging and reminding consultees to respond. A further four advisory communications were sent during the course of the consultation.

25.3. Consultees

25.3.1. At the start of the consultation Birmingham Airport sent out a notification to 254 stakeholder consultees, comprising:

25.3.2.	Airspace Users	30
	Local Aircraft Operators	36
	MPs	11
	Parish Councils	15
	Resident's Groups	6
	Airport Consultative Committee	35
	Regional Economy/Travel Trade	10
	Heritage/Environment	13
	Local Councillors	91
	Local Authority Officers	7

25.3.3 A full list of Consultees is detailed at Appendix B of the Consultation Report.

26. Overview of the responses

- 26.1.** In total, responses were received from 22, or 9% of formal consultees. While some responses did not specifically differentiate between the individual procedures under consideration, some responded specifically with reference only to one and made no comment on the other aspects of the consultation.
- 26.2.** Of the 22 consultees who responded, 12 (55%) supported the proposals or had no objection to the proposed procedures.
- 26.3.** 2 consultees (9%) either stated they had no comment to make or made comments without specifically stating they were supportive or objected to the proposals.
- 26.4.** 8 consultees (36%) objected to the proposals.
- 26.5.** Key themes or issues raised by the consultee responses have been identified and are detailed within Appendix C of the Sponsor Consultation Report.
- 26.6.** Notwithstanding that the consultation was targeted primarily at the listed stakeholder consultees, BAL has endeavoured to develop widespread community awareness and engagement. In addition to promoting the consultation through Public Notices and via Social Media platforms, the consultation was the subject of news reports in both the Birmingham Evening Mail newspaper and the BBC's Midlands Today new programme, as well as being a subject for discussion on the BBC's Sunday Politics show. 14 Community "Roadshows" were held so that members of the public could find out about the consultation and the likely effects of the proposals on local communities.
- 26.7.** Submissions from individuals who were not listed stakeholder consultees were welcome and have been considered by BAL.
- 26.8.** During the consultation period 492 submissions were received from members of the public or other organisations that were not consultee stakeholders. 36 submissions (7%) supported the proposals. 451 (92%) objected to the proposals, while 5 responses (1%) did not make it clear if they were in support of, or objecting to the proposals. Responses also included two petitions objecting to the proposals and requesting mitigation measures (these are captured and addressed in Appendix C). One was received in full and had 328 signatories, while BAL was advised of the second, with 470 signatories, in the response of a formal consultee.
- 26.9.** It should be noted that many submissions did not refer to the specifics of the proposals, but instead expressed concerns about levels of aircraft activity and noise similar to those which are received by BAL in the course of its everyday operations. It would appear that heightened awareness of aircraft activity was engendered by the publicity surrounding the consultation and that many respondents saw the consultation as an opportunity to express generalised concerns about the impact of aircraft activity on their community.
- 26.10** Many of these submissions raised issues that were broadly similar to those addressed in the responses from the formal consultee stakeholders. However, where

concerns or questions were identified which had not been raised by the consultees, these have been included in the key themes section of the Sponsor Consultation Report.

- 26.11.** Of particular note was the development of a substantial body of opinion against the proposals arising in the community of Castle Bromwich. In particular, concerns were raised about increased levels of traffic over the area resulting from the removal of the Whitegate SID and the subsequent re-routeing of traffic which had previously used it onto the Trent/BIMBA routeing, which directly overflies Castle Bromwich. This, together with concerns that they are also impacted by the southbound flightpath, provoked a considerable response from residents. In fact, over 50% of all responses received were from the Castle Bromwich area. Following the staging of a second community roadshow event in Castle Bromwich, with the support of the local MP and ward councillor, residents formed the Castle Bromwich Airport Forum and sought further dialogue with BAL in order to express their concerns. BAL was happy to engage with the group and to date, four meetings with the group have been held, involving detailed discussions of the technicalities of the ACP process, BAL's proposals, residents' concerns and their proposals for mitigating the impact of the proposals on the community of Castle Bromwich.
- 26.12.** The key themes and issues arising from the consultation, together with comment from BAL are detailed in Appendix C of the Sponsor Consultation Report.

27. Modifications to the Proposal

- 27.1.** The consultation process requires that BAL takes a balanced judgement on any key issues raised by the consultees and, if practicable within the regulations and the criteria for the safe design of IFPs, adapt the proposal to incorporate appropriate aspects of the issues raised. In this context BAL took due regard of early concerns raised by consultees in respect of the proposed southbound departure route, the centreline of which directly overflies the village of Curdworth. Consultees asked BAL to investigate the viability of re-routing the proposed design such that it took traffic further to the north, in the vicinity of Junction 9 of the M42. In response, BAL commissioned its procedure designers to investigate the feasibility of such a routeing, with the outcome that this revised routeing will be that submitted to the CAA as part of the ACP.

28. Report of the Consultation - feedback to consultees

- 28.1.** Where appropriate, an e-mail or letter was sent to consultees in response to specific queries or requests for information. Acknowledgements were sent when requested.
- 28.2.** In some cases, meetings and briefings were held with interested parties to explain the proposals in more detail, or to discuss some of the factors which had influenced the development of the proposals. In addition, requests for additional information, in some cases beyond the scope of the consultation, were made by consultees and members of the public. Where these requests could be met, appropriate responses were made.
- 28.3.** In accordance with normal consultation practice, detailed individual replies were not sent to each consultee response in order that a consolidated overview of the key themes and issues arising from the consultation could be established.
- 28.4.** With respect to submissions from individuals or organisations who were not formal consultees, in general, a standard automatically generated electronic acknowledgement was set. Again, detailed individual responses were not sent, but all submissions received full consideration.
- 28.5.** The Sponsor Consultation Report represents BAL's considered response to the consultation process and its consolidated analysis of the key themes and issues identified from all the responses received. It also provides BAL's feedback on these key themes and issues.
- 28.6.** To ensure feedback to consultees, the Sponsor Consultation Report is sent to all those who responded to the consultation and provided contact details. As such, it will form part of the formal submission to the CAA of an ACP for the introduction of new RNAV SID's for departures from Runway 33.

29. Conclusion

- 29.1.** The changes we are proposing at Birmingham Airport are the direct result of the planned removal of existing navigational infrastructure and the redesign of airspace to the north of Birmingham. As such, they represent our contribution to the process of airspace modernisation which is underway on a national scale. In preparing this Airspace Change submission, BAL believes it has proposed the most appropriate solutions to the issues which have necessitated changes to departure procedures from runway 33. It has clearly stated the principles on which its proposals have been based and believes it has been able to adhere to these while paying due consideration to those factors which have restricted its available options and, importantly, the concerns and comments of those communities who will be impacted by any changes. BAL now looks forward to the regulator's response.

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