

Doncaster Sheffield Airport

Airspace Change Proposal for the Introduction of RNAV (GNSS) Departure and Approach Procedures



Foreword

Doncaster Sheffield Airport is one of the UK's newest international airports, opening its doors in 2005, with ambitions growth plans to further serve the Sheffield City Region and surrounding parts of Yorkshire, Lincolnshire, Nottinghamshire and North Derbyshire.

The airport provides a strategic economic role for the region, increasingly recognised as a catalyst for business development, inward investment and job creation with specific emphasis on those linked to aviation activities. The airport currently supports 1,000 jobs and contributes £40 million gross value added benefit to the economy.

In the last two years over £113 million has been invested in improving surface access connectivity to the site including a new access road to the M18 motorway. There are also short and long term aspirations for direct rail links further enhancing connectivity with the rest of the region and beyond.

Whilst our growth ambitions are strong, we recognise the environmental effects associated with our activities and that our main impact on the neighbouring communities can be noise disturbance from aircraft. To grow sustainably this impact must be balanced with the benefits of the growing airport to ensure success for the site and wider region.

Introduction of new technology used to navigate aircraft and ongoing steps being consulted on by government to modernise UK airspace policy allows us to further pursue this goal.

The following document sets out our proposals to modify the departure routes from the existing, and soon to be removed, ground based navigation aids to satellite navigation, known as Area Navigation (R-Nav). In implementing this new technology we are seeking to comply with current government policies whilst committing to making improvements to benefit the immediately adjoining communities where possible.

The proposed departure routes will help us contribute towards government objectives for UK airspace as a whole, in reducing noise, less CO₂ and other emissions plus fuel and time savings. These are all objectives we enthusiastically endorse and are seeking to deliver in part through this activity.

As far as practicable, the departure routes have been matched to those currently in operation with some minor modifications where necessary, or where clear benefit to the community can be achieved. We hope that should these be approved and implemented, that benefits will be realised to the immediately adjoining communities and that the use of R-Nav will deliver more consistency and accuracy in the flight paths taken by aircraft.

The Airport Company regularly meets with the members of its Airport Consultative Committee along with the Noise Monitoring and Environmental Sub-Committee and we see this as key to ensuring accurate and informative communication of the activities and developments of the business are promulgated to the neighbouring communities.

Thank you for taking the time to read this consultation. We welcome your feedback on these proposals for implementing R-Nav technology.



A handwritten signature in black ink that reads "Steve Gill".

Steve Gill

—
Chief Executive,
Doncaster Sheffield Airport



Executive summary

Doncaster Sheffield Airport (DSA) are consulting on the introduction of aRNAV (RNAV) Standard Instrument Departure (SID) procedures and RNAV Instrument Approach Procedures (IAPs). The adoption of the departure procedures (SIDs) requires an additional portion of controlled airspace for procedure containment to the east of DSA.

The Civil Aviation Authority (CAA) requires a formal process to any airspace change, including the introduction of, or changes to, Instrument Flight Procedures (IFPs), including SIDs and IAPs. The formal change process is captured in the UK Civil Aviation Publication (CAP725⁰¹).

The project will be part funded by the European Commission (EC), as part of UK wide funding provided by the EC to help the UK accelerate the upgrading of its air traffic management systems in support of delivering a Single European Sky.

The Gamston VHF Omni-directional Radio Range (GAM VOR) is a ground-based navigational aid upon which all the existing SIDs and Preferred Departure Routes (PDRs⁰²) are predicated. NATS Services Ltd will be removing the GAM VOR in 2019, as part of a national, CAA approved, rationalisation programme. To facilitate continuous operations for aircraft departing from DSA, it is necessary that the airport replace the existing departure procedures with new procedures not reliant on this aid. The proposed new SID procedures will be designed to meet modern Performance-Based Navigation (PBN) criteria aligned to the UK Future Airspace Strategy (FAS).

We propose that current procedures be replaced with a suite of PBN SIDs based upon Global Navigation Satellite Systems (GNSS) with a navigation standard of RNAV-1 (these terms are explained in the body of this consultation document). The proposed RNAV (GNSS) SID procedures have been designed to optimise the traffic flow from DSA whilst making every effort to minimise the communities significantly affected by aviation noise.

On withdrawal of the GAM VOR the existing conventional SID and PDR procedures will be withdrawn as the residual ground-based navigation infrastructure is inadequate to support these procedures. It is proposed that an Omni-Directional Departure (ODD) be implemented for each runway to accommodate those operators who are unable to fly GNSS-based procedures.

To meet the requirements of UK FAS and as a contingency for the unlikely event of Instrument Landing System (ILS) failure, DSA are planning the introduction of RNAV IAPs. The ILS will remain the primary means of instrument approach with the existing practice of radar vectoring by ATC remaining the primary methodology for directing arriving aircraft to the ILS.

This consultation will run from 25 September 2017 to 15 December 2017. DSA encourages your participation in this consultation, details of how you can respond are given in the body of this document within Part D.

01 CAP725: CAA Guidance on the Application of the Airspace Change Process. (dated March 2016)

02 Preferred Departure Routes (PDRs) – PDRs are routes that could not previously meet the criteria of a SID due to airspace containment limitations. CAA policy has subsequently relaxed to allow SIDs to extend beyond controlled airspace.



Arrangement of this document

1. This document provides an explanation of technical issues as clearly as possible so that those not familiar with aviation terminology can understand how and why we have developed the proposed procedures in the way we have. It is necessary that the consultation document covers and explains several complex technical issues. To make the document manageable it is divided into four basic parts listed below. This introduction contains the executive summary, a list of abbreviations and acronyms used, a list of source reference documents and a contents page covering the whole of the consultation document.
2. **Part A** is a preamble that explains some of the technical terminology. Its purpose is to explain how the procedures are designed, how the proposed procedures will differ from the existing conventional⁰³ navigation procedures and how these will align with the modern aircraft navigation technologies. It then describes the existing Noise Abatement Procedures (NAPs) in place at DSA for departing aircraft, the changes that are proposed and the impacts these changes will have on the communities in and around the airport. A Glossary of Terms is included together with a list of consultees in Appendix A.
3. **Part B** explains in detail each of the proposed departure procedures and provides an overview and explanation of aspects which are common to all. Part B is supported by technical annexes that give greater detail specific to each route. The technical annexes discuss the design of each route and the options that were considered together with the environmental impact of the procedures.
4. **Part C** explains the changes being made to the arrival and approach procedures and is supported by technical annexes to give greater detail on the procedures for each runway.
5. **Part D** provides details about the conduct of the consultation itself and how you can feedback your comments on the proposed procedures. Whether you are an aviation or a community stakeholder, we welcome your contribution to our consultation.

⁰³ "Conventional Navigation" refers to navigation methodology which is essentially aligned on ground-based navigational facilities. A more detailed explanation is given in the body of this document.

Abbreviations

DSA	Doncaster Sheffield Airport	IFP	Instrument Flight Procedure
ACP	Airspace Change Proposal	IFR	Instrument Flight Rules
AIP	Integrated Aeronautical Information Package	ILS	Instrument Landing System (a ground-based navigation aid)
amsl	Above Mean Sea Level	INM	Integrated Noise Model
ANSP	Air Navigation Service Provider	IRS/IRU	Inertial Reference System / Inertial Reference Unit
AONB	Area of Outstanding Natural Beauty	ISA	International Standard Atmosphere
ATC	Air Traffic Control	KIAS	Knots-Indicated Airspeed
ATM	Air Traffic Management	MAP	Missed Approach Procedure
ATS	Air Traffic Services	NAP	Noise Abatement Procedure
BAP	Bickerdike Allen Partners	NATS	The en-route ANSP (previously National Air Traffic Services)
CAA	Civil Aviation Authority	NDB	Non-Directional Beacon (a ground based navigation aid)
CAP	Civil Aviation Publication	NTK	Noise and Track Monitoring Equipment
CAT	Commercial Air Transport	ODD	Omni-Directional Departure
DfT	Department for Transport	PC	Prestwick Centre (NERL)
DME	Distance Measuring Equipment (a ground-based navigation aid)	PBN	Performance Based Navigation
FAS	Future Airspace Strategy	RNAV	Area Navigation
FMS	Flight Management Systems	RNP	Required Navigation Performance
ft	Feet	RTF	Radio Telephony
GA	General Aviation	SEL	Sound Exposure Level
GNSS	Global Navigation Satellite Systems (space-based navigation aids, e.g. GPS)	SID	Standard Instrument Departure
IAS	Indicated Air Speed	TMA	Terminal Control Area
ICAO	International Civil Aviation Organisation	VOR	VHF Omni-Directional Radio Range (a ground-based navigation aid)

Reference documents

- [1] CAP725 – CAA Guidance on the Application of the Airspace Change Process, dated March 2016

- [2] CAP778 – Design and Operation of Departure Procedures in UK Airspace, dated November 2012

- [3] CAP785 – Approval of Instrument Flight Procedures, dated March 2010

- [4] CAP1184 – Transition to PBN in UK and Irish Airspace, dated June 2014

- [5] ICAO Doc 8168 (PANS-OPS) Volume 2: Construction of Instrument and Visual Flight Procedures, 5th Edition 2006

- [6] ICAO Doc 9613 – Performance Based Navigation Manual, 2nd Edition 1999

- [7] CAA Future Airspace Strategy, briefing paper dated November 2012

- [8] CAA Policy Statement – Policy for the Application of Performance-based Navigation in UK/Irish Airspace, dated October 2011

- [9] Department for Transport – Guidance Document Guidance to the CAA on Environmental Objectives relating to the exercise of its Air Navigation Functions dated January 2014

- [10] CAP1378 – Airspace Design Guidance: Noise Mitigation Considerations when Designing PBN Departure and Arrival Procedures, dated April 2016

- [11] CAP1379 – Description of Today’s ATC Route Structure and Operational Techniques, dated March 2016

- [12] CAP1385 – Performance-based Navigation (PBN): Enhanced Route Spacing Guidance, dated April 2016

- [13] UK AIP – Doncaster Sheffield Aerodrome AD 2-EGCN-1, current

- [14] CAP1498 – Definition of Overflight, 1st Edition dated February 2017

- [15] Department for Transport – UK Airspace Policy: A framework for balanced decisions on the design and use of airspace – Moving Britain Ahead, dated February 2017 – Under Consultation

- [16] Department for Transport Air Navigation Guidance – Guidance on Airspace and Noise Management and Environmental Objectives, dated February 2017 – Under Consultation

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PART A:
Background

1. Introduction

1.1. What is this consultation about?

1.1.1. Many airports have continued to experience an increase in air transport movements over recent years requiring the revision of operational Air Traffic Management (ATM) systems, noise considerate routings and their integration into the existing ATM en-route network. The airspace, within which these routes are contained, is a finite resource which must be flexed to support a diverse set of users. It is against this backdrop that the International Civil Aviation Organisation's (ICAO) Global ATM Operational Concept was conceived leading to regional programmes such as the Single European Sky ATM Research Programme (SESAR). SESAR was established to incorporate innovative technological developments to improve safety and efficiency whilst minimising the impact of aviation on the environment across Europe. The UK is meeting its obligations to SESAR through the FAS.

1.1.2. As the UK moves towards the application of PBN, the CAA recommends that all departure procedures should be designed as RNAV procedures with a navigation standard of RNAV-1.

1.1.3. The GAM VOR is being withdrawn as part of the NATS rationalisation programme, approved by the CAA and in keeping with the UK FAS policy.

1.1.4. This consultation, being conducted by DSA, is about the introduction of:

- RNAV SID procedures;
- RNAV IAPs;
- Omni-Directional Departures (ODDs);
- An additional CTA portion to the east of DSA; and
- The lowering of L60/L603 from FL155 to FL125 above R313.

1.1.5. These changes are compatible with CAA Policies governing Performance-Based Navigation⁰⁴ (PBN) and the design of Instrument Flight Procedures (IFPs). Improvements to the airspace construct are proposed of which more detail can be found in Part B of the document. The development and introduction of these procedures is being carried out in accordance with CAA arrangements for airspace change.

1.1.6. The driver for introducing these new procedures is the removal of the GAM VOR which provides an opportunity to modernise the ATM arrangements. DSA has sought to allow for (rather than actively encourage) greater capacity and growth in the design of these procedures to future-proof airspace arrangements and in so doing, significantly reduce the likelihood of any further changes for the foreseeable future.

⁰⁴ Performance-Based Navigation is the broad term used to describe the technologies that allow aircraft to fly flexible, accurate, repeatable, 3-dimensional flight paths using on-board equipment and capabilities. Further details of PBN concepts and UK CAA Policy can be found at www.caa.co.uk/pbn

1.2. What is this consultation not about?

- 1.2.1. It is appropriate at this stage to summarise what is not included in the scope of this consultation. The consultation is not about:
- The criteria used to design the IFPs – the CAA requires all procedures to be designed in accordance with ICAO PANS-OPS (see Section 2);
 - Future growth of DSA – the introduction of these procedures does not affect the current approved plans for growth of DSA;
 - The removal of the GAM VOR – this has been approved by the CAA and is beyond the control of DSA;
 - Air traffic movements at DSA not associated with the RNAV SIDs, ODDs and IAPs, e.g. circuit training and transit flights;
 - The CAA process for conducting airspace change – this is a mandated process that DSA are following and changes to it are beyond the control of DSA; or
 - Department for Transport (DfT) Policy on Airports and Airspace.
- 1.2.2. Any comments in your responses which are about these aspects will be noted but discounted from the analysis.

2. Area Navigation (RNAV) and Procedure Design

2.1. What is RNAV?

2.1.1. RNAV stands for aRea NAVigation. RNAV is a navigation technique which uses the modern on-board navigation technology in an aircraft Flight Management System (FMS) to take data from several internal and external navigation sources, for example ground-based and space-based⁰⁵ navigation systems and an on-board Inertial Reference Systems (IRS) to work out where the aircraft is, where it needs to go to, and what it needs to do to follow a specified flight path.

2.1.2. RNAV (GNSS) has essentially replaced the “old fashioned” navigation methodology (known as conventional navigation) whereby routes were defined by tracks aligned between a network of ground-based navigational beacons.

2.1.3. RNAV (GNSS) instead allows navigation between “points-in-space”. This enables flexible design of the ATM route structure and improves efficiencies; essential features of the UK FAS.

2.1.4. The European Commission’s Single European Sky Air Traffic Management Research (SESAR) Programme and the UK’s FAS specify that RNAV-1 should be the minimum navigation standard for operations in terminal airspace. In the case of DSA, terminal airspace is defined as the Control Zone (CTR) and the Control Areas (CTAs).

2.1.5. RNAV-1 refers to a comprehensive navigation specification which includes a requirement (amongst other system performance requirements) for a maximum 1 Nautical Mile (NM) lateral navigation tolerance either side of a nominal flight track.

The lateral navigation accuracy is not the only performance criterion specified, the standard also covers aircraft navigation system functionality, integrity requirements and flight crew training. In reality, aircraft approved for RNAV-1 operations will consistently achieve an actual navigation performance much better than 1NM. Constant review of RNAV-1 operations indicates that actual achieved navigation performance of close to 0.1NM is consistently achieved.

2.1.6. Whilst most modern aircraft are suitably equipped and approved for RNAV-1 (or better), a few operators using older aircraft types are not. The progressive nature of current regulations in the UK and Europe will eventually phase these legacy aircraft types out limiting operations from mainstream routes.

2.1.7. In the meantime, whilst the FAS requires new terminal airspace procedures to be designed as RNAV procedures, the CAA allows the retention of non-RNAV (conventional) procedures, where necessary, for use by aircraft and aircraft operators that are not approved for RNAV-1 operations⁰⁶.

2.1.8. In the initial stages of the development of the RNAV (GNSS) procedures, DSA carried out a survey of the equipment and approval status of applicable aircraft operators using the airport. It was established that most were (or would be by mid-2018) equipped and approved for RNAV-1 operations in UK and European terminal airspace.

⁰⁵ Space-based navigation satellites are known as Global Navigation Satellite Systems (GNSS), of which the best-known system is the Global Positioning System (GPS).

⁰⁶ Airports around the UK are progressively converting their long-standing conventional SIDs to RNAV procedures.

2.1.9. DSA proposes to replace the conventional SIDs and PDRs with a suite of RNAV-1 (GNSS) SIDs. Provision will be made for non-RNAV-1 approved aircraft to access the Network ATM System using Omni-Directional Departure (ODD) procedure provided for each runway. Additionally, DSA is proposing to complement the existing conventional IAPs with RNAV IAPs.

2.2. Designing RNAV Routes

2.2.1. The points defining an RNAV route are known as “waypoints” and may be specified as “flyby” or “flyover”. Waypoints are “points-in-space” and fixed as geographical (latitude/longitude) positions.

2.2.2. For “flyby” waypoints the aircraft navigation system predicts when the aircraft should start to turn to intercept tangentially the track to the next waypoint. For “flyover” waypoints, logically, the aircraft navigation system takes the aircraft over the waypoint before starting the turn towards the next waypoint.

2.2.3. Flyby waypoints are the general preferred methodology and have been utilised in the proposed designs. Generally, these provide better navigation accuracy and consistency. However, flyover waypoints may be preferred where it is necessary for all aircraft consistently to reach a specified point on the ground before turning.

2.2.4. The type of track to be followed between the waypoints is also specified in the procedure design and can be, for example (this list is not exhaustive):

- **Track to Fix (TF)** – the aircraft intercepts tangentially the track directly between the two waypoints;
- **Course to Fix (CF)** – following a flyover waypoint, the aircraft intercepts a specified track inbound to the next waypoint;

- **Course to Altitude (CA)** – the aircraft flies on a specified track until a specified altitude is reached before turning onto the course to the next waypoint. As the climbing performance of every aircraft is different, there is no specified waypoint position at the end of a CA leg and the resulting aircraft tracks across the ground are dispersed over a wider area.

2.2.5. In addition, strict rules dictate the minimum distances that can be allowed between successive waypoints. The minimum distances depend on both the types of waypoints, the leg types between the waypoints, the aircraft performance (e.g. speed and angle of bank) and the angle of the turn (track change) used in the procedure design.

2.2.6. RNAV procedures are intended to be interpreted by the numerous different computerised navigation and Flight Management Systems (FMS) in service. For this reason, very strict protocols must be observed by the procedure designer to ensure that the design can be safely flown by any of the systems in service and that the FMS can compensate within its calculations for the varying atmospheric conditions affecting an aircraft.

2.2.7. The strict design protocols that must be observed mean that there is sometimes less flexibility in designing modern, highly accurate RNAV procedures for current aircraft navigation systems than have been the case historically for previous generations of aircraft.

2.3. What are Standard Instrument Departure (SID) Procedures?

2.3.1. The International Civil Aviation Organisation (ICAO) defines SID procedures as follows:

‘...designated Instrument Flight Procedure (IFP) departure routes linking an aerodrome, or a specified runway at an aerodrome, with a specified significant point, normally on a designated Air Traffic Service (ATS) Route at which the en-route phase of flight commences.’

2.3.2. These departure routes are repeatable and act as a standard clearance to a pilot. They are distributed for aviation use in the UK Integrated Aeronautical Information Package (UK AIP), a document, published by the CAA in accordance with International Standards, which contains all aeronautical information relevant to aircraft operations in UK airports and airspace.

2.3.3. The purpose of a SID is to:

- Provide a standardised Air Traffic Control (ATC) clearance that links the aerodrome and/or departure runway to the en-route (or “Network”) ATS System⁰⁷ and is compatible with both the Network ATM System and the Airport ATM System enabling reduced inter-ATC Unit co-ordination;
- Ensure adequate clearance from obstacles in the departure path;
- Reflect the Noise Abatement requirements of the Airport Operator; and
- Provide a pre-determined flight procedure in graphical and textual format so that pilots can brief themselves in advance on the route and the required climb gradients to be followed on departure.

2.3.4. In promulgating SIDs, complex departure instructions can be simplified, potential misinterpretations avoided and Radio-Telephony (RTF) loading reduced.

2.3.5. SIDs are designed in such a way as to ensure that they:

- **Are safe to fly** by each of the aircraft categories required to use them;
- **Meet the ATS requirement** for the safe integration and separation of aircraft on closely spaced routes in complex terminal airspace; and
- **Meet the environmental requirements** of the Airport Operator as closely as practicable.

2.3.6. It is inevitable that there will be conflicts between ATM and environmental considerations. ATS providers, aerodrome operators, aircraft operators and procedure designers work closely together to derive the best possible compromise whilst still satisfying procedure design requirements. The safety of flight operations and the ATM system is paramount and must always be demonstrated.

2.3.7. The CAA requires that all SID procedures be designed in accordance with international criteria for the design of Instrument and Visual Flight Procedures⁰⁸ together with any “Differences” that the UK CAA has notified⁰⁹.

⁰⁷ Generally known as “Airways”

⁰⁸ ICAO Document 8168 Volume 2: Procedures for Air Navigation Services - Aircraft Operations: Construction of Instrument and Visual Flight Procedures (known as “PANS-OPS”).

⁰⁹ For example, the UK specifies that after take-off no turn may be commenced below 500ft above aerodrome level (aal), whereas PANS-OPS permits turns to be commenced at 394ft aal.

The CAA has published its requirements in CAP778¹⁰, CAP785¹¹ and several other Policy Statements and guidance documents^{12 13 14}.

- 2.3.8. The “PANS-OPS” document describes various technical parameters for designing procedures, including atmospheric conditions based on the International Standard Atmosphere (ISA), nominal procedure design speeds, nominal turn radii, minimum and nominal climb rates etc. The procedure design provides a “nominal ground track” appropriate to the specified set of parameters against which obstacle clearance can be assessed. However, “on the day” there will be many variables which may result in aircraft following a slightly different flight path to the “nominal ground track” of the procedure, but within the safety parameters for obstacle clearance. Aircraft will therefore fly slightly differently (albeit within accepted tolerances) to the nominal ground tracks. Examples that may influence these differences are discussed below:
- Atmospheric conditions are seldom, if ever, precisely the same as those of the ISA used for the procedure design. Temperature, pressure, wind speed and direction, and the rate at which they change with altitude are all variables which affect aircraft climb and turn performance;
 - Aircraft will inevitably fly at different speeds due to different load factors (weight), operator safety procedures and a variety of other operator defined influences; and
 - The procedure design criteria must always reflect the “worst possible case” in aircraft performance and navigation to protect aircraft from obstacle hazards.

Typically, aircraft have a considerably better actual performance (for example, climb or turn performance) than is reflected in the procedure design criteria. The design parameters provide the minimum criteria for continued safe operation of aircraft where there is a combination of adverse circumstances.

- 2.3.9. There will always be an element of dispersion, or a “swathe”, on either side of the nominal procedure design track in which aircraft can legitimately be expected to fly whilst retaining adequate protection from obstacles or other airspace hazards. Procedure design accounts for the level of dispersion based on the accuracy required for the route. Technological advancements continue to improve accuracy and repeatability and, in so doing, reduce the width of the track dispersion.
- 2.3.10. As well as describing a route, a SID procedure also includes a vertical profile that an aircraft is required to fly. The vertical profile can be expressed in terms of a minimum climb gradient (for obstacle clearance or ATM requirements) or in terms of minimum or maximum altitudes at specified points along the route. It must specify an upper limit for the procedure. Once, after take-off, the aircraft is under the control of a Radar Controller, it can be instructed to climb above these specified levels to achieve safe tactical “real-time” integration of the departing aircraft with other flights. This tactical control allows aircraft to climb as quickly as possible to their ultimate cruising level.

10 CAP778: Policy and Guidance for the Design and Operation of Departure Procedures in UK Airspace.

11 CAP785: Approval Requirements for Instrument Flight Procedures for Use in UK Airspace.

12 CAP1378: Airspace Design Guidance: Noise Mitigation Considerations when Designing PBN Departure and Arrival Procedures, dated April 2016.

13 CAP1379: CAP1379 - Description of Today's ATC Route Structure and Operational Techniques, dated March 2016.

14 CAP1385: Performance-based Navigation (PBN): Enhanced Route Spacing Guidance, dated April 2016.

2.4. How will the proposed SIDs differ from the existing procedures?

- 2.4.1. The method by which the proposed SIDs are designed and flown differ as they use a satellite navigational system whereas the existing procedures use ground-based navigational facilities that have different accuracy characteristics. The result is the increased predictability and repeatability of the tracks flown owing to the accuracy of the satellite navigational equipment employed.
- 2.4.2. The existing array of departure procedures includes a mixture of SIDs and PDRs. The PDRs were originally implemented due to restrictions imposed by policy relating to the airspace arrangements. Historically, SIDs were not permitted outside controlled airspace whereas PDRs were intended for departure routes outside controlled airspace. Introducing PDRs to the east allowed for defined and repeatable departures towards the east to a point called ROGAG¹⁵. These PDRs can now be converted to SIDs as the controlled airspace containment policy has been relaxed by the CAA. SIDs are preferred to PDRs as they follow a regulated design process and are therefore inherently safer.
- 2.4.3. It is evident, from the various diagrams depicted in this document, that aircraft currently do not follow the conventional SIDs or PDRs exactly as they were designed. Whilst there are differences in how the procedures have been interpreted from that which was intended, there is a consistency to the manner in which aircraft have flown them.
- 2.4.4. Aircraft have followed the current SID designs and remain within the allowable containment area. Operators typically input RNAV overlays into their Flight Management Systems (FMS) in order for the aircraft to automatically follow the procedure. These RNAV overlays differ due to minor differences in FMS software coding between aircraft types. The PDRs on the other hand are not as clearly defined, nor are they charted, and for this reason it is not easy to determine what should have been flown versus that which has been flown.
- 2.4.5. A maximum Indicated Airspeed (IAS) in the initial part of each RNAV SID design has been included to ensure greater track consistency. The purpose of the speed constraint is to manage the turn radius of faster accelerating aircraft in order that they do not fly a wider turn. Speed may have been a contributory factor in the historic dispersion of flight paths away from the intended procedure tracks.
- 2.4.6. In developing the proposed procedures detailed in this consultation, a series of Focus Groups were established to draw upon the experience of airline pilots and air traffic control staff to review operational efficiencies. The Airport Consultative Committee, through the Noise and Environment Sub-Committee, were included as a Focus Group to assist in determining the optimum environmental solutions. These Focus Groups resulted in the conceptual development of a refined and efficient SID array which has subsequently been put through the rigours of procedure design and simulation.
- 2.4.7. The existing and proposed arrays can be seen at [Figures 1 and 2](#).

¹⁵ Significant point name codes are defined in the UK CAA Policy Statement – Significant Point Name Codes (5LNC) and ATS Route Designators as determined by ICAO, Annex 11.

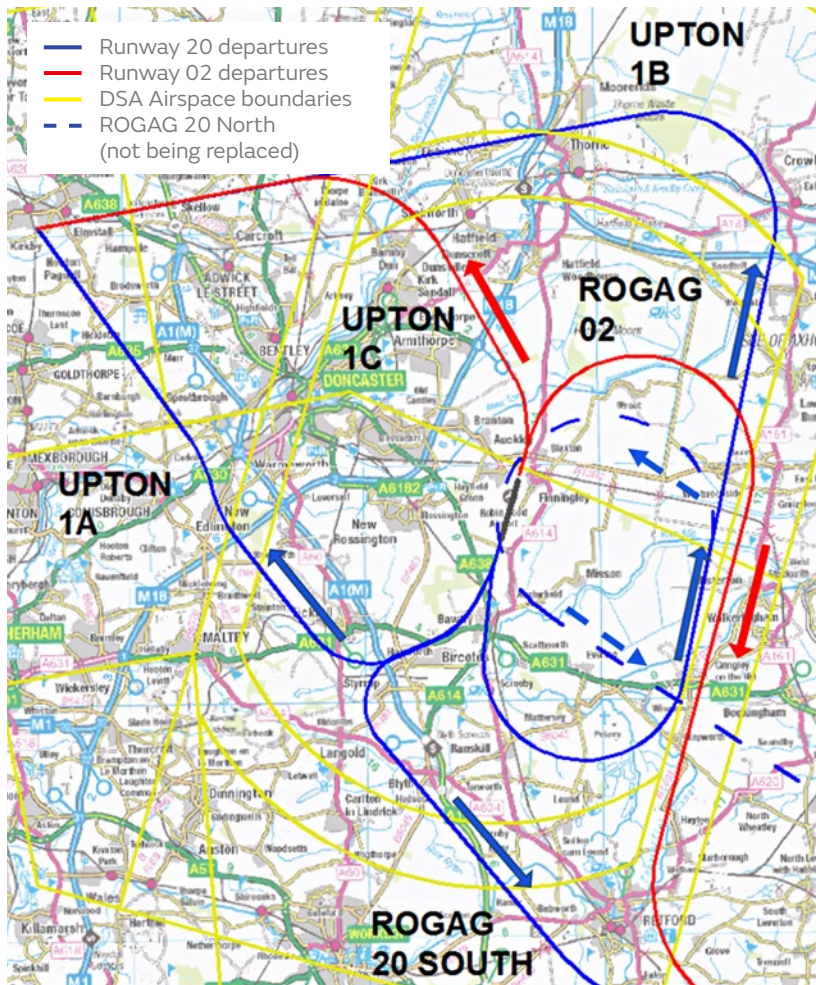


Figure 1: Existing DSA SID and PDR Array

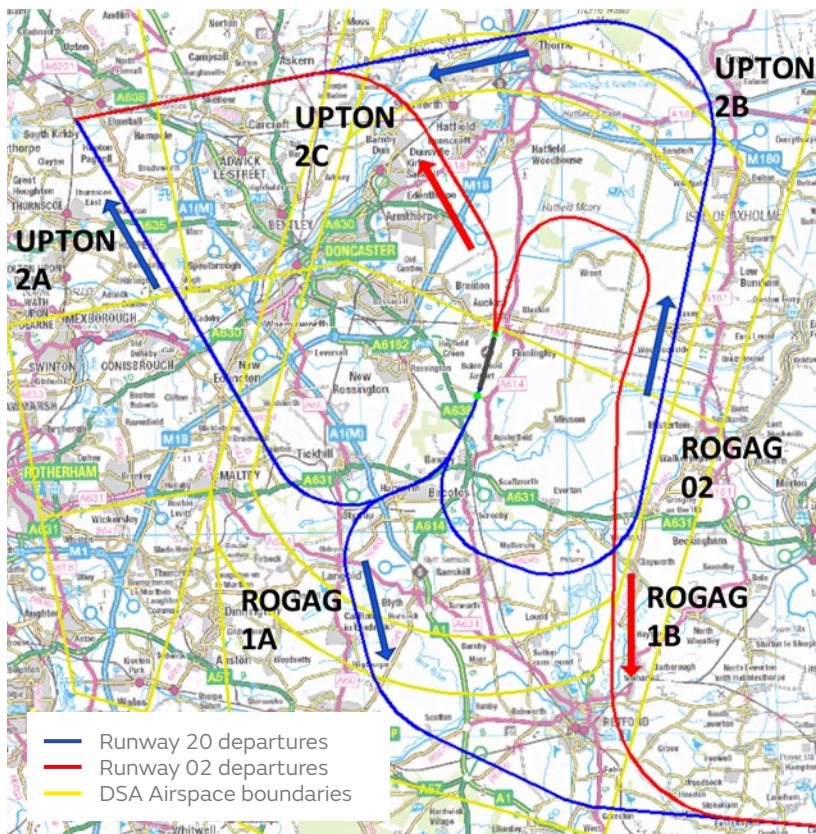


Figure 2: Proposed DSA SID Array

2.5. What is an Omni-Directional Departure (ODD)?

- 2.5.1. An ODD is a convenient and simple method of ensuring obstacle clearance for IFR departing aircraft. These procedures are designed on the basis that an aircraft maintains runway direction to a minimum height of 500 feet above aerodrome level before commencing a turn. The height restriction is a UK safety requirement and supersedes the ICAO minimum permissible turn height of 394 feet. Where additional height is required for obstacle clearance, the straight-ahead departure continues until reaching the required height. On reaching the specified height, a turn, in any direction, may be made to join the en-route phase of flight.
- 2.5.2. Aircraft will be issued an ODD to access the Terminal and Network ATM systems if they are either:
- non-RNAV-1 capable;
 - non-GNSS equipped; or
 - not capable of complying with the demands of the SID procedures.
- 2.5.3. The ATC clearance will specify the ODD route to be followed in compliance with the Noise Abatement Procedures (NAPs). This is similar to that currently provided for aircraft which cannot, for whatever reason, comply with the existing departures.
- 2.5.4. In the case of DSA, it is proposed that the ODD procedures would require the aircraft to follow runway heading until they reach 3,500 feet on a minimum 7% Procedure Design Gradient (PDG), an efficient, reasonable and acceptable PDG for all operators. On passing 3,500 feet, controllers will be able to vector the aircraft in the required direction. Climbing straight-ahead to 3,500 feet is the best option (from an airspace and obstacle perspective) to allow for the subsequent turns to the north (UPTON) or south (ROGAG) and satisfies the Minimum Sector Altitude (MSA)¹⁶, which in this case is 3,100 feet.

¹⁶ The Minimum Sector Altitude (MSA) is the lowest altitude which may be used which will provide a minimum clearance of 300 metres (1,000 feet) above all objects located in the area contained within a sector of a circle of 46 km (25 NM) radius centred on a radio aid to navigation.

2.6. What are Instrument Approach Procedures (IAPs)?

- 2.6.1. Instrument Approach Procedures (IAPs) are a series of predetermined manoeuvres for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing or to a point from which a landing may be made visually.
- 2.6.2. The existing primary IAP is the Instrument Landing System (ILS) and will be complemented with RNAV IAPs. As with the SIDs, the proposed RNAV IAPs will utilise a navigation technique which uses modern on-board navigation technology, in the aircraft FMS, to take data from several internal and external navigation sources to work out where the aircraft is, where it needs to go to, and what it needs to do to follow the specified flight path.
- 2.6.3. As previously stated, the FAS requires new terminal airspace procedures to be designed as RNAV procedures whilst allowing the retention of non-RNAV (conventional) procedures, where necessary.

2.7. How will the RNAV IAPs complement the existing ILS?

- 2.7.1. The Instrument Landing System (ILS) will remain the primary approach aid for aircraft carrying out an instrument approach at DSA with the new RNAV (GNSS) IAPs providing the redundancy required for continued operations when the ILS is out of service.
- 2.7.2. The ILS failure rate is extremely low with DSA conducting routine maintenance on a regular basis. A set of Key Performance Indicators (KPIs) have been set against unscheduled outages with current performance exceeding the KPIs ensuring continuous operations.

3. Noise Abatement Procedures (NAP)

3.1. General

- 3.1.1. DSA operates comprehensive NAPs for arriving and departing aircraft, using either runway, which are intended to minimise the noise impact and the number of people affected in proximity to the airport.

The NAPs apply to all aircraft above 5,700 kg Maximum Total Weight Authorised (MTWA)¹⁷ and require them to climb straight ahead to 0.5 DME¹⁸ from the facility before any turn is made.

Additionally, the departure procedures are designed on the basis that an aircraft does not make a turn until passing a minimum height of 500 feet above aerodrome level. The 500 feet height rule is a UK safety requirement and supersedes the ICAO minimum permissible turn height of 394 feet.

- 3.1.2. The only aspect of the NAPs that will require amendment are the Noise Preferential Routings (NPRs) described in 3.2 below.

3.2. Noise Preferential Routings (NPRs)

- 3.2.1. Included in the NAPs are NPRs that DSA has agreed with the Local Planning Authority, Doncaster Metropolitan Borough Council, under a Section 106 Agreement¹⁹. These NPRs must be followed by all departing aircraft of more than 5,700 kg MTWA with exception to deviations required for safety.
- 3.2.2. The NPRs at DSA extend from the designated runway end, centred on the nominal track of the SID and either side by 1.5km and extending to an altitude of 3,000 feet based on the minimum procedure climb gradient.
- 3.2.3. Each SID has a defined NPR and since the SIDs are changing, the NPRs will adapt to the new proposed designs. **Figures 3 and 4** provide an overview of the existing (yellow) and proposed (blue) NPRs providing a graphical indication of the changes. The proposed NPRs are slightly shorter owing to the increased climb gradient, but will still extend to 3,000 feet.
- 3.2.4. The procedure design must consider and specify minimum climb gradients. The proposed procedure designs have been predicated on a minimum climb gradient, for ATM purposes, of between 6% and 9%; a higher than normal climb gradient has in certain instances been utilised to contain the aircraft within controlled airspace. The majority of aircraft operating from DSA can achieve these climb gradients. Conversely, if an aircraft is unable to achieve these climb gradients, the ODD will be issued. Most aircraft invariably climb faster than the minimum used for procedure design purposes as the design takes into account the potential “worst case” scenario.

¹⁷ 5,700 kg MTWA is equivalent to a light twin-engine aircraft such as the Beech 200 Super King Air.

¹⁸ DME is Distance Measuring Equipment and measures the distance (in nautical miles) from the DME facility.

¹⁹ Section 106 (S106) Agreements are legal agreements between Local Authorities and developers; these are linked to planning permissions and can also be known as planning obligations.

3.2.5. The blue NPRs, in Figure 3 below, that head towards the south-west incorporates both the proposed UPTON 2A and ROGAG 1A SIDs with the UPTON 2A turning further west and the ROGAG 1A turning south.

The perimeters of the 2 NPRS create an illusion as they appear to meet and split up. It is at the edge of the blue NPRs that aircraft pass 3,000ft whilst climbing on the respective SIDs.

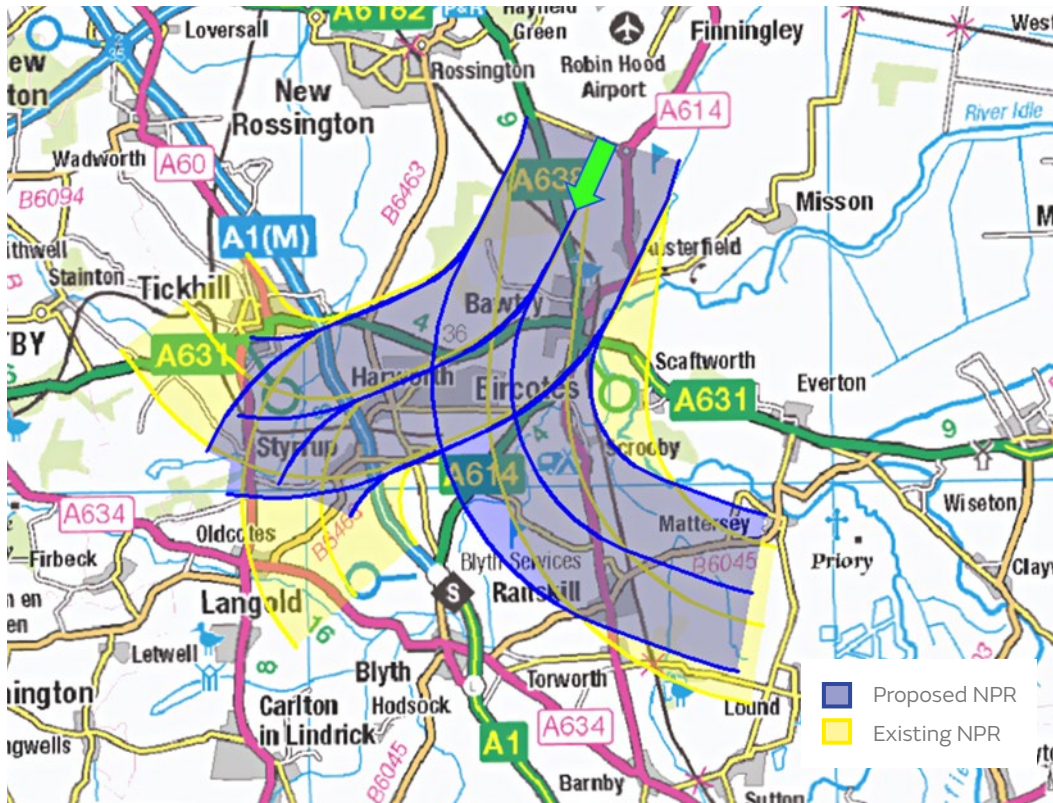


Figure 3:
Runway 20
DSA Noise
Preferential
Routings

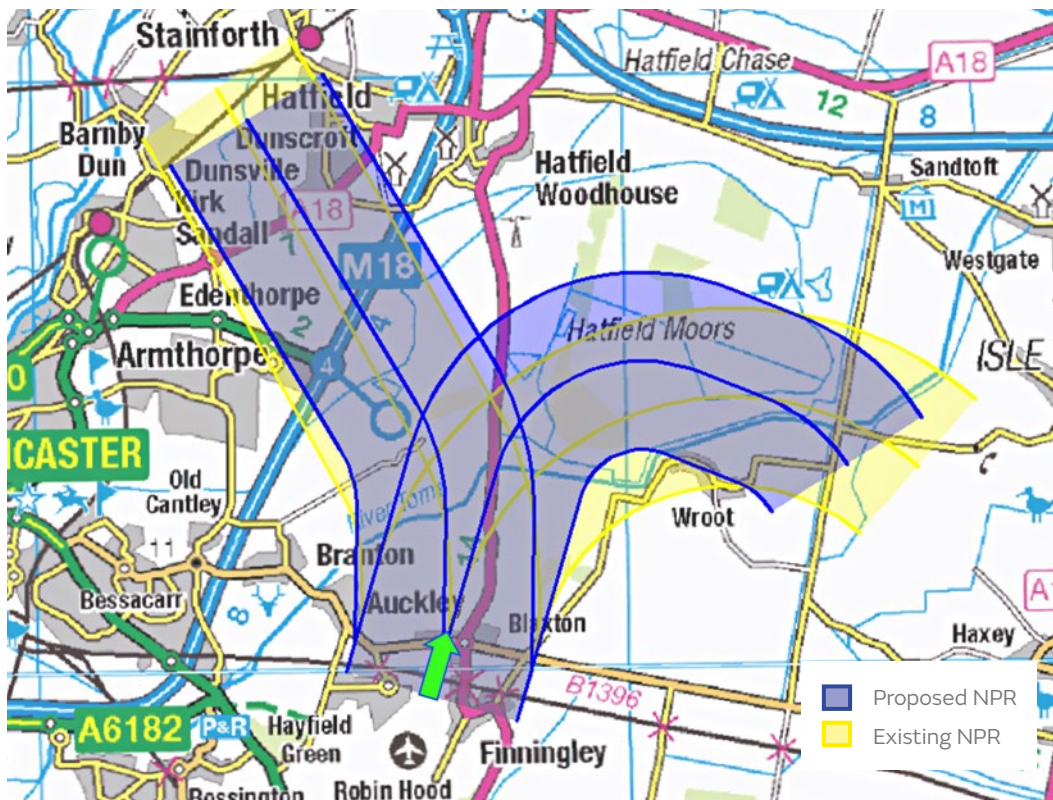


Figure 4:
Runway 02
DSA Noise
Preferential
Routings

3.3. Noise and Track Monitoring

- 3.3.1. DSA utilises a Noise and Track Monitoring (NTK) System that measures the noise generated by arriving and departing aircraft and records tracks flown.
- 3.3.2. Diagrams in this document showing historic tracks flown by aircraft are derived from the NTK System. Figures 5 and 6 show the NTK track data from the June/July period 2016 against the proposed NPRs.

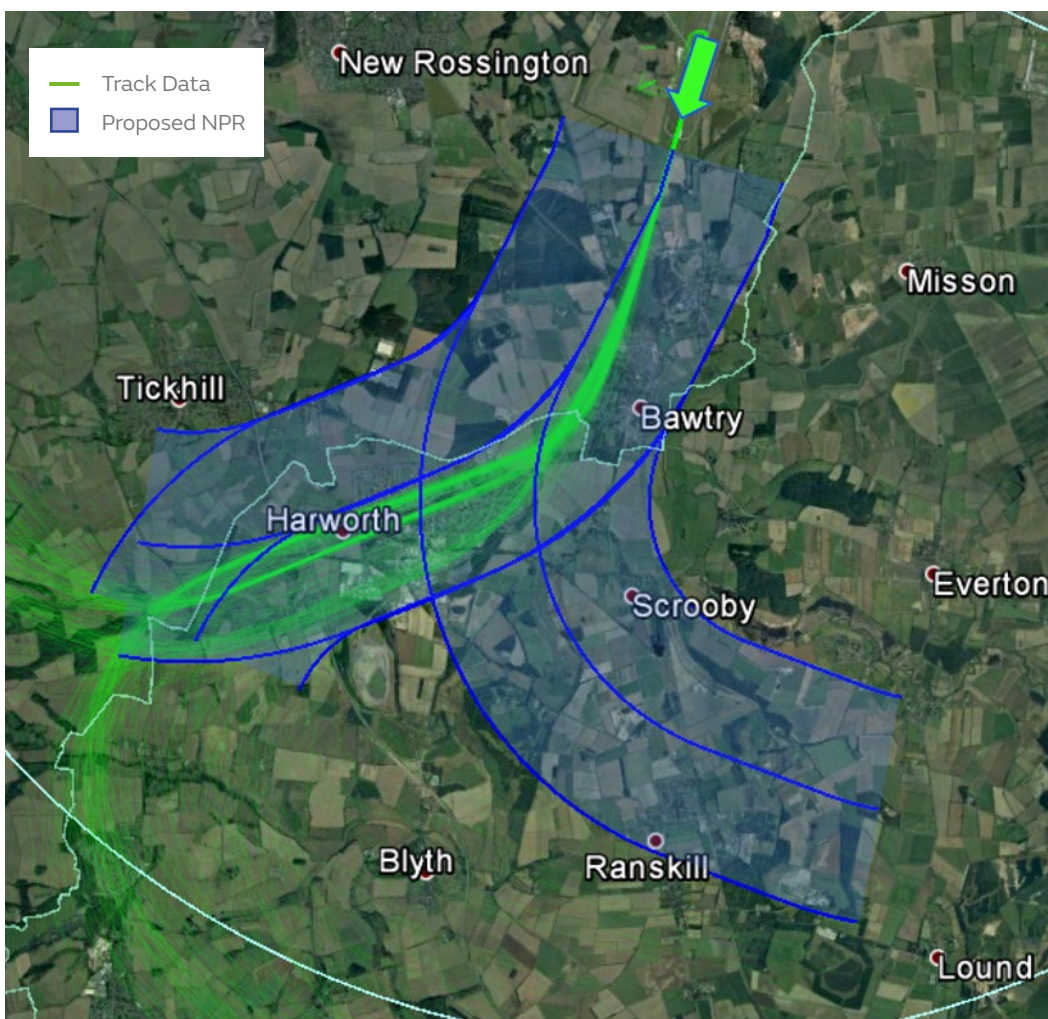


Figure 5: Proposed Runway 20 NPR with existing NTK data. Due to limited use of the current UPTON 1B SID, the NTK data does not show any significant tracks for this SID. The element of usage of the UPTON 1B and the proposed UPTON 2B are discussed in further detail in Annex B of Part B of this document. The proposed UPTON 2A and ROGAG 1A NPRs capture the existing NTK data and as such not much change is anticipated.

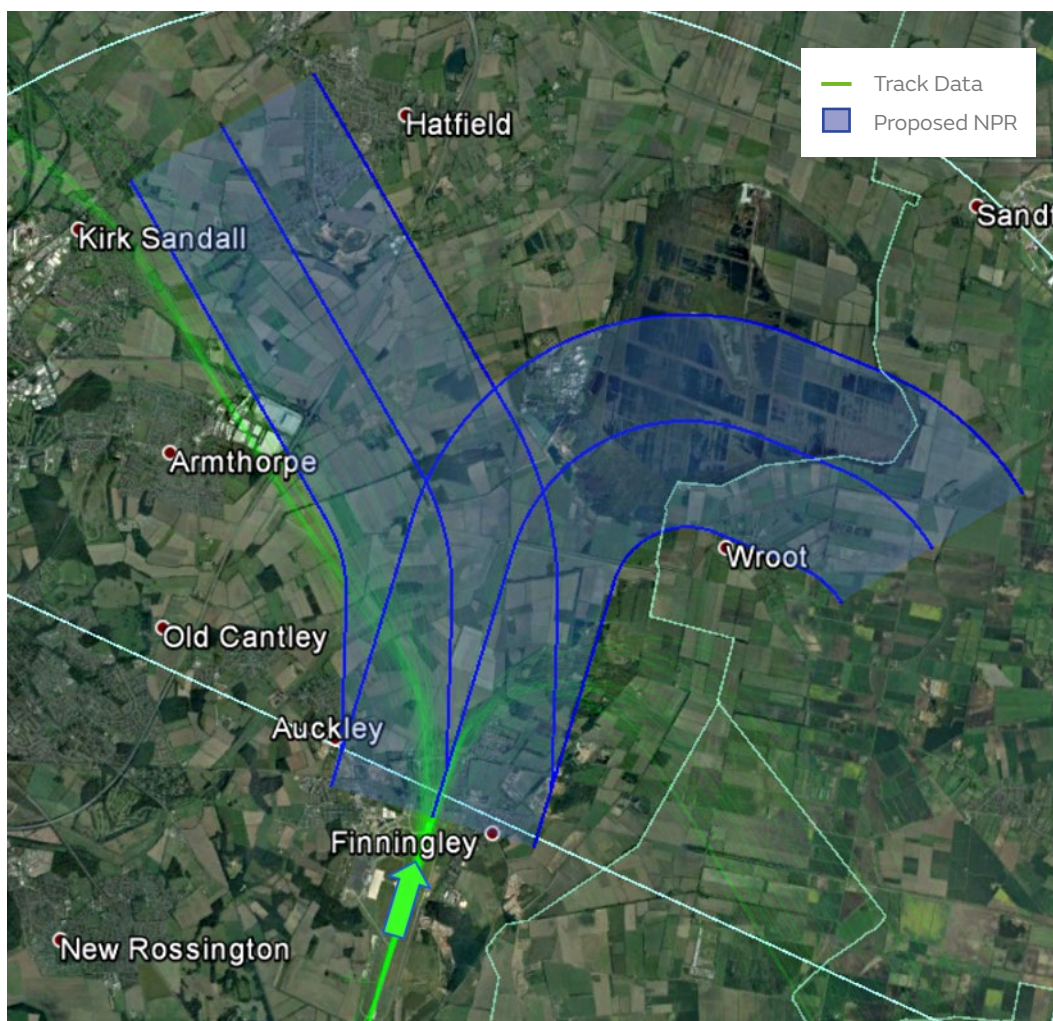


Figure 6: Proposed Runway 02 NPR with existing NTK data.
 The NTK data indicates a difference between the proposed SIDs/NPRs against what is currently flown. The intent of the proposed SIDs/NPRs is to improve track adherence using latest technology, i.e. to correct the offset flight tracks back into the NPR.

3.4. Noise Contour Charts – LAeq Contours

- 3.4.1. Noise (LAeq) contour charts are produced to show how aircraft noise from both landing and departing aircraft is distributed near the airport. LAeq is the equivalent continuous sound level measured in a unit called the “A-weighted decibel” (dB(A)), where dB means decibel (a unit of “loudness”) and A-weighted means it is matched to the frequency response of the human ear.
- 3.4.2. The noise contour charts are calculated, by independent specialists, to show the noise distribution over a daytime 16-hour period (LAeq, 16h) between 0700 and 2300 for a typical summer day. This is mainly because airports are normally busier during the summer period and a greater number of movements are likely to produce higher LAeq values. In addition, as aircraft tend to climb less well in hot weather they will be slightly closer to the ground and so LAeq values will tend to be slightly higher than in cold weather. The noise calculation produces a cautious estimate (i.e. tends to over-estimate) noise exposure. Noise levels from 51dB(A) to 72dB(A) at 3dB(A) intervals are plotted. The standard methodology throughout the UK is 57dB(A) to 72dB(A) and it should be noted that DSA has elected to provide data from 51dB(A) in line with future DfT requirements thereby exceeding existing regulation.
- 3.4.3. The noise contours allow for an assessment of the number of households and the population contained within each contour, which in turn allows for an assessment of the effects brought about by changes to the routes and traffic profiles close to the airport.
- 3.4.4. The CAA requires noise exposure contours to be produced for any airspace change which entail amendments to departure routes below 4,000ft. The contours must be produced for the current situation; the situation immediately following the change; and the predicted situation after traffic has increased under the new arrangements (typically five years).
- 3.4.5. DSA engages specialist noise consultants, Bickerdike Allen Partners (BAP), to produce noise contour charts on a regular basis. Aircraft noise is evaluated in the vicinity of airports using flight track information, aircraft fleet mix, standard defined aircraft profiles, and terrain data where included. BAP utilise software to produce noise exposure contours as well as predict noise levels at specific user-defined sites.
- 3.4.6. To produce the contours, a large grid of points with details of the aircraft type noise levels and frequencies of occurrence at each point were defined. Current SID distribution statistics for each runway direction and aircraft type were calculated and applied to the total summer period daytime departure traffic.
- 3.4.7. The LAeq, 16h contours are an average, as per UK convention, based on DSA traffic data for the summer period.
- 3.4.8. The 72dB(A) contour was produced but is not shown on the charts below as it is not easily distinguished from the other contours; it is largely limited to the airport site.
- 3.4.9. **Table 1** shows the cumulative area and population within the 2017 summer contours as well as the area and population within each 3dB contour interval. The equivalent information for both sets of 2023 contours is also included.
- 3.4.10. The contour data is similar for 2017 irrespective of whether the current or the proposed routes are in use, and is identical for the higher value contours, 60 dB LAeq, 16h and above. For the 57 dB LAeq, 16h contour there is an apparent increase in the population with the proposed routes; the difference to the situation with the current routes is only 33 people but this is exaggerated by the rounding-up required by CAP 725. The similarity is shown in the banded results where there is no difference in the rounded value for 57-60 dB LAeq, 16h.

LAeq, 16h Contour Level, dB	Area (km ²)			Population (thousands)		
	2017 Current Routes	2017 Proposed Routes	2023 Proposed Routes	2017 Current Routes	2017 Proposed Routes	2023 Proposed Routes
>51	14.6	14.7	18.1	4.4	3.7	5.5
>54	8.5	8.7	10.6	1.3	1.2	2.0
>57	5.0	5.0	6.1	0.4	0.5	0.6
>60	2.8	2.8	3.5	0.1	0.1	0.2
>63	1.6	1.6	1.9	0.0	0.0	0.1
>66	1.0	1.0	1.1	0.0	0.0	0.0
>69	0.6	0.6	0.7	0.0	0.0	0.0
>72	0.4	0.4	0.4	0.0	0.0	0.0
51–54	6.1	6.0	7.5	3.2	2.5	3.5
54–57	3.5	3.7	4.5	0.8	0.7	1.4
57–60	2.2	2.2	2.6	0.4	0.4	0.4
60–63	1.2	1.2	1.6	0.1	0.1	0.1
63–66	0.6	0.6	0.8	0.0	0.0	0.1
66–69	0.4	0.4	0.4	0.0	0.0	0.0
69–72	0.2	0.2	0.3	0.0	0.0	0.0

Table 1: Summer Noise Contour Data

A more consistent effect is found for the lowest contour considered, 51 dB LAeq, 16h, where there is a reduction in the population of around 700 which is repeated for the 51-54 dB LAeq, 16h contour band.

3.4.11. Considering the situation in 2023, an effect of the forecast increased activity is that the contours are larger and consequently contain higher populations. An increase in contour size would occur irrespective of whether the departure routes remain as current or change to those proposed. The LAeq, 16h contours themselves can be seen at **Figures 7, 8 and 9**.

3.4.12. To assist with comparing the varying populations exposed to the different levels of noise the number of people who would be 'highly annoyed' has been calculated. This has been done using the populations with the contour bands in **Table 1** and a response relationship known as the Schultz curve, as detailed in CAP 725. As would be expected this relationship has a higher proportion of people 'highly annoyed' with increasing noise level. Taking the exposure in 2017 for the current routes the calculated number of people 'highly annoyed' is 230 which reduces, by around 10%, to 202 for the proposed routes.

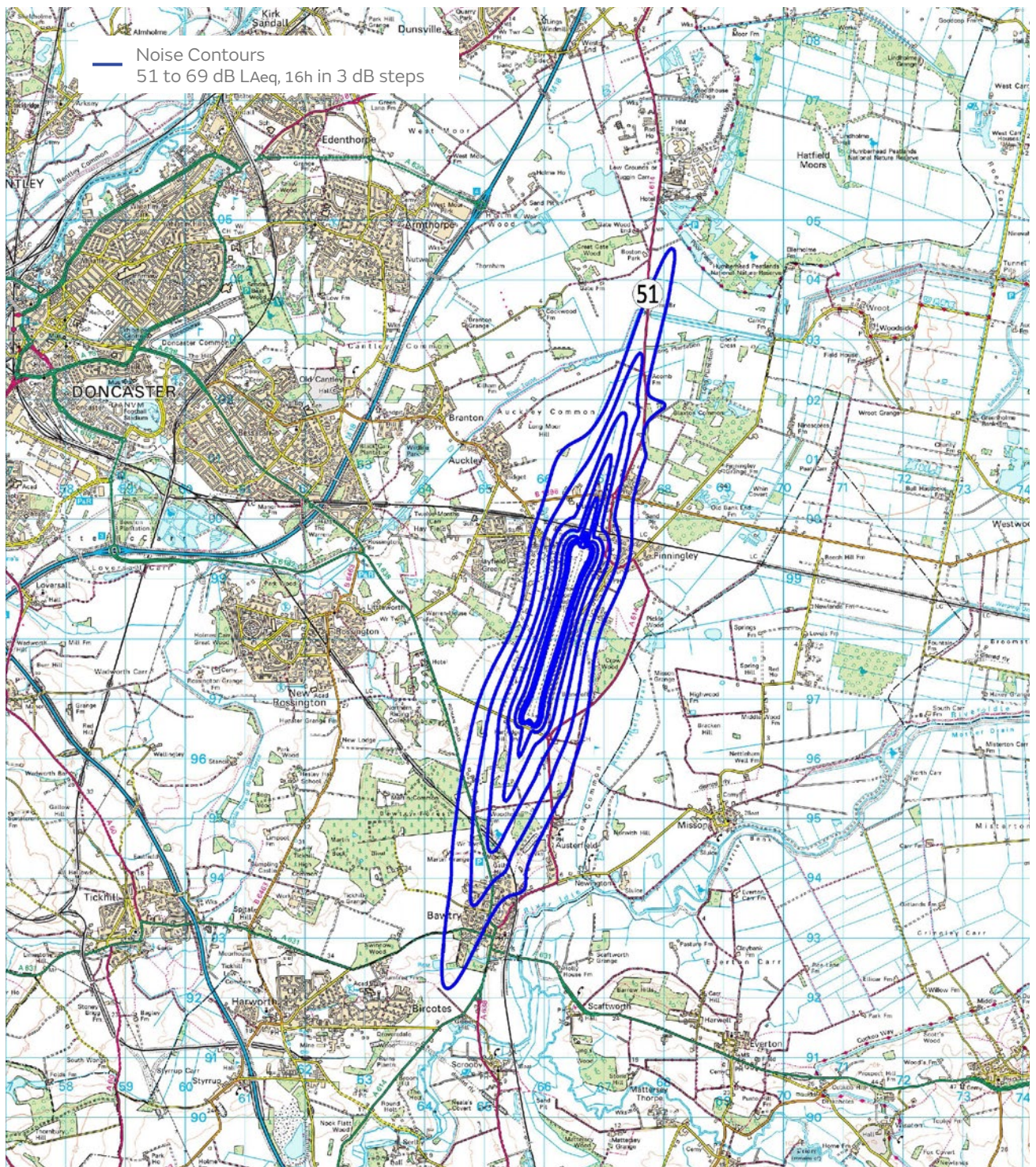


Figure 7: DSA 2018 average summer day LAeq noise contours – with existing SIDs

3.4.13. Considering the 57 dB LAeq, 16h contour, this extends from just north of Bawtry to the south of the airport to west of Blaxton Common to the north of the airport.

In doing so, the contour contains parts of Finningley and Blaxton. The lower value contours also contain parts of Bawtry.

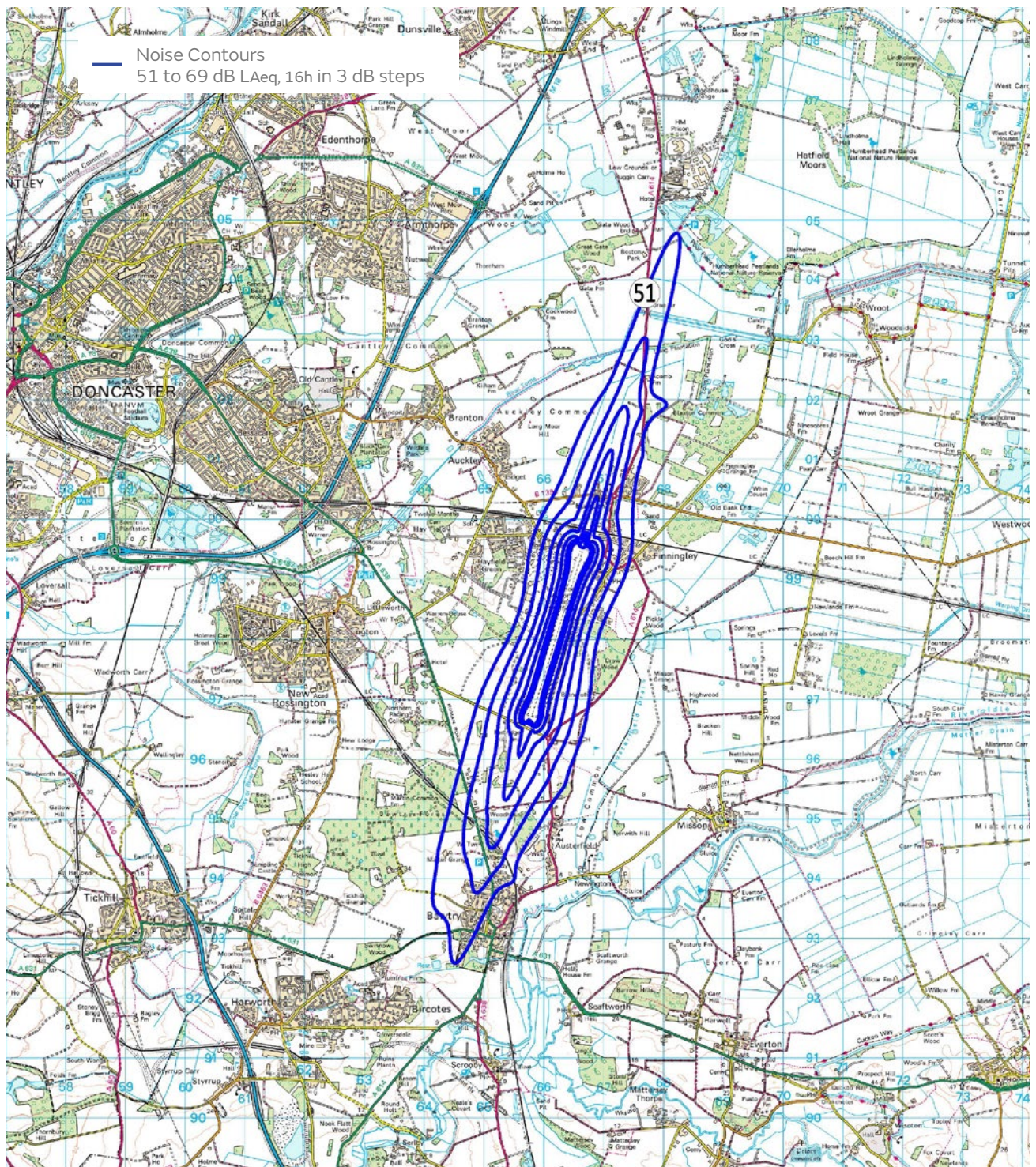


Figure 8: DSA 2018 average summer day LAeq noise contours - with airspace change

3.4.14. Considering the situation immediately following the proposed change, the contours are largely similar. The lower value contours also contain parts of Bawtry, although slightly less than the contours produced using the existing SIDs.

This similarity in the contours is expected as they only encompass the initial portion of the departure routes. The magnitude of the differences between the current and proposed routes is limited, and the contours are also significantly influenced by noise from landing aircraft which is unaffected by the proposed changes.

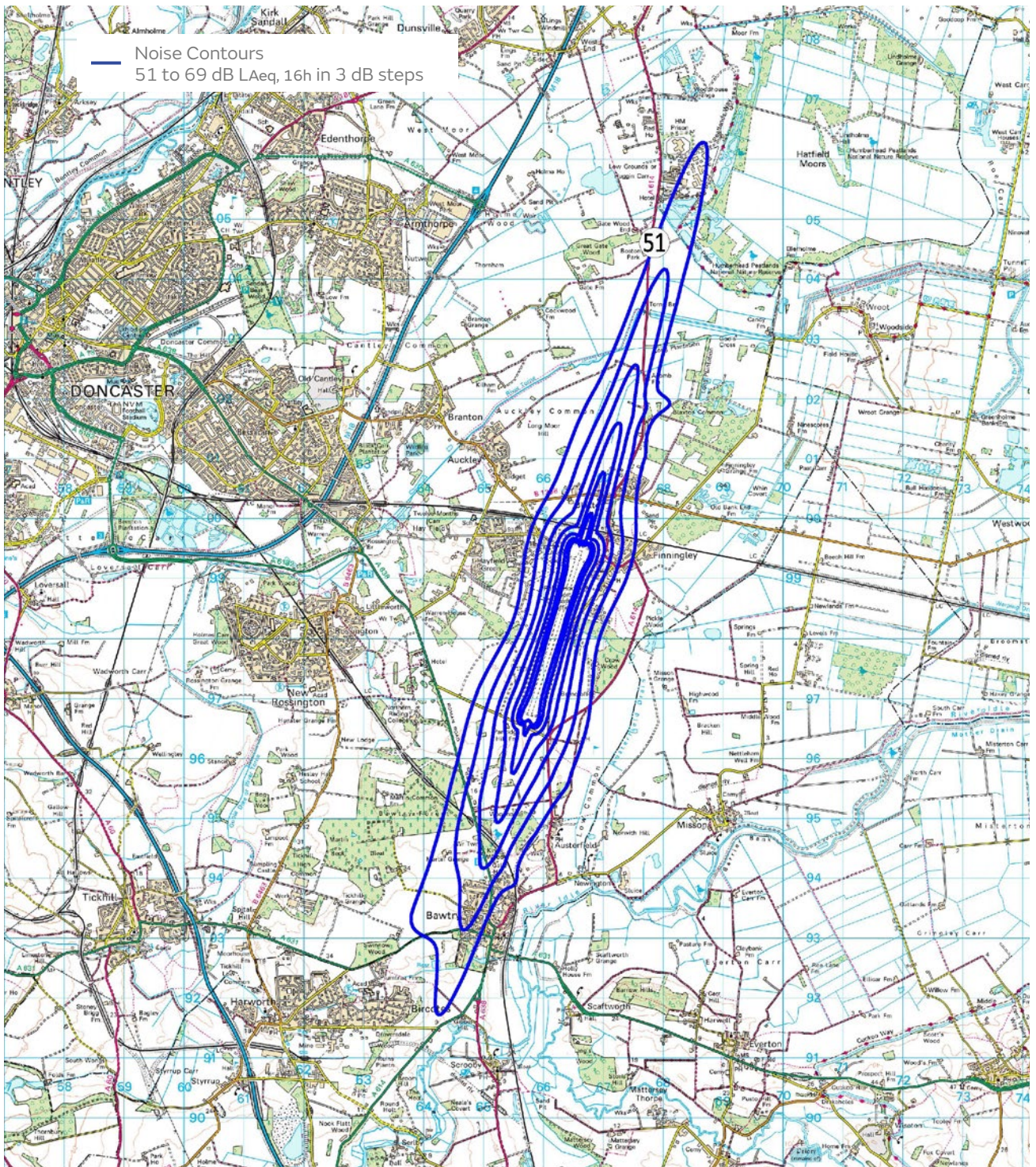


Figure 9: DSA 2023 average summer day LAeq noise contours - with airspace change

3.4.15. This extent of the contours in 2023 is similar to those for 2017 albeit a bit larger, in particular to the north of the airport.

This increase arises due to the greater movements forecast for 2023 although this is offset to some extent by the absence of a small number of relatively noisy aircraft types, such as the Boeing 727, which feature in the 2017 forecast.

3.5. Noise Contour Charts – SEL Footprints

- 3.5.1. In addition to LAeq contours, DSA commissioned Sound Exposure Level (SEL) footprints. SEL footprints show the extent of noise energy generated from a single aircraft event, for example, an aircraft either taking off or landing (in contrast to the summing of events in noise exposure). This footprint shows a contour of equal SEL values. Thus, a 90 dBA SEL footprint shows the area in which SEL values are greater than (or equal to) 90 dBA. These footprints are useful in evaluating options by identifying the relative contribution of different aircraft types, routes and operating procedures on the total noise impact. Footprints are particularly useful in portraying the impact of aircraft movements at night on sleep disturbance.
- 3.5.2. The CAA guidance is that the SEL footprints should be produced for the same three situations as the LAeq contours, based on the specific aircraft types that operate at night, particularly the noisiest and most frequent types. Night is defined as the period between 2300 and 0700. The Boeing 737-800 is the most common and the noisiest type at night in the forecasts for both 2017 and 2023. SEL footprints have therefore been prepared for this aircraft type for each of the departure routes and are shown in annexes to **Part B** and these show the area and population within the 90 and 80 dB(A) SEL footprints for departures by the Boeing 737-800 on each of the current and proposed routes.
- 3.5.3. Current DfT guidance²⁰ states: *“...that, in general, the balance of social and environmental advantage lies in concentrating aircraft taking off from airports along the fewest possible number of specified routes and that these routes should avoid densely populated areas as far as possible. The framework also stresses that any changes to departure routes should avoid significantly increasing the number of people affected by aircraft noise.”*
- 3.5.4. As a measure of this concentration, the population within the combined area of the SEL footprints of the departure routes from each runway end, for both the current and proposed routes, has also been calculated. This gives the population that will be exposed by a movement on one or more of the routes. For Runway 02 this is the combined area of two SEL footprints, the footprint from a departure on the ROGAG 1B routes and the footprint from a departure on the UPTON 1C/2C routes. Similarly, for Runway 20 the areas of three SEL footprints have been combined, one for each of the departure routes. The combined populations are also given in **Table 2** on the next page.

²⁰ DfT Guidance to the Civil Aviation Authority on Environmental Objectives Relating to the Exercise of its Air Navigation Functions (Para 7.3) - www.gov.uk/government/publications/air-navigationguidance

SEL Value	Runway	Route (Current/Proposed)	Area (km ²)		Population (thousands)	
			Current Routes	Proposed Routes	Current Routes	Proposed Routes
90 dB(A)	02	ROGAG 1B	5.8	5.7	1.8	1.5
		UPTON 1C/2C	5.7	5.7	0.8	1.1
		Combined	–	–	1.8	1.5
	20	ROGAG 1A	5.8	5.8	0.4	0.4
		UPTON 1A/2A	5.8	5.8	0.4	0.4
		Upton 1B/2B	5.8	5.8	0.4	0.4
		Combined	–	–	0.4	0.4
80 dB(A)	02	ROGAG 1B	31.3	32.6	4.2	4.7
		UPTON 1C/2C	31.5	31.6	12.8	7.3
		Combined	–	–	12.9	7.3
	20	ROGAG 1A	32.6	32.4	14.7	14.6
		UPTON 1A/2A	32.5	32.3	14.0	14.3
		UPTON 1B/2B	32.5	32.3	7.0	9.2
		Combined	–	–	15.2	15.2

Table 2: SEL Footprint Noise Data

3.5.5. Considering the footprint areas, these are very similar irrespective of the route, particularly at the value of 90 dB(A). This is expected as the route followed does not typically have a significant effect on the footprint area. When the combined effect is considered, the number of the population affected by the proposals is either the same or less. These results were expected as there is no significant change to the initial portion of the procedures.

3.5.6. The SEL contours for each proposed SID can be seen within the Annexes to Part B.

4. Environmental guidance on developing departure procedures

4.1. Department for Transport Guidance (2014)

4.1.1. In 2014, the Department for Transport (DfT) issued revised guidance to the CAA on how it should exercise its functions²¹ relating to the environmental impact of Civil Aviation and introduces the concept of altitude-based priorities for airspace development and associated route structures. These are summarised below:

- Below 4,000ft above mean sea level (amsl) the priority should be to minimise noise impact of aircraft and the number of people on the ground significantly affected by it. Where options for route design below 4,000ft are similar in terms of impact on densely populated areas then the value of maintaining legacy arrangements should be considered.
- As aircraft climb above 4,000ft amsl their noise impact reduces. Between 4,000ft amsl and 7,000ft amsl the focus should continue to be minimising the impact on densely populated areas, but may be balanced by the need for an efficient and expeditious flow of traffic that minimises emissions.
- In airspace above 7,000ft amsl the priority is efficient use of airspace with a view to minimising aircraft emissions. The impact of noise is no longer a priority.
- All changes below 7,000ft amsl should consider local circumstances in the development of airspace structures.
- Departure procedures should be designed to enable aircraft to operate efficiently and to minimise the number of people subject to noise nuisance on the ground whilst taking account of the overriding need to

maintain an acceptable level of safety.

4.2. Concentration vs Dispersion or Respite

4.2.1. It is widely acknowledged, and supported in existing DfT Guidance, that the application of PBN principles to terminal airspace operations, including the introduction of RNAV SID procedures, will serve to enhance aircraft track-keeping accuracy, meaning that aircraft will be more concentrated towards the nominal track of published procedures. This means that noise impacts will be spread over a smaller area and fewer people will be exposed to aircraft noise than has historically been the case. The result is that those affected by aviation noise (albeit fewer) may be affected on a more regular basis.

4.2.2. The existing DfT guidance considers the impact of concentrating the flight paths of aircraft over narrowly defined routes against the alternative possibility of dispersing flight paths over a wider area. This is principally considered in the context of any necessary overflight of densely populated areas. Government policy has, for many years, been that the best environmental outcome was derived from the concentration of departures over the least number of practical routes designed specifically to minimise the number of people overflowed at low levels.

4.2.3. Whenever possible, and subject to safety and operational constraints, routes should avoid densely populated areas at low level with flight over less populated, open countryside preferred.

²¹ Under the auspices of the Transport Act 2000, the Secretaries of State (SoS) for Transport and Defence issue directions to the CAA amplifying its functions and responsibilities, including Directions with respect to minimising the environmental impact of aviation. The DfT Guidance amplifies how the SoS expect the CAA to carry out these environmental functions. The CAA, in turn, exercises its responsibility through the auspices of CAP725 and requires the sponsors of airspace change to consider, inter alia, the DfT Guidance in developing their proposals.

4.2.4. The new proposed DfT guidance, currently out for consultation, requires the CAA to seek assurances from change sponsors that any opportunity to provide respite and relief to communities affected by aviation noise through dispersal or multiple routes have been adequately considered. Various options have been considered for concentrating departures on the minimum number of concentrated tracks against wider dispersal of flight paths over a larger ground footprint. It has concluded that concentration provides the best option for reducing the overall number of people affected by overflight of aircraft at low altitude.

4.2.5. In developing the SID procedures detailed in this consultation, due consideration has been made to minimise those overflown within the requirements of procedure design criteria and linking to the upper route structure. In common with most airports and their proximity to large built up areas, it is inevitable that some populated areas will continue to be encompassed within the route swathe. It is anticipated that more accurate and consistent track keeping can be expected to narrow down the lateral spread of tracks in the initial turn and lead to fewer people being overflown.

4.2.6. In the context of DSA operations, it is expected that implementation of the RNAV departures from Runway 20 will result in the concentration of the majority of IFR departing traffic on a flight path that deviates slightly to the right shortly after take-off. This should provide greater relief to those on the ground than if the departures were to continue straight ahead (as evidenced by historical track keeping data). The benefits of this should be felt by the communities of Bawtry and Bircotes.

4.2.7. Implementation of the proposed UPTON SID from Runway 02, which deviates slightly to the left, should provide relief to the communities of Auckley, Branton, Armthorpe and Kirk Sandall which are currently being overflown and should also provide some relief to the community of Blaxton.

4.2.8. It is proposed that the ROGAG route continues straight ahead for a greater distance to provide relief to the communities of Blaxton and Finningley (as compared to that experienced today), and route around the north of Wroot before turning south to remain west of Haxey and Westwoodside.

4.3. Overflight Assessment and Population Counts

4.3.1. CAP725 states that a method of portraying the potential noise impact of an airspace change is by a simple count of the population residing beneath the affected airspace. The CAA recently released CAP1498, which provides additional guidance on what or who may be considered as being overflown detailed as an overflight assessment. DSA has elected to utilise the guidance material as a means of identifying affected areas to provide information to improve an understanding of the potential impact.

4.3.2. BAP was commissioned to carry out a comparative population count and overflight assessment for the current situation with the SIDs and PDRs in place against the projected impact of the new SID designs. The concept of an overflight assessment is relatively new, and in many ways, the use of them is not yet fully validated. Nevertheless, despite not yet being mandated, DSA has elected to include them in the interests of transparency.

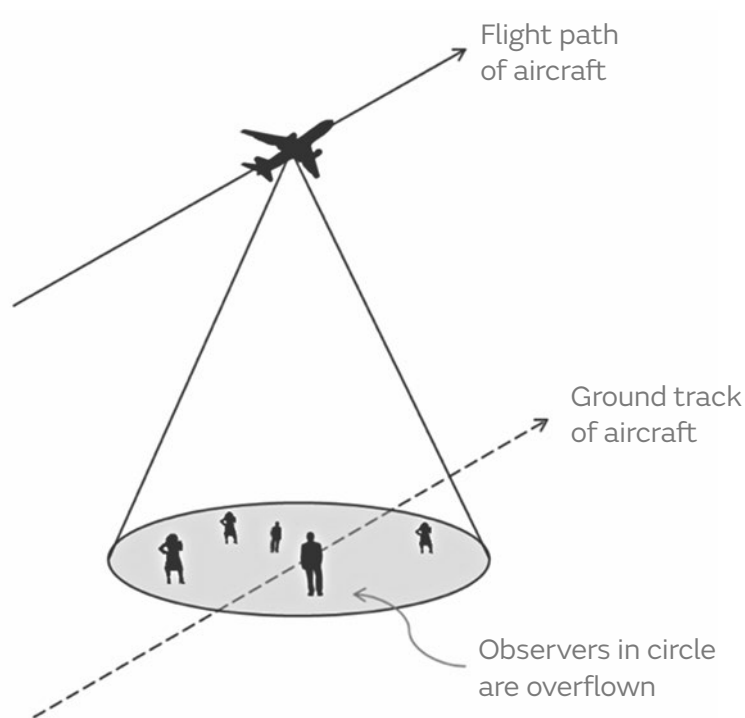


Figure 10: Overflight Cone (CAA - CAP1498)

4.3.3. In the CAA’s CAP 1498 ‘Definition of Overflight’, dated February 2017, a number of options are given for the application of the assessment. In this report, an observer has been considered as overflown if, when the path of the aircraft is at its closest horizontal distance to the observer, the aircraft is at no more than 4,000ft above the ground, and the elevation angle is at least 48.5° (as shown in Figure 10).

Using this definition of the overflight cone, contours have been produced of the number of times receptors are overflown by departures during an average day, at values from 10 upwards (in increments of 5). In the CAA document, it notes that levels below 10 “...are not typically presented due to the uncertainty in the predictions at these low levels”. This approach has been followed here, and as a consequence, there is no overflight contour for the night time as there are fewer than 10 departures on an average night in all scenarios.

4.3.4. The peculiarity of overflight metrics is the idea that if ‘one can see it, one can hear it’. By the definition of overflight one may perceive themselves as being overflown as the aircraft will, in most cases, be displaced relative to their position. The noise metrics already shown in Sections 3.4 and 3.5 evidence that the noise impact will be either comparable or better using the proposed routes.

4.3.5. Overflight contours have been produced for the same scenarios as the LAeq contours, and are shown in Figures 11 and 12. These show the areas considered overflown based upon the methodology articulated above.

4.3.6. The contour areas on Figure 12 show an increase when the proposed routes are in use as opposed to the current routes shown on Figure 11. While a key influence on these contours is the number of movements, which is unchanging, the proposed routes include an initial concentration of the flights, as the proposed routes have more commonality between them than the current routes. This is particularly true of the use of Runway 20 for departures as the initial track of the UPTON 2A and the ROGAG 1A is coincident.

Every effort has been made to reduce the swathe experienced today in a bid to affect less people overall. It was therefore proposed that the nominal track of these two SID's, which will be accurately flown using RNAV technology, should be moved to the north of Harworth as opposed to being spread across several communities.

4.3.7. Of note, the contours for Runway 02 are minimal owing to the combination of there being fewer departures and the fact that the departures are not concentrated on the same track over the ground, i.e. the UPTON and ROGAG departures are not coincident with each other.

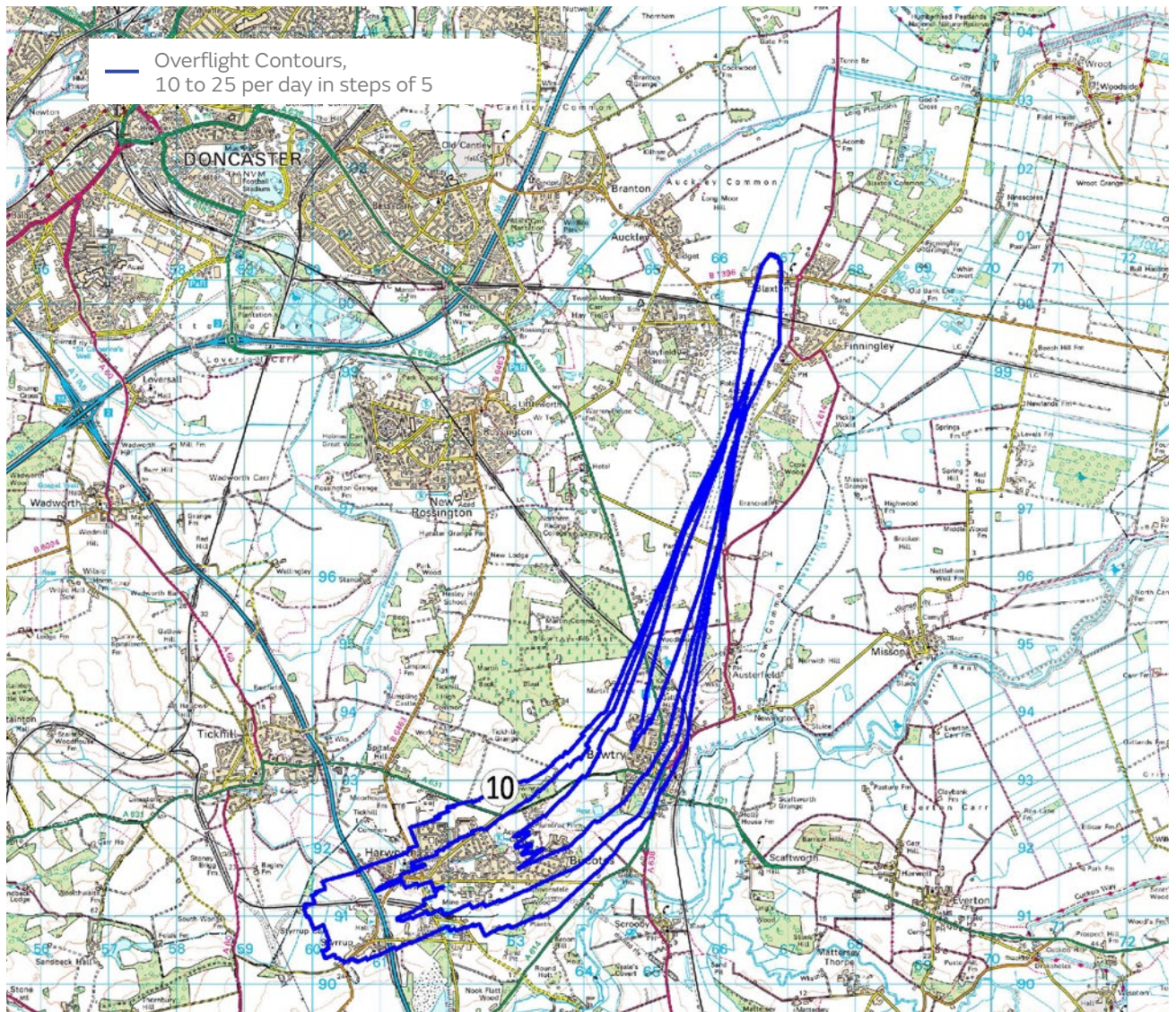


Figure 11: Overflight Contours 2017 Summer Daytime - Current Routes

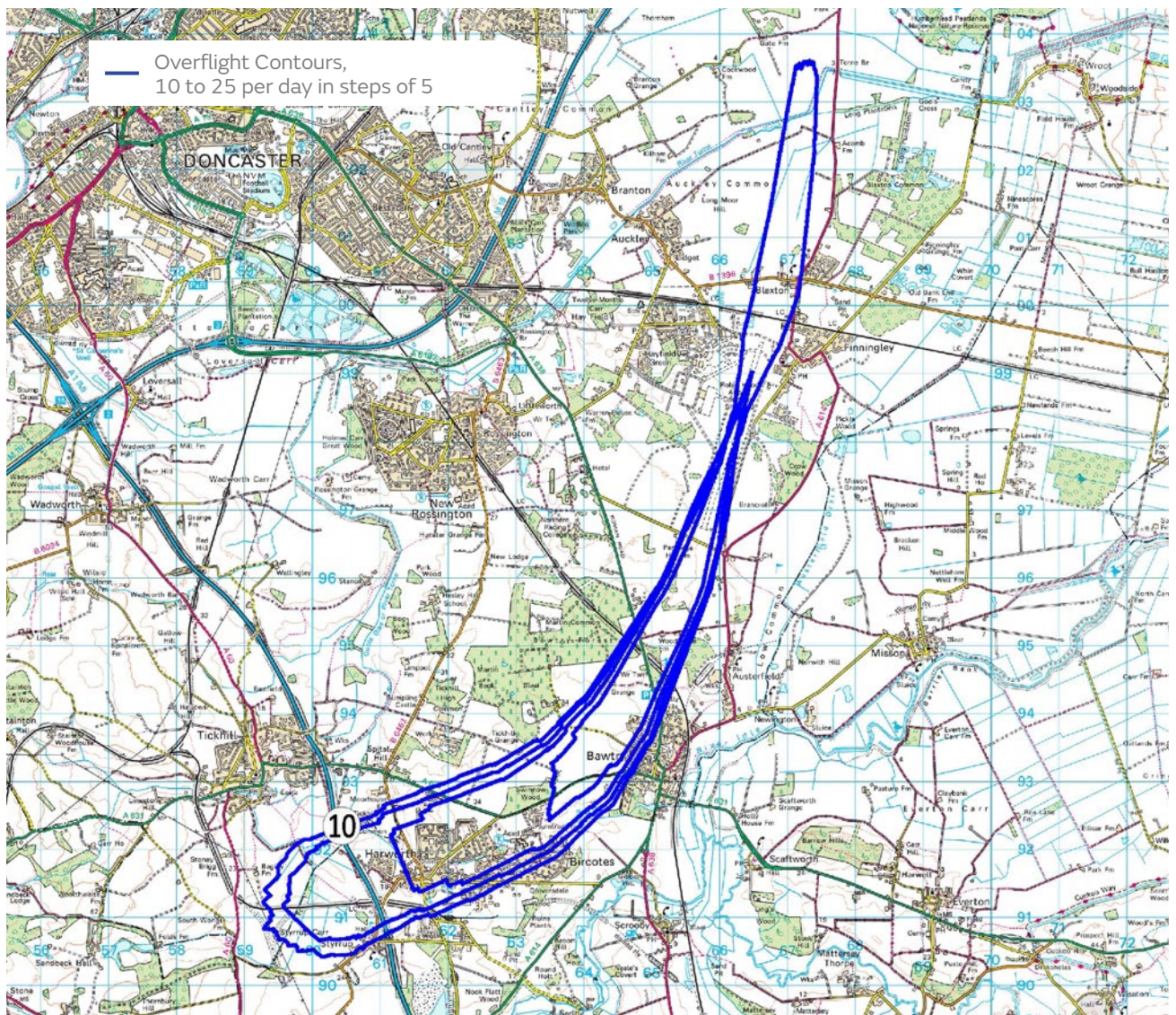


Figure 12: Overflight Contours 2017 Summer Daytime - Proposed Routes

4.4. Air Quality

4.4.1. The CAA does not require DSA to make an assessment of air quality as neither the airport nor the surrounding airspace lie within an Air Quality Management Area (AQMA) and no significant changes to the departure procedures are proposed below 1,000ft.

4.5. Visual Intrusion and Tranquillity

4.5.1. Although difficult to measure, the potential visual intrusion and impact on tranquillity is recognised. Close to the airport there are only minor changes from both runway ends, it is further out that more significant changes have been made as DSA have attempted to adapt the departure routes to remain, as far as practicable, clear of communities. It is acknowledged that the amended ROGAG departure off runway 02 will result in overflight of a slightly greater portion of the Site of Specific Scientific Interest (SSSI) at Hatfield Moors, however, this has been proposed to avoid overflight of communities.

5. Glossary of terms

A-weighted decibel dB(A)	Decibel (a unit of “loudness” of a sound), “A-weighted” (which matches the frequency response of the human ear).
Air Traffic Control Service (ATC)	A service provided for the purpose of preventing collisions between aircraft, and on the manoeuvring area between aircraft and obstructions; and expediting and maintaining an orderly flow of traffic.
Air Traffic Management (ATM)	The aggregation of the airborne and ground- based functions (air traffic services, airspace management and air traffic flow management) required to ensure the safe and efficient movement of aircraft during all phases of operations.
Air Traffic Service (ATS)	A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).
Altitude (ALT)	<p>The distance, in feet, above mean sea level. This is the standard level reference for aircraft operations and airspace design at the lower levels to overcome variations in terrain.</p> <p>The aircraft altimeter is set to the barometric pressure at the aerodrome which has been adjusted to take account of the aerodrome elevation (known as QNH).</p>
AMSL (or amsl)	Above mean sea level
AONB	Area of Outstanding Natural Beauty
ATC	Air Traffic Control
ATM	Air Traffic Management
CAA	Civil Aviation Authority

Capacity	The term used to describe how many aircraft can be accommodated within an airspace area or by a runway without compromising safety or generating excessive delay.
Centreline	The nominal track of a published route
CO ₂	Carbon dioxide
Concentration	Refers to the density of aircraft flight paths over a given location. Generally, refers to high density where tracks are not spread out over a wide area. The opposite is Dispersion.
Continuous climb	A climb that is constant, i.e. without periods of level flight (sometimes referred to as “steps”).
Continuous descent	A descent that is constant, without periods of level flight (sometimes referred to as “steps”).
Controlled airspace	A generic term for airspace in which Air Traffic Control service is provided. There are different sub-classifications of airspace that define the particular types of air traffic services that are provided and the degree to which aircraft are required to participate.
Conventional navigation	The historic navigation standard by which aircraft fly, and routes are designed, with reference to ground-based navigation aids.
Dispersion	Refers to the density of flight paths over a given area and generally refers to low density operations where tracks or routes are “spread out” over a wide area. The opposite of Concentration.
Future Airspace Strategy (FAS)	The CAA’s blueprint for modernising UK airspace in line with European and other worldwide initiatives. The CAA explains the FAS here: www.caa.co.uk/fas

General Aviation (GA)	All civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire. It covers sport and recreational flying and corporate jet and non-jet flights
Holding; holding area; Holding stacks	An airspace structure where aircraft circle one above the other at 1,000ft intervals when queuing to land.
Leq	<p>Equivalent Continuous Sound Level</p> <p>The level of hypothetical steady sound which, over the measurement period, would contain the same frequency weighted sound energy as the actual variable sound.</p> <p>It is used to assess long term environmental noise exposure and takes into account the impact of many noise events over longer periods. The extent of total noise exposure is illustrated by noise exposure contours (contours of equal Leq) which are, effectively, aggregations of SEL noise footprints of individual aircraft movements.</p>
LAeq16hr	The A-weighted Leq measured over the 16 busiest daytime hours is the normal time period used to develop the Airport Noise Contours.
Lmax	The simplest measure of a noise event, such as an aircraft overflight, is Lmax which is the maximum sound level recorded (in dB(A)).
Low altitude airspace	<p>A generic term to describe airspace in the vicinity of an airport containing arrival and departure routes below 4,000ft.</p> <p>Airports have primary accountability for the design of routes in this airspace as this and the local ATC operation is largely dictated by local environmental requirements, airport capacity and efficiency.</p>
NATS	<p>An air traffic service provider licensed by Government to provide the air navigation services in en-route airspace which connects the airports with each other and with the airspace of neighbouring States.</p> <p>NATS also provides ATS, under contract, to some airports.</p>

Nautical Mile (NM) Aviation measures most horizontal distances in nautical miles. One nautical mile is 1852 metres, making it approximately 15% longer than a statute mile. (Aviation uses metres for some horizontal distances such as runway lengths and visibility.) (The standard measurement of vertical distance is feet.)

Noise contours The depiction of noise across a period of the day as a series of contours around the airport. Aircraft noise maps, which show lines joining points of equal noise, to illustrate the impact of aircraft noise around airports. Major airports publish annually or bi-annually the noise contours for the “daytime” period (0700 to 2300). These are referred to as the Leq (16 hours) noise contours.

Noise footprint The depiction of noise from a single aircraft as a “footprint” around the airport. These are referred to as SEL footprints.

Performance-Based Navigation (PBN) A generic term for modern standards for aircraft navigation capabilities (as opposed to conventional navigation standards). The design of future airspace routes and structures will be predicated on requiring a specified minimum navigation capability by all aircraft using the route or airspace structure. For more information, see www.caa.co.uk/pbn and www.eurocontrol.int/navigation/pbn.

Radar Vectoring Provision of navigational guidance to aircraft by ATC in the form of specified headings based on the use of radar.

Route Published routes that aircraft are required or plan to follow. Routes have a nominal centreline which gives an indication of where the aircraft would be expected to fly.

Aircraft will fly along routes or route segments with varying degrees of accuracy based on a range of operational factors such as weather, aircraft weight, aircraft speed and altitude, and technical factors such as PBN specification and ATC intervention. (The depiction of a nominal route on a map should not be taken as an indication that aircraft will not be seen elsewhere.)

Route system or Route structure	The network of routes linking airports to each other and to the airspace of neighbouring States.
Runway designation	<p>Airport runways are referenced by a 2-digit number which is derived from the orientation of the runway relative to magnetic north.</p> <p>For example, the runways at DSA are orientated on a bearing of 0017.65°M/197.66°M, the rounded-up reference numbers given to them are 02 and 20m respectively.</p>
Sound Exposure Level (SEL)	SEL footprints show the extent of noise energy generated from a single aircraft event, for example, an aircraft either taking off or landing.
Standard Instrument Departure procedure (SID)	<p>A published route for departing aircraft to follow which links an airport or a runway at an airport to the en-route airspace structure.</p> <p>A SID incorporates both airport and en-route ATC requirements for the integration of departure routes with routes to and from other airports together with the Airport Operator's noise abatement requirements in proximity to the airport. It is presented in the UK AIP in graphical format to assist pilots in briefing themselves on the route and levels to be flown after departure. It also includes sufficient information for loading into aircraft navigation databases for use by aircraft flight management systems.</p>
Tactical air traffic control	Air traffic control methods which involve air traffic controllers directing aircraft off the established route structures for reasons of safety or efficiency.

Table 3: Glossary of Terms

6. Summary of Part A

In **Part A** of this Sponsor Consultation document we have explained in some broad detail the background to the various operational, regulatory and environmental considerations that must be considered in this consultation.

Each of these areas of consideration are, in themselves, complex technical subjects often with competing priorities. In proposing the procedures, it is necessary for a careful balance to be struck between these, often competing, considerations. At all times, the safety of both the operation of aircraft and the ATM System remain paramount.

Parts B and C of this Sponsor Consultation document go on to describe the proposed departures and the addition of new approach procedures in greater detail and explain how the competing requirements have been balanced to arrive at the proposed procedure configuration.

Appendix A: List of Consultees

A.1. Development of the Consultee List

- A.1.1. This section is included so that consultees understand why they have been included on the Consultation List.
- A.1.2. Development of the “Consultee List” is dictated very much by the CAA requirements specified in CAP725.
- A.1.3. The CAA requires that consultation with non-aviation bodies includes Statutory Bodies and appointed Councils down to and including Parish Council level throughout the area that would be overlaid or affected by the proposed flight paths or the operation of them. 60 Councils at County, City, District, Borough, Town and Parish Councils have been identified. The CAA also expects certain other non-aviation national organisations, such as Natural England, that may have an environmental interest, be included.
- A.1.4. It is expected that some consultees may not be familiar with aviation terminology, particularly with the technical aspects of IFP design. The offer is made for them to seek clarification, preferably by email query, if they so desire. (See Section 2 in Part D of the consultation document.)
- A.1.5. With respect to those with aviation interests, the CAA requires appropriate “local” aviation parties to be included in the process as individual entities; these being aircraft operators likely to regularly use the procedures or other aerodromes that may be affected by the procedures.
- A.1.6. Such is the national interest in airspace usage that the consultation process needs to include the wider aviation community (including more distant aerodromes and airspace user groups). The CAA expects national bodies such as Light Aircraft Association (LAA), British Gliding Association (BGA), Airport Operators Association (AOA) etc. to represent their members’ interests through the auspices of the CAA’s National Air Traffic Management Advisory Committee (NATMAC). These member organisations are inherently more aware of the wider issues involved and, moreover, have been directly involved in the development of the CAA’s regulatory process for airspace change. Consequently, it is reasonable to expect that they should respond objectively to the consultation.
- A.1.7. Military organisations are also members of the NATMAC and are included as consultees. It is standard practice for the MoD to provide a consolidated response representing all military branches.

A.2. Airport user consultees

- Cessna
- DHL
- Easyjet
- Flybe
- National Police Air Services (NPAS)
- Thomson
- Wizz Air
- 2Excel Aviation

A.3. Off-airport aerodrome and airspace user consultees

- Air Traffic Control Services Limited (ATCSL)
- National Air Traffic Services (NATS)

A.4. NATMAC consultees

- Airport Operators Association (AOA)
- Aircraft Owners & Pilots Association UK (AOPA UK)
- Association for Remotely Piloted Aircraft and Systems (ARPAS-UK)
- Aviation Environment Federation (AEF)
- British Airways (BA)
- BAE Systems
- British Airline Pilots Association (BALPA)
- British Air Transport Association (BATA)
- British Balloon & Airship Club (BBAC)
- British Business & General Aviation Association (BBGA)
- British Gliding Association (BGA)
- British Hang Gliding & Paragliding Association (BHPA)
- British Helicopter Association (BHA)
- British Microlight Aircraft Association (BMAA)
- British Model Flying Association (BMFA)
- British Parachute Association (BPA)
- Future Airspace System VFR Integration Group (FASVIG)
- General Aviation Alliance
- General Aviation Safety Council (GASCo)
- Guild of Air Traffic Control Officers (GATCO)
- Helicopter Club of Great Britain (HCGB)
- Heavy Airlines
- Honourable Company of Air Pilots (HCAP)
- Light Aircraft Association (LAA)
- Light Airlines
- Low Fares Airlines
- NATS
- PPL/IR Europe
- Unmanned Aerial Vehicle Systems Association (UAVS Association)
- UK AIRPROX Board (UKAB)
- UK Flight Safety Committee (UKFSC)

A.5. NATMAC military consultees

- Defence Airspace and Air Traffic Management (DAATM)
- Military Aviation Authority (MAA)
- Aviation Division NC HQ
- HQ 3rd Air Force USAF (3AF UK/A3)

A.6. Non-aviation consultees (County, City, District and Town Councils)

- Barnsley Metropolitan Borough Council
- Bassetlaw District Council
- Bawtry Town Council
- Bolsover District Council
- Chesterfield Borough Council
- Derbyshire District Council
- Doncaster Metropolitan Borough Council
- East Lindsey District Council
- East Midlands Regional Assembly
- East Riding of Yorkshire Council
- Epworth Town Council
- Lincolnshire County Council
- Maltby Town Council
- Mansfield District Council
- Newark and Sherwood District Council
- North East Derbyshire District Council
- North Kesteven District Council
- North Lincolnshire Council
- North Yorkshire Town Council
- Nottinghamshire District Council
- Rotherham MBC
- Selby District Council
- Sheffield City Council
- Stainforth Town Council
- Tickhill Town Council
- Wakefield City MBC
- West Lindsey District Council

A.7. Non-aviation consultees (Parish Councils)

- Auckley Parish Council
- Austerfield Parish Council
- Barnby Dun with Kirk Sandall Parish Council
- Barnby Moor Parish Council
- Belton Parish Council
- Blaxton Parish Council
- Blyth Parish Council
- Braithwell Parish Council
- Cantley with Branton Parish Council
- Carlton in Lindrick Parish Council
- Crowle and Ealand Parish Council
- Everton Parish Council
- Finningley Parish Council
- Firbeck Parish Council
- Gringley-on-the-Hill Parish Council
- Harworth/Bircotes Parish Council
- Hatfield Parish Council
- Haxey Parish Council
- Hodsock Parish Council
- Lound Parish Council
- Loversall Parish Council
- Mattersey Parish Council
- Misson Parish Council
- Misterton Parish Council
- Ranskill Parish Council
- Rossington Parish Council
- Scaftworth Parish Council
- Scrooby Parish Council
- Styrrup with Oldcotes Parish Council
- Thorne & Moorends Parish Council
- Torworth Parish Council
- Wadworth Parish Council
- Wroot Parish Council

A.8. Non-aviation consultees (other organisations)

- Doncaster Chamber of Commerce
- CPRE
- English Heritage
- English Nature
- Environment Agency
- FODSA
- Sheffield Chamber of Commerce
- South Yorkshire Joint Secretariat
- The National Trust (East Midlands)
- The National Trust (Yorkshire)

A.9. Members of Parliament

- Dan Jarvis, MP for Barnsley Central
- Stephanie Peacock, MP for Barnsley East
- John Mann, MP for Bassetlaw
- Andrew Percy, MP for Brigg & Goole and the Isle of Axholme
- Caroline Flint, MP for Don Valley
- Rosie Winterton, MP for Doncaster Central
- Ed Milliband, MP for Doncaster North
- Angela Smith, MP for Pensitone and Stocksbridge
- Kevin Barron, MP for Rother Valley
- Sarah Champion, MP for Rotherham
- Nigel Adams, MP for Selby and Ainsty
- Gill Furniss, MP for Sheffield Brightside and Hillsborough
- Paul Blomfield, MP for Sheffield Central
- Jared O'Mara, MP for Sheffield Hallam
- Louise Haigh, MP for Sheffield Heeley
- Clive Betts, MP for Sheffield South East
- John Healey, MP for Wentworth and Dearne

A.10. Copy addressees

- UK CAA Safety and Airspace Regulatory Group

PART B:

Proposed departure procedures

1. Introduction

1.1. Options Development

- 1.1.1. This part of the consultation document, together with the accompanying technical annexes, details individually each of the SID procedures. Any potential environmental impact of the changes is also addressed.
- 1.1.2. It was considered that realistically there were only three available options; Do Nothing, Replicate or Redesign:
- **Do Nothing** – this option is not available because the navigational aid that the current procedures rely upon is being withdrawn by NATS Services Ltd;
 - **Replicate** – this option is considered the most viable as the entry and exit points to the existing route network shall remain extant and the airspace construct was designed around the procedures that exist today;
 - **Redesign** – given the existing airspace construct there is very limited scope for designing procedures radically differently from how they are today. It is considered that the opportunity to deliver significant environmental or operational benefits from the complete redesign of the procedures are minimal without total redesign of the associated airspace.
- 1.1.3. Six routes are currently used by aircraft departing from DSA to enter the route structure of Prestwick Centre (PC) airspace. Three routes track to the north-west via a position named UPTON (around 7.5 miles north-east of Barnsley), the remaining three routes track to the south-east via a position named ROGAG (around 10 miles east of Lincoln). UPTON and ROGAG are the positions at which the SID procedures link to the route network.
- 1.1.4. While it is now permissible for SIDs to extend into uncontrolled airspace it is best practice and preferable for SID procedures (including their appropriate protection areas) to be wholly contained within the existing controlled airspace around DSA²². The proposed SID procedures to UPTON remain fully contained within controlled airspace. However, it is acknowledged that the existing controlled airspace does not enable fully contained linkage to the existing route network for the proposed SID procedures to ROGAG.
- 1.1.5. RNAV-1 (GNSS) SID procedures have been developed (where possible) as replications of the existing departures to accommodate 5 of the 6 procedures. The 6th departure (formerly a PDR) will be withdrawn as it has rarely been used and is no longer required.
- 1.1.6. Full replication of the existing departures has not proven entirely possible due to a variety of factors, including design incompatibility with the PDRs which did not align with PANS-OPS criteria. A balance was sought between that which was previously designed versus that which is currently flown and any slight adjustments that could be made to allow for an optimum solution aimed at affecting fewer people on the ground whilst, where possible, improving the operational aspects for aircraft operators and ATC.

²² The dimensions of the CTR and CTAs around DSA have recently been subject to a Post-Implementation Review (PIR) by the CAA and no changes are required.

1.1.7. It must be emphasised that the departure routes from DSA are only one element of the myriad of routes accessing the overlying PC airspace. Safety is paramount at all times in the development and design of both the individual procedures and the overall route structure. This means that sometimes we cannot put a route precisely where we would prefer due to the overriding ATM system safety requirements.

1.1.8. Similarly, air traffic controllers at both DSA and at PC must retain the operational flexibility to integrate aircraft flight paths with one another to achieve the most effective and efficient overall traffic flow and to get departing aircraft climbing to their cruising levels as quickly as possible (explained in Part A of the consultation). Once aircraft pass the end of the NAP, ATC need to retain the option for operational flexibility to route aircraft tactically away from the nominal route when clear of other aircraft within controlled airspace.

Notwithstanding, the SID procedures do represent an efficient strategic route structure, within the necessary procedure design and environmental constraints, for integrating the traffic flows with the minimum of inter-controller co-ordination. It is expected that this airspace systemisation will result in a significant reduction in the requirement to radar vector.

1.1.9. There is no fixed or predetermined track for radar vectoring; the chosen flight path would be dependent on many factors such as the position of other departing, arriving or overflying aircraft within the overall traffic flow.

1.1.10. Figure 13 below provides an illustration of typical tracks of aircraft departing from DSA over an 8-week period over June/July 2016.

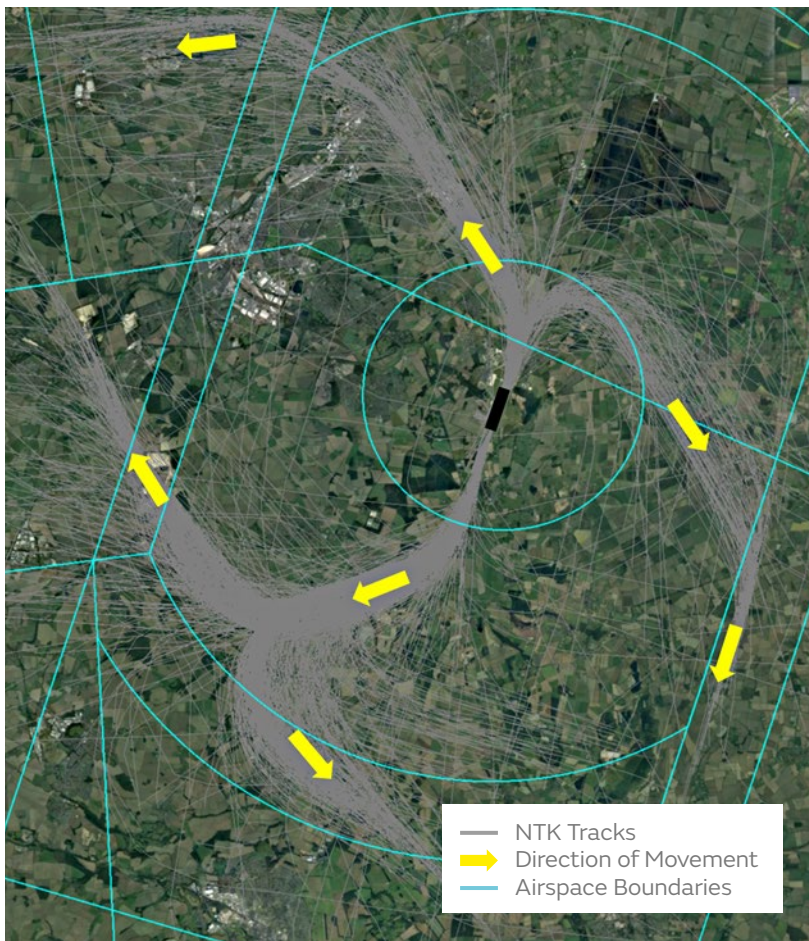


Figure 13: Sample departure tracks June/July 2016

2. Proposed SID Procedures

2.1. Overview

2.1.1. This section of the Consultation Document describes the proposed SID procedures. The detailed and more technical descriptions of the individual procedures, supported by diagrams, are given as separate documents, as defined in Section 4 to Part B of this document.

2.1.2. There are no changes to the main access points, UPTON and ROGAG, into PC airspace for the SIDs.

2.1.3. The proposed SIDs, together with the current departures and associated NTK data for each runway, are discussed in brief below.

2.2. Runway 02

2.2.1. Figure 14 below depicts the proposed SIDs off Runway 02 overlaid with historic track data (NTK) from Summer 2016. Figures 15, 16 and 17 are an expansion of portions of this image.

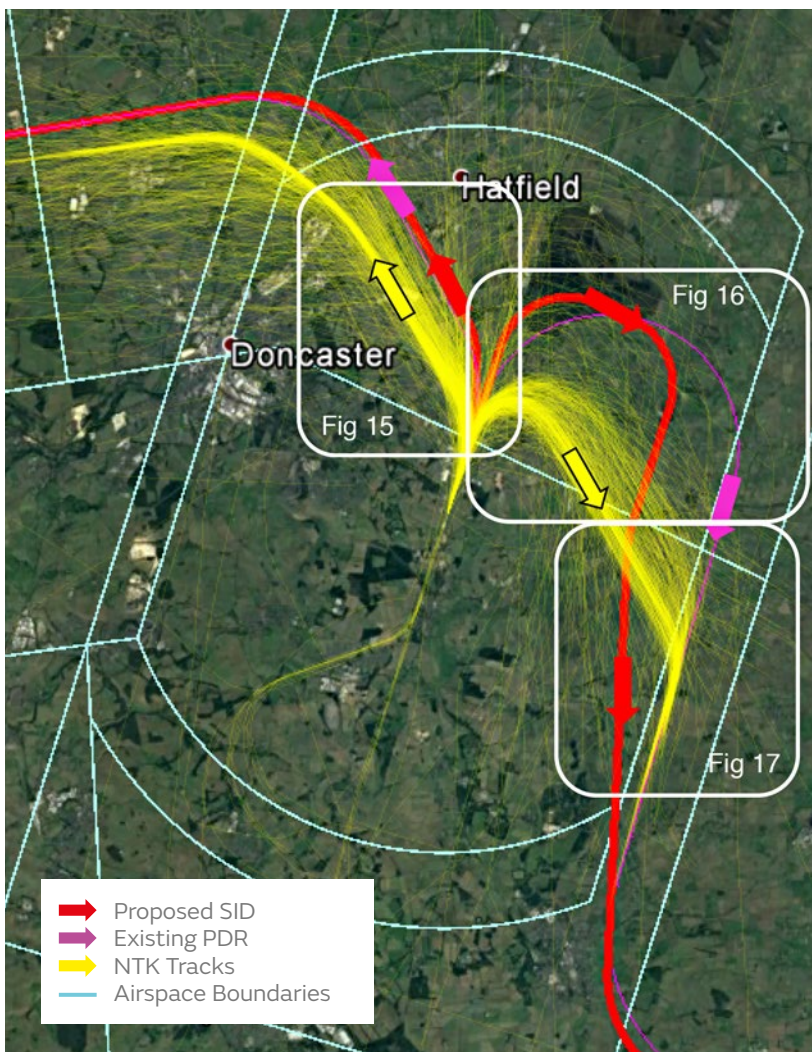


Figure 14: Runway 02 - Proposed SIDs vs Current Departures and NTK

2.2.2. In Figure 15 below the UPTON 2C SID (to the north-west) is proposed as a replication of the intended track of the original SID. It can be seen that aircraft have historically not closely followed the intended track of the existing UPTON 1C SID. This is most likely due to airline operators using various interpretations of the procedure overlays in the navigation database, which are not subject to the regulatory rigour that the procedures themselves are. The historic tracks have impacted more adversely on the communities north of the airport (such as Armthorpe, Edenthorpe and Kirk Sandall) than was intended.

The NTK data is shown in yellow and the proposed SID (overlaid on the existing SID) is shown in red. The introduction of an RNAV SID will remove the interpretation that has taken place historically resulting in the accurate alignment of flight to the intended flight path²³. The proposed RNAV SID takes a path between Kirk Sandall and Armthorpe to the west whilst avoiding Hatfield and Stainforth to the north and east. It is acknowledged that Dunsville remains under the flightpath. RNAV design criteria restricts moving the route to the east as it impacts airspace containment.

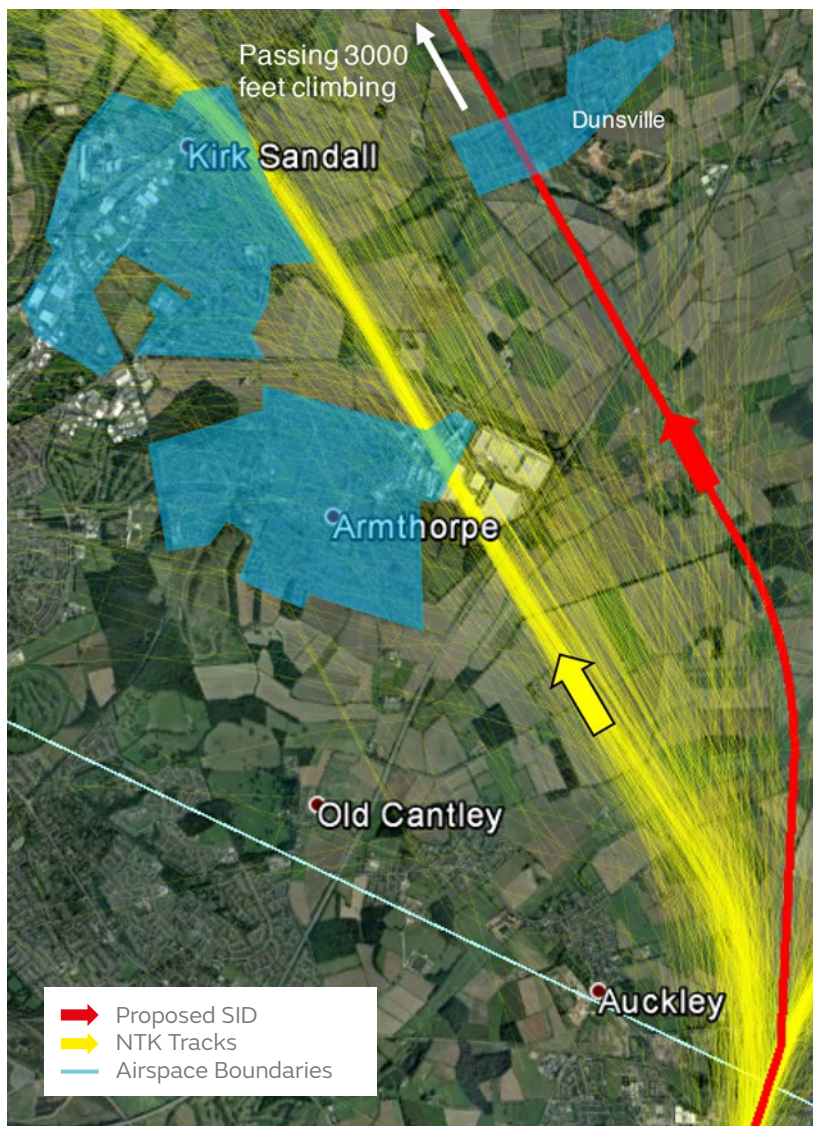


Figure 15: Runway 02 - Portion of UPTON SID

23 In all cases, following introduction of the proposed RNAV SIDs DSA will monitor the adherence of actual flight paths to the intended flight paths and will discuss any discrepancies with the aircraft operator concerned. This is likely to be a specified requirement of the CAA in its Post Implementation Review.

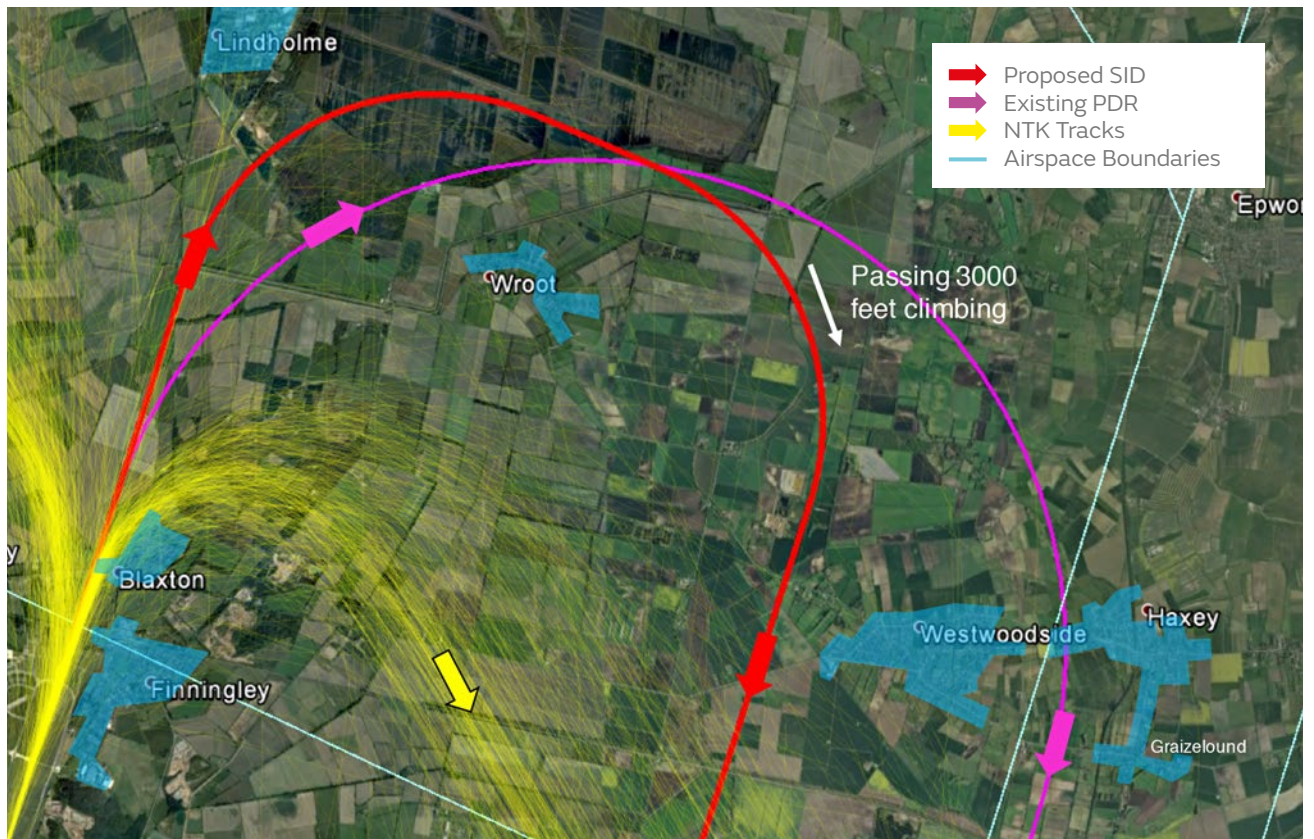


Figure 16: ROGAG 1B SID off Runway 02

The yellow tracks show where aircraft have actually flown as they have interpreted the ROGAG PDR, which is represented by the magenta line. The discrepancy between the yellow and the magenta lines is due to PDRs not being as strictly defined as SIDs and therefore open to wider interpretation by database coders (as earlier discussed in Part A, Section 2.4). The magenta line shows how the ROGAG PDR was originally planned whereas the red line shows what we believe to be an optimum track within the bounds of procedure design.

- 2.2.3. The proposed ROGAG 1B SID (to the south-east) is depicted in **Figure 16** above. It is intended to turn east later than the current procedure, in order to provide benefit to Blaxton and Finningley. Aircraft will pass to the north of Wroot before turning south and remaining to the west of Haxey and Westwoodside. As can be seen in **Figures 16 and 17**, every attempt has been made to effectively 'weave' departing aircraft around those communities.

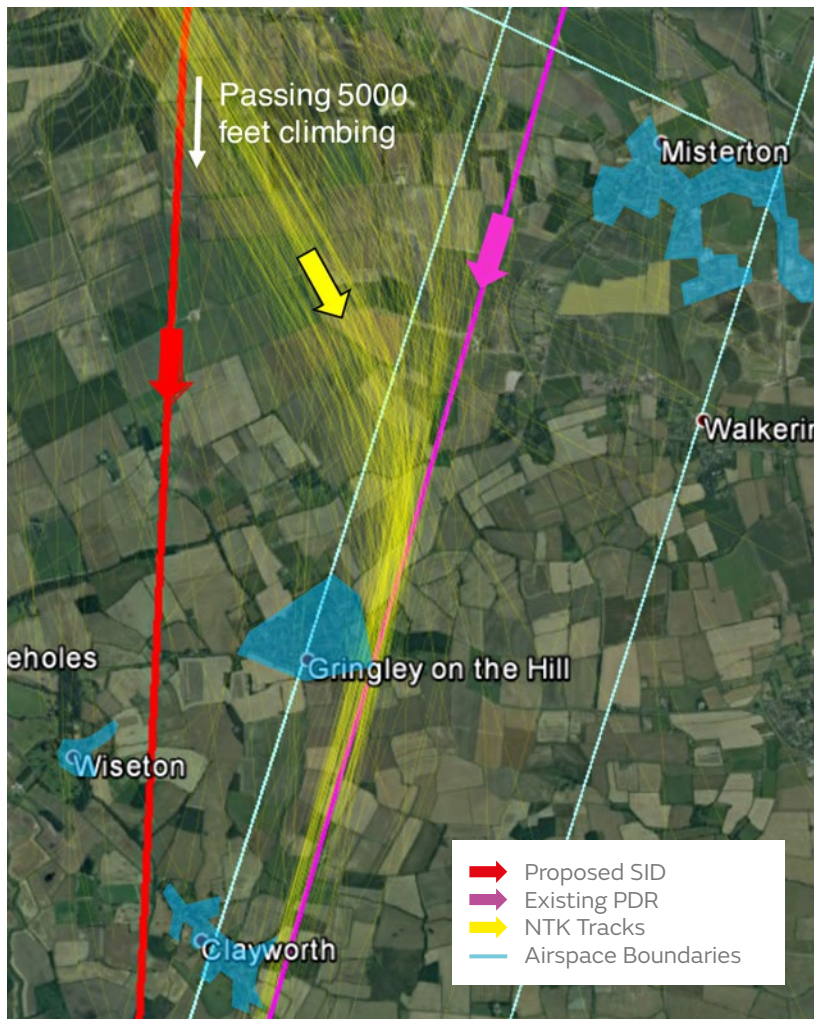


Figure 17: Mid-section of ROGAG 1B SID off Runway 02

2.3. Runway 20

2.3.1. With respect to Runway 20, particular care, within designable limits, has been taken to avoid as much of Bawtry as possible, despite its location in the immediate departure path. IFP design criteria limits, for safety reasons, turns close to the departure end of the runway. The initial departure path of the proposed UPTON 2A and ROGAG 1A have been designed to deviate slightly to the right within allowable deviation limits. Further along the UPTON 2A route, every effort has been made to keep the nominal centreline of the flight path clear of most of Harworth, Bircotes and Styrrup before turning further west, avoiding Tickhill, Maltby and Braithwell and picking a gap between New Edlington and Conisbrough.

Further turns, earlier to the north-west, are not feasible due to airspace containment requirements further along the procedure, i.e. the aircraft require sufficient track distance in order to achieve the required climb gradient to remain inside controlled airspace. We have considered increasing the required minimum climb gradient but this also proved not feasible due to aircraft performance and procedure design constraints.

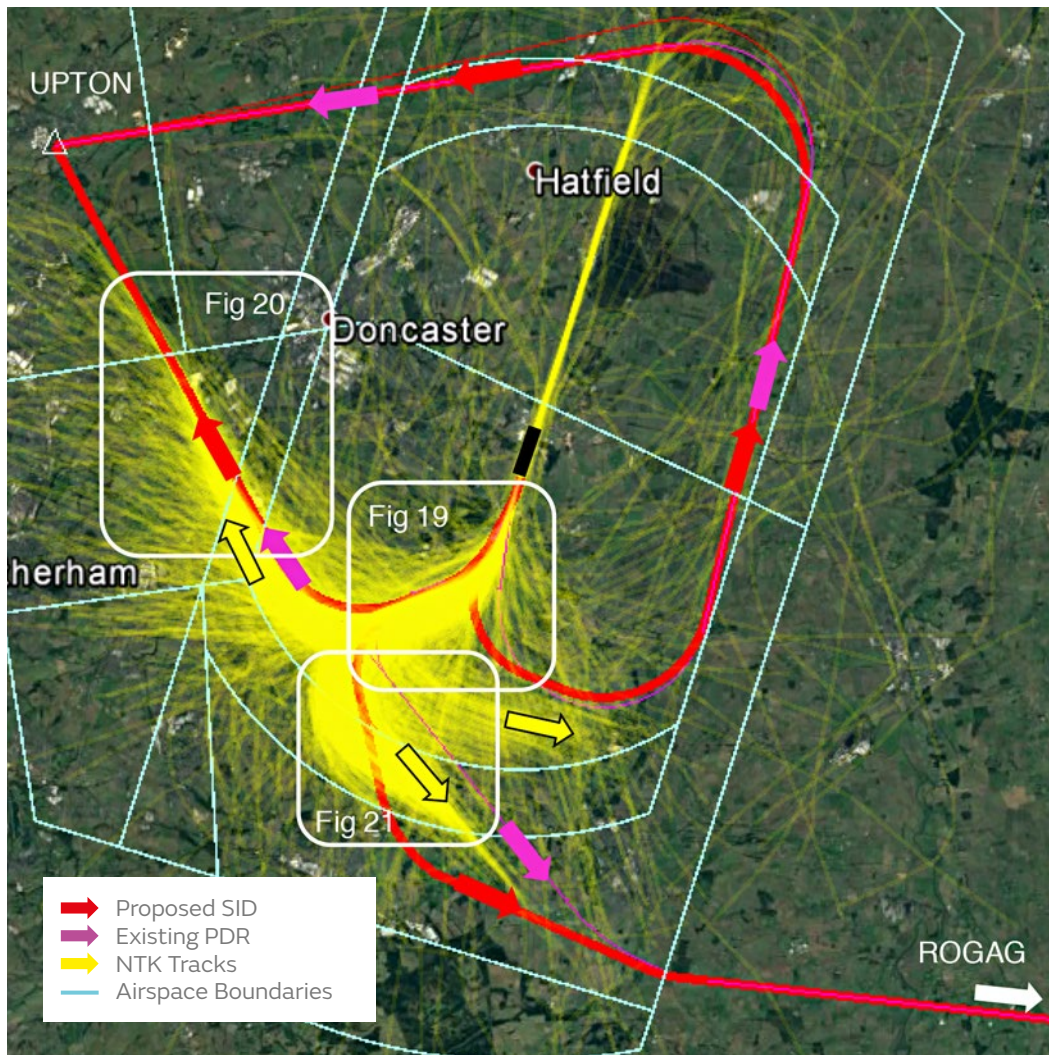


Figure 18:
Runway 20
– Proposed
SIDs vs
Current
Departures
and NTK

2.3.2. Figure 18 above depicts the proposed SIDs off Runway 20 with historic track data (NTK) from Summer 2016. Figures 19, 20 and 21 are an expansion of portions of this image.

2.3.3. Figures 19 and 20 on the next page show the NTK data from existing traffic (due to RNAV overlay interpretations of the conventional SID procedure (UPTON) and PDR (ROGAG)) in yellow. The magenta lines are the existing published SIDs (UPTON 1A and 1B) whereas the red are the proposed SID nominal tracks (UPTON 2A and 2B). Once again, the introduction of RNAV procedures that do not require interpretation by navigation database coders will result in adherence to the intended flight path.

2.3.4. Figure 21 depicts the proposed ROGAG 1A SID off Runway 20 which has been realigned further west than the existing PDR track (magenta line) but lies slightly to the east of the flight paths (yellow lines) flown by aircraft following RNAV overlays. The track is considered by DSA as the optimum flight path between the communities of Langold, Blyth, Carlton in Lindrick and Costhorpe. The existing magenta line could not be replicated in PANS-OPS design terms owing to the extreme nature of the turn that would be required.

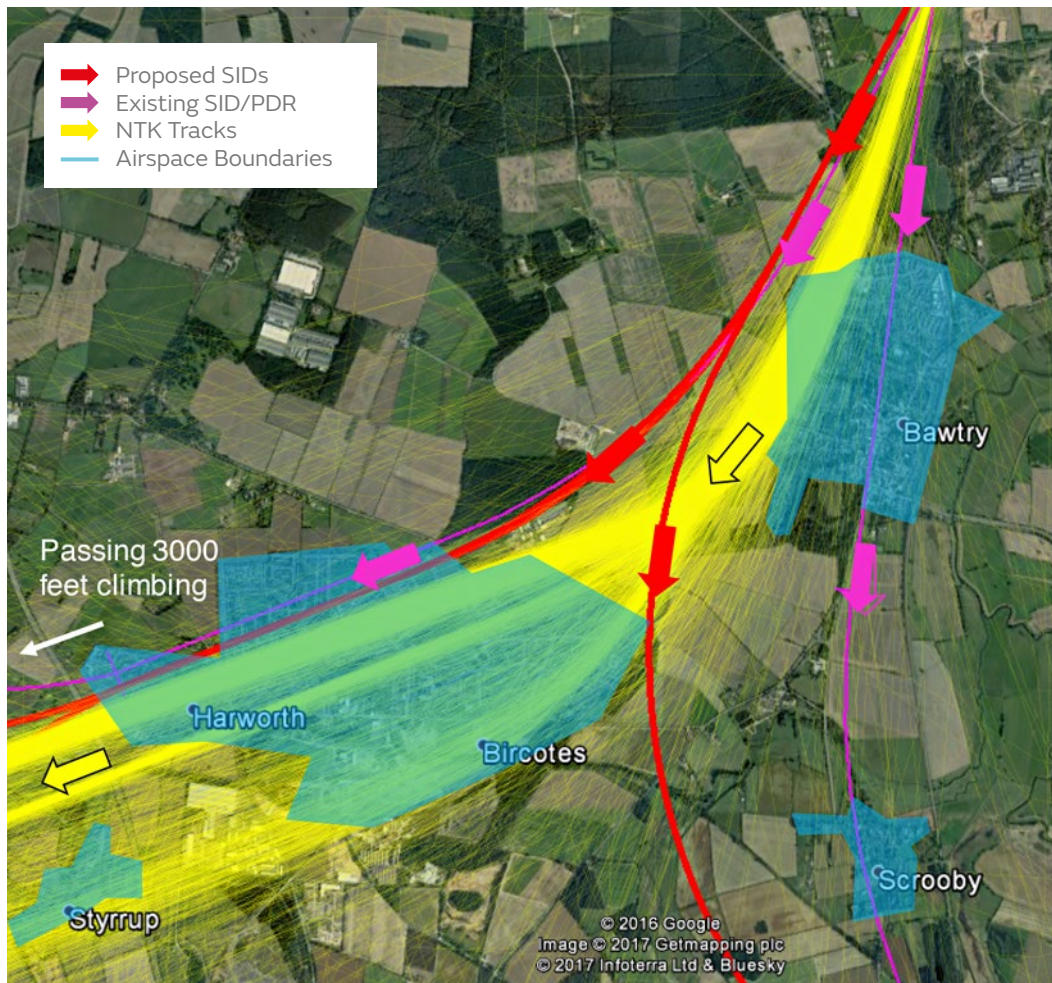


Figure 19:
Departures
off Runway
20

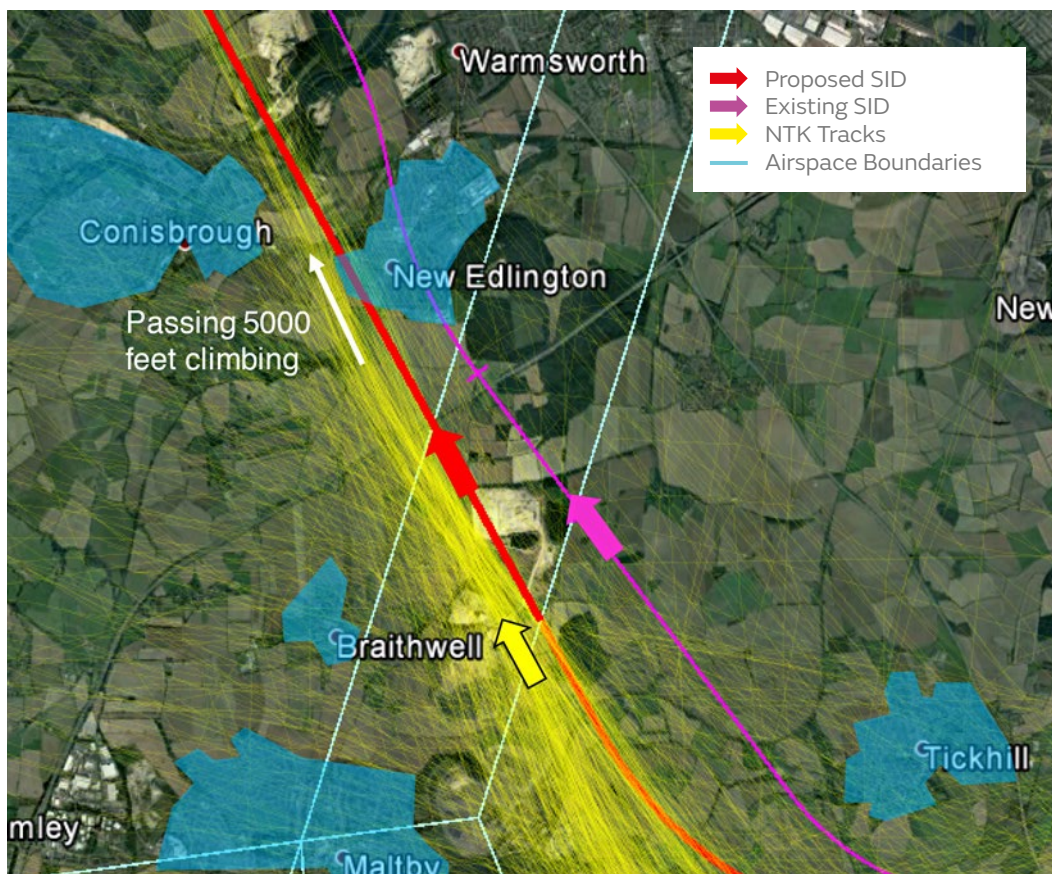


Figure 20:
Mid-section
of UPTON
2A off
Runway 20

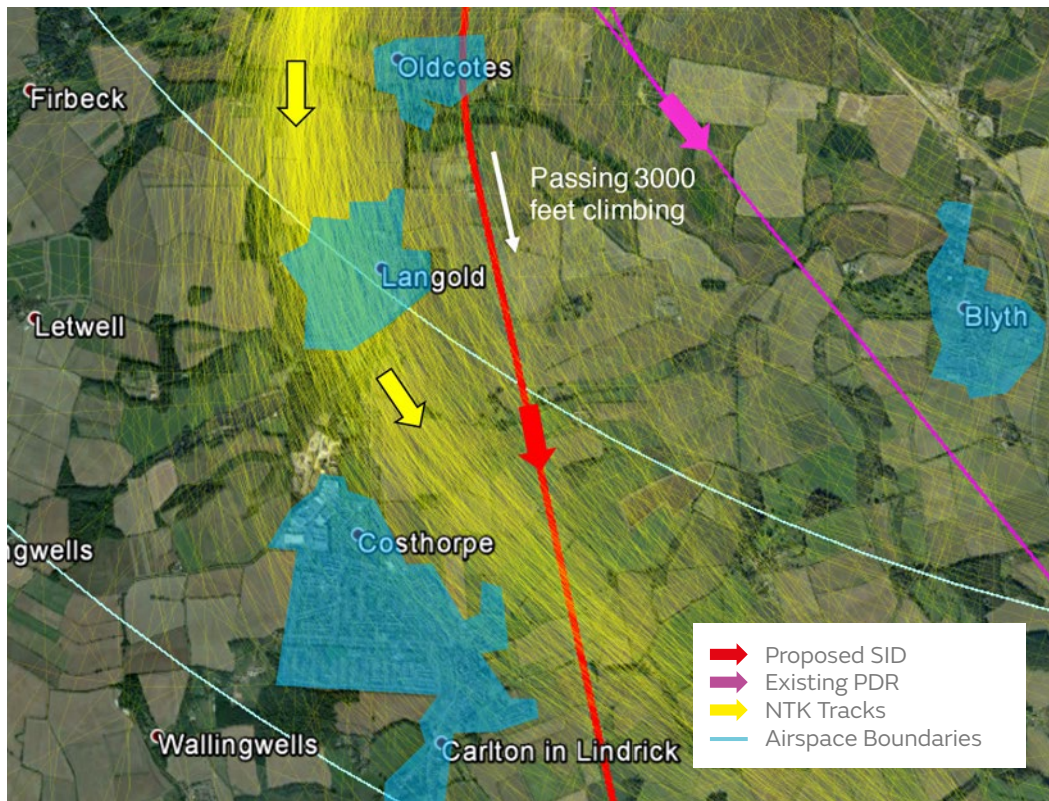


Figure 21:
Mid-section
of ROGAG
1A off
Runway 20

2.4. Upper limit of all SIDs

2.4.1. The overarching operational requirement for procedures to and from DSA to fit into the higher-level route structure constrains the flexibility to develop departure routes at the lower levels.

2.4.2. To ensure that safety is strategically built-in to the route structure, the published upper limit of the SID procedures is specified by NATS PC and will remain as:

- UPTON – FL60²⁴ until further climb can be issued by PC.
- ROGAG – FL160 until further climb can be issued by PC.

Note: A climb clearance above FL60 or FL160 will be given on a tactical basis by controllers at PC. It is unlikely that departing aircraft will routinely be required to stop their climb at FL60 or FL160.

²⁴ FL refers to Flight Level and is based on the international barometric pressure setting of 1013.32 hPa. Essentially, aircraft flying above a certain altitude (based on local air pressure), will reference height based on a Flight Level (FL). FL60 is approximately the equivalent of 6,000ft amsl on the basis that local air pressure is similar to the international setting.

3. Introduction of Omni-Directional Departures (ODDs)

3.1. Overview

- 3.1.1. DSA is committed to providing all operators who use the airport an appropriate departure that ensures the minimum obstacle clearance. As not all operators are able to meet the minimum navigation performance for RNAV-1 SIDs, DSA has elected to include ODDs for both runways to safeguard departures against obstacles off the end of the departure runway.
- 3.1.2. As the navigational performance of an ODD is not to the desired performance accuracy of RNAV-1, slight variation in tracks can be expected. The basic premise of an ODD is a departure that extends on runway heading to a specified altitude from which ATC will provide further routing guidance under radar control.
- 3.1.3. An ODD goes through the similar regulated design criteria but is not charted in the same manner. Rather than designing a specific route, the ODD has a constructed Obstacle Clearance Area defined that protects an aircraft, from obstacles in the selected departure path, of the described ODD. **Figures 22 and 23** provide the Obstacle Clearance Area in diagram form.
- 3.1.4. The usage of the ODDs, for departure, is expected to be very low with an average of 2.3 aircraft per month currently unable to comply with the current SIDs over a 12-month period. Airspace development, in line with the UK FAS, will require outdated aircraft navigation systems to be upgraded, failure to meet the minimum standard may result in these aircraft to be unnecessarily disadvantaged.
- 3.1.5. Notwithstanding the technology element, the ODDs will also facilitate aircraft who are unable to meet the minimum climb gradient required on the proposed SIDs. It is also expected that very few aircraft will require the ODD as a result of not being able to meet the required climb gradients of the proposed SIDs.

3.2. Runway 02

3.2.1. Figure 22 is a diagram of the Obstacle Clearance Area for Runway 02 with the ODD described as follows:

Climb straight ahead on track 019° MAG (magnetic) until reaching 3,500ft, then turn on track to en-route safety altitude or as directed by radar.

Restrictions: Minimum climb gradient 7% for operational reasons.

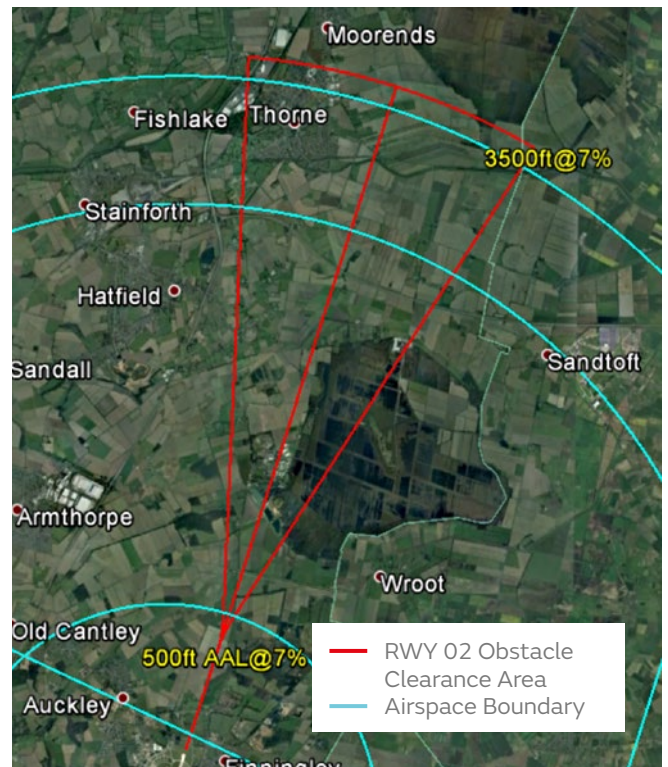


Figure 22: RWY 02 ODD Obstacle Clearance Area

3.3. Runway 20

3.3.1. Figure 23 below is a diagram of the Obstacle Clearance Area for Runway 20 with the ODD described as follows:

Climb straight ahead on track 119° MAG (magnetic) until reaching 3,500ft, then turn on track to en-route safety altitude or as directed by radar.

Restrictions: Minimum climb gradient 7% for operational reasons.

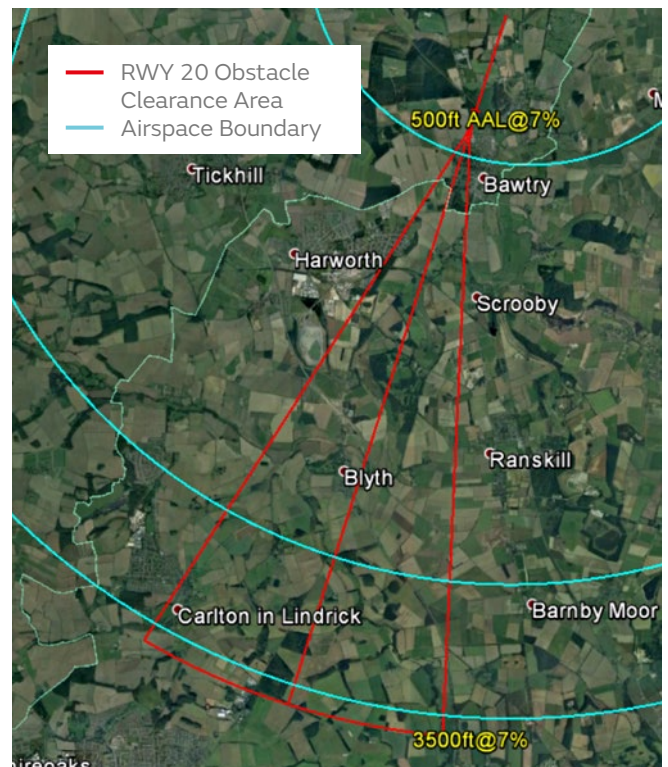


Figure 23: RWY 20 ODD Obstacle Clearance Area

4. ROGAG Airspace Proposal

4.1. Background

- 4.1.1. As described previously, the existing airspace configuration, which was introduced in 2008, did not include controlled airspace to the east of DSA to contain departure procedures via position ROGAG. At that time, there was insufficient traffic demand to justify the additional controlled airspace. Under the CAA Policies in place at the time, the departure procedures towards ROGAG were designated as Preferential Departure Routes (PDRs).
- 4.1.2. The current airspace configuration remains insufficient to provide full controlled airspace containment for the proposed ROGAG SIDs. Whilst best endeavours have been made to design the SIDs to remain, as far as practicable, within controlled airspace, both procedures face a challenge some 7NM to the east of DSA where the controlled airspace base level changes from 2,000ft (the base level of the CTA) to FL105 (the base level of ATS Routes L60/L603) and again where the base level of L60/L603 steps up to FL155. This section aims to discuss the issues at hand and proposes both a minor extension to DSA airspace and the lowering of the base levels of the applicable airways (designated L603 and L60) to enhance the safety of commercial aircraft routing to ROGAG by adding the protection that controlled airspace affords.
- 4.1.3. Since the introduction of the DSA controlled airspace in 2008, the traffic orientation of aircraft operating to/from the airport has changed. Whereas in the early years of airport operation the traffic orientation was to/from the west, now over 50% of the departures from DSA are orientated to the east and use the ROGAG routing. Forecasts indicate that this is a growing trend. It is therefore highly important to provide these aircraft with adequate protection from other aircraft operations in the area.
- 4.1.4. The first issue is that aircraft are required to remain clear of military restricted airspace, designated R313 (Scampton), and the required safety buffer (between controlled airspace and the restricted zone of R313). R313 sits between the current DSA CTA (at position CNS21 on the proposed SID procedure) and position ROGAG on ATS Route L603. The CAA policy statement²⁵ regarding safety buffers for Special Use Airspace (dated 22 August 2014) requires airspace structures to be not less than 2,000ft above the Special Use Airspace when they are within 5NM of its lateral boundary. The diagrams below highlight R313, the SID route and the associated safety buffer. In both Figures 24 and 25 position CNS20 is a waypoint, for both routes, at which the 5NM safety buffer restriction applies.

Note: Figures 24 and 25 were conceptual designs based upon the full extent of the safety buffer. The airspace proposal considers a reduction in the requirements to the safety buffer and therefore the waypoints as depicted in the annexes are different.

25 Special Use Airspace – Safety Buffer Policy for Airspace Design Purposes (22 August 2014)

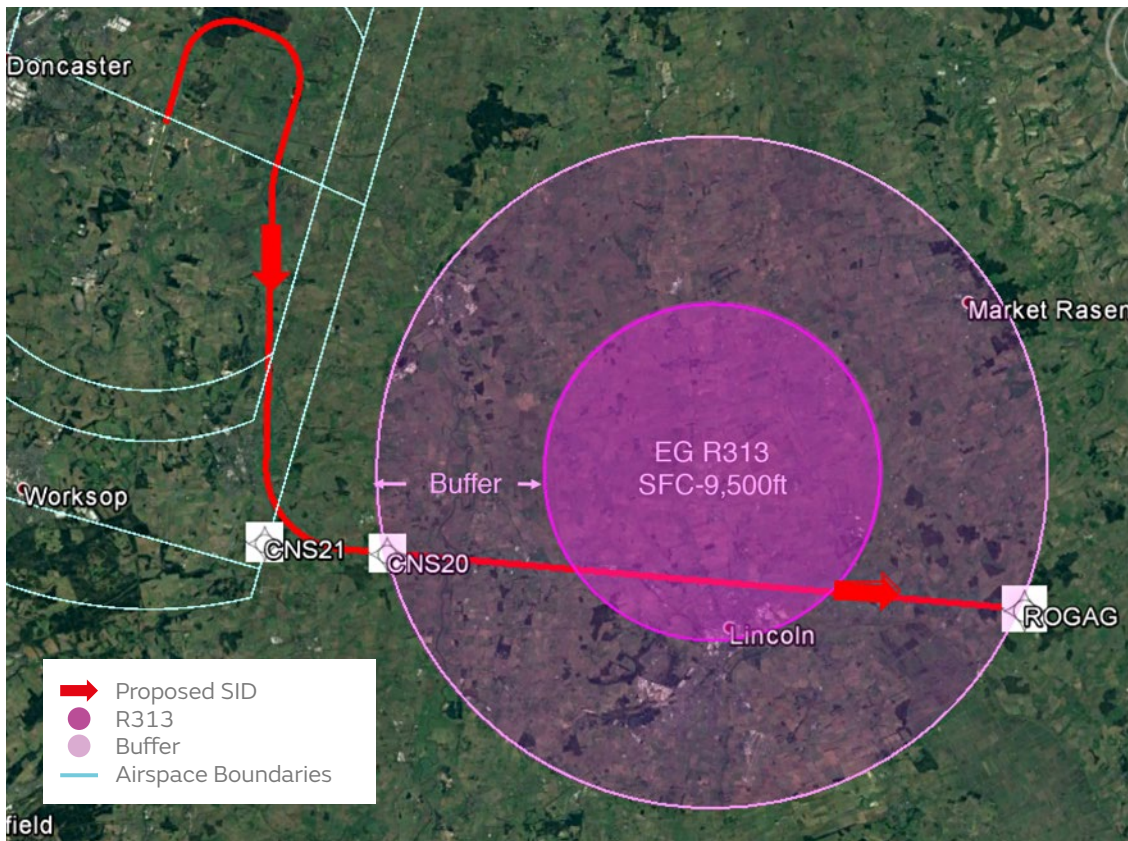


Figure 24:
Runway 02 –
ROGAG 1A

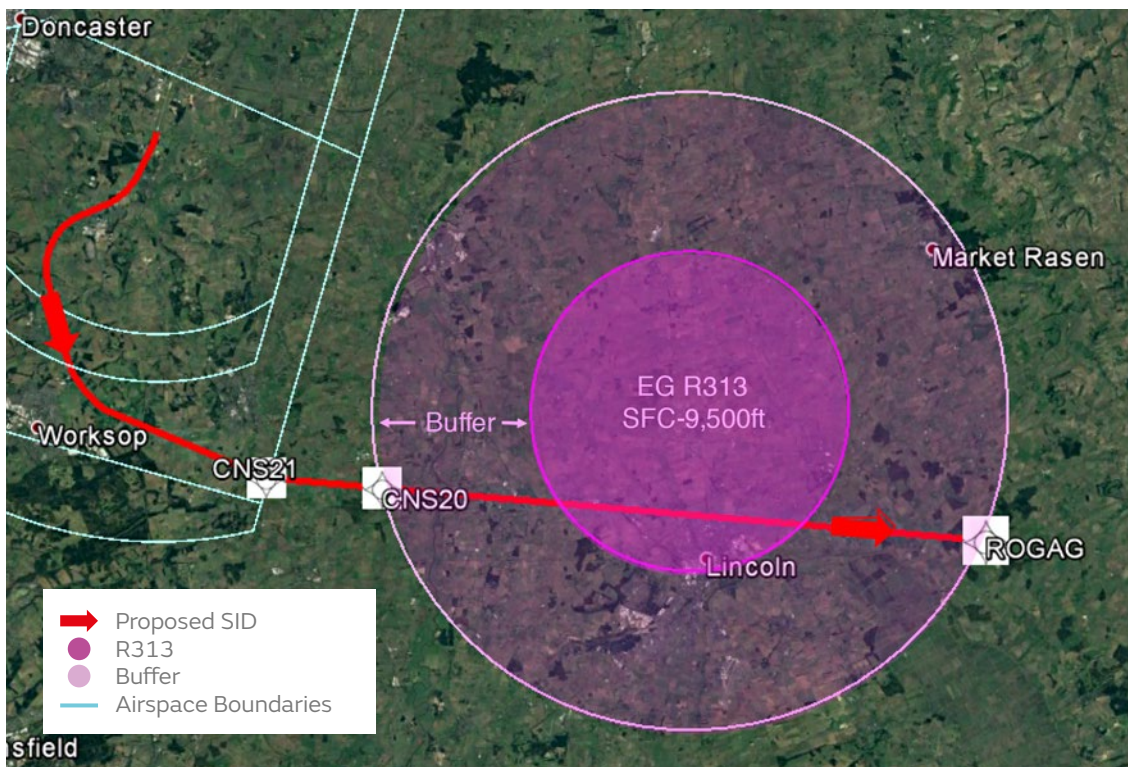


Figure 25:
Runway 20 –
ROGAG 1B

4.1.5. The second issue is that in the case of both ROGAG SIDs, the procedures are not wholly contained within controlled airspace between the eastern boundary of the DSA CTA and ROGAG. Depending on climb performance, aircraft may (in the worst-case scenario usually related to weight) leave controlled airspace at the CTA boundary and not re-enter controlled airspace until just before ROGAG. It is acknowledged that the climb gradient required to achieve airspace containment is steeper and more demanding than that presented by the existing PDRs and it is therefore anticipated that most aircraft will leave controlled airspace where the base of L60/L603 steps up from FL105 to FL155 (about 5NM after CNS20). An Air Traffic Service would need to be provided by the DSA ANSP outside controlled airspace in accordance with CAP774²⁶.

4.1.6. Figure 26 below shows the nature of the current situation in elevation view. It clearly shows the extent to which protection, in the form of controlled airspace is not afforded to aircraft following the ROGAG procedure on a preferred climb gradient (red dotted line). It also clearly indicates the excessive climb gradient required for a flight to be contained within controlled airspace (yellow solid line). The climb gradient required for airspace containment is, in most cases when tested in an aircraft simulator, were not achievable.

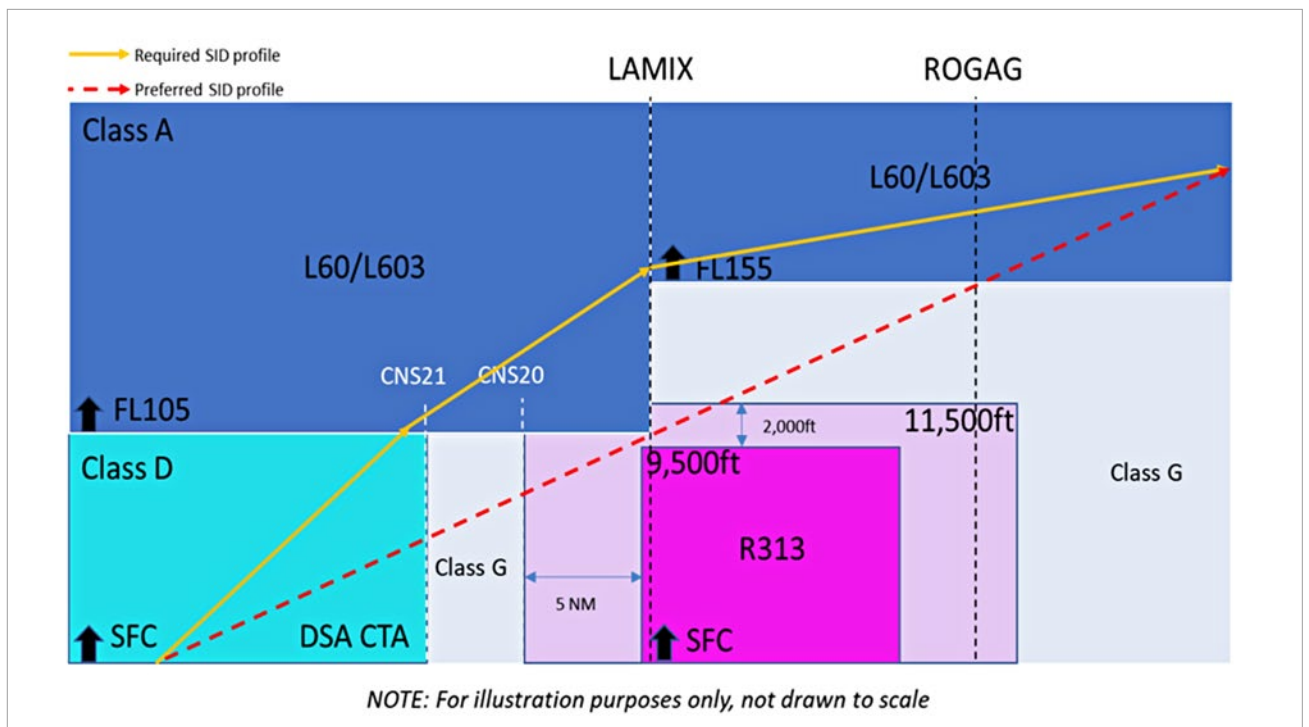


Figure 26: Elevation View of Current Airspace Configuration indicating required and preferred climb gradients

26 The UK Flight Information Services (CAP 774) details the suite of air traffic services (ATS) which (excluding aerodrome services) are the only services provided in Class G airspace within the UK Flight Information Region (Where notified, elements of the UK FIS are also provided to aircraft operating in Class E airspace). Therefore, this document is equally applicable to all civilian and military pilots, air traffic controllers, and Flight Information Service Officers.

4.2. Airspace Proposal

4.2.1. This particular portion of the consultation proposes an additional portion of CTA for DSA (described below as CTA X) and the airspace change for a portion of affected by airways designated L60 and L603 (described in 4.2.5) to support the ROGAG SIDs for each runway.

4.2.2. It is planned that a Letter of Agreement (LoA) be agreed between DSA ATC and the Ministry of Defence (MoD) to reduce the lateral limit between CTA X and the lateral limit of the Safety Buffer Zone of R313 from 5NM to 2NM, during published hours of operation and with conditions in place. It is not the intent of this proposal to allow DSA flights to enter R313 during published hours of operations.

4.2.3. In support of this proposal, DSA will sponsor the airspace change associated with L60/L603 to ensure alignment of airspace requirements at implementation.

4.2.4. Figures 27 and 28 on the next page provide visualisation of the proposal to accommodate aircraft to remain within controlled airspace to the maximum extent practicable. The airspace defined has been determined as that which is needed to support DSA operations and kept to a minimum requirement rather than apportioning airspace that would not be used.

4.2.5. The vertical and horizontal elements of these airspace proposals are as follows:

- CTA X: Lower limit – FL85,
Upper limit – FL105

Area bounded by the following coordinates (subject to verification prior to publication):

N 53°26'43", E 0°49'56"
 N 53°15'59", E 0°55'41"
 N 53°13'44", E 0°43'16"
 N 53°14'26", E 0°42'56"

This portion of airspace aligns to the minimum climb gradient of the ROGAG SIDs, allowing 500 feet for containment, to provide continuous climb and permitting adequate separation from traffic transiting below.

The ROGAG 1B minimum climb gradient is 7.3% with the altitude calculated to be FL90 at CNS21.

The ROGAG 1A is 9% with the altitude at CNS21 calculated to be FL90.

The next point on the SIDs is CNS29 (3NM east of CNS20) and with the proposed relaxation of the buffer policy, through an LoA, aircraft may reduce their climb rate to a more acceptable level to achieve FL115 by CNS29.

The upper limit of CTA X is limited to FL105 adjoining PC airspace (L603) above.

- L603/L60: Lower Limit – FL125,
Upper limit – FL195

DSA is proposing lowering the base of L603 and L60, (above R313) to allow the SID to be contained within controlled airspace to position ROGAG. This involves lowering that portion of the route airspace structure from LAMIX eastbound towards ROGAG to FL125 (aligning the lower limit to above the required safety buffer required above R313 with consideration to pressure variation). There is no requirement to amend the upper limit.

The area is bounded by the following coordinates (subject to verification prior to publication):

N 53°23'43", E 0°38'41"
 N 53°13'44", E 0°43'16"
 N 53°11'39", E 0°29'12"
 N 53°19'19", E 0°24'34"

The minimum climb gradient remains around 6% for the portion of the SID between CNS29 and ROGAG and this proposal would allow most aircraft to remain inside controlled airspace in the climb towards ROGAG.

4.2.6. Figure 27 depicts the elevation view of this proposal with the yellow line being minimum climb gradient of the ROGAG SIDs. The light blue airspace the intended vertical profile (which many operators will out-perform) and the red line being the vertical profile achievable by those operators operating at Maximum Take-Off Mass (MTOM).

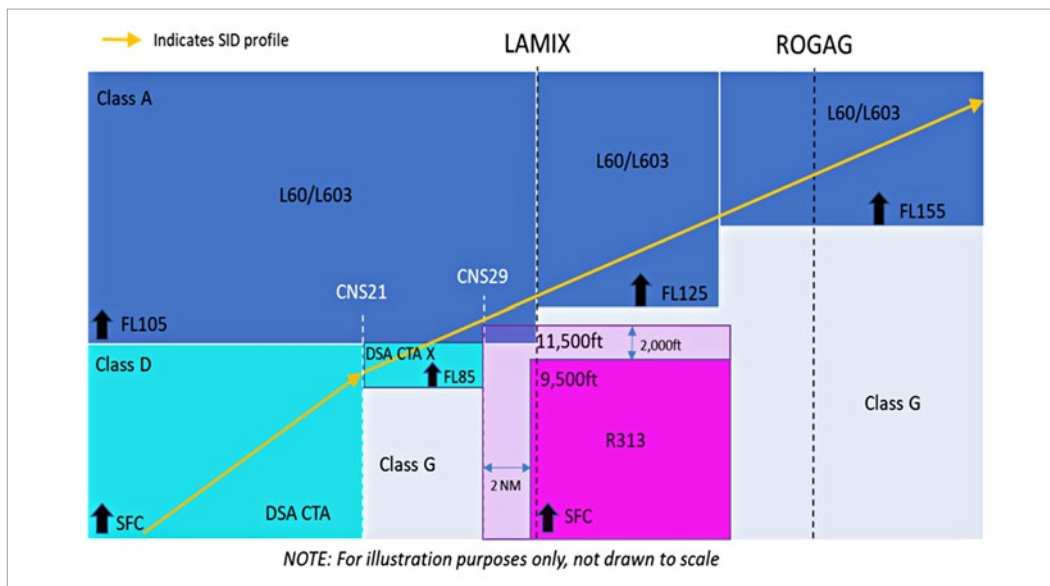


Figure 27: Elevation View of Proposed Airspace Configuration

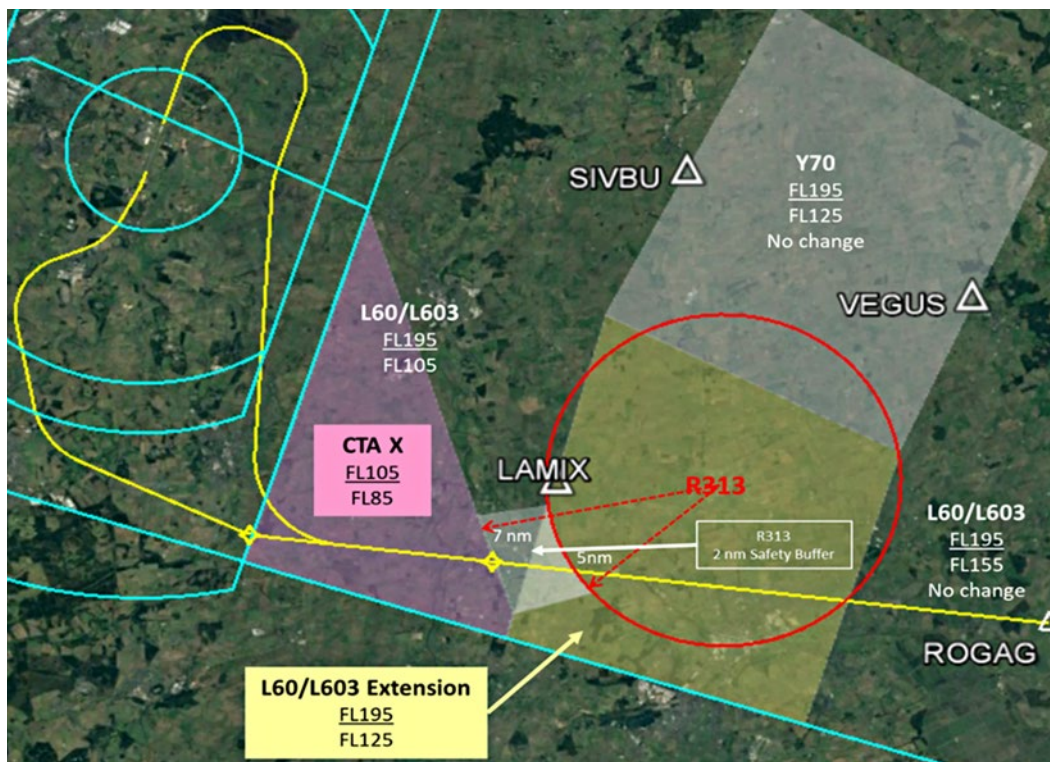


Figure 28: A simplified Plan View of Proposed Airspace Configuration (showing only L603)

5. Summary of Part B

DSA is developing a proposal for the introduction of 5 RNAV-1 (GNSS) SID procedures to replace the existing conventional SIDs and PDRs to:

- Reflect current CAA policies for the design and application of departure procedures and PBN in UK airspace; and
- Ensure the continuation of SID procedures beyond the withdrawal of the GAM VOR.

In addition, to the SIDs, ODDs and additional portions of controlled airspace are proposed. These additions aim to support the airspace development as a whole providing obstacle clearance and aircraft airspace containment.

The SID procedures detailed in this document have been designed in accordance with the ICAO PANS-OPS procedure design criteria as required by the CAA. The procedures also reflect current environmental guidance for the design of departure procedures, together with the principles detailed in the FAS. Throughout the development of the procedures, safety has been paramount. At all times, there has been focus on the consideration of the environmental impact of departing aircraft on communities both near DSA and further out along the flight paths.

6. Annexes to Part B

The following technical **Annexes** are published as separate documents to support **Part B** of this consultation document:

- Annex A Runway 20: UPTON2A
- Annex B Runway 20: UPTON2B
- Annex C Runway 02: UPTON2C
- Annex D Runway 02: ROGAG1B
- Annex E Runway 20: ROGAG1A

Consultees can review the procedures of interest to their locality without downloading the full spectrum of procedures.

1. Description of Procedures

1.1. Introduction

- 1.1.1. The implication of the withdrawal of the GAM VOR will be the removal of the associated VOR/DME approach procedures, which are used occasionally for arriving aircraft. These procedures are dependent upon the VOR navigational aid. Although there are Non-Directional Beacon (NDB) procedures available, many modern airliners no longer carry the equipment required to use them and this will leave the airport with limited redundancy in the event of a failure of the Instrument Landing System (ILS) during poor weather conditions. There would be a greater likelihood that aircraft would have to divert to another airport.
- 1.1.2. To provide the desired redundancy and to align to the UK FAS, RNAV (GNSS) Instrument Approach Procedures (IAPs) will be introduced. The introduction of RNAV IAPs aligns with the global modernisation of navigation standards to reduce reliance on ground-based infrastructure, allowing airlines to operate using the increased capability of their respective Flight Management System (FMS).
- 1.1.3. Following research and engagement with our operators, we have commissioned designs for Lateral Navigation (LNAV), Lateral Navigation with Vertical Guidance (LNAV/VNAV) and Localiser Performance with Vertical Guidance (LPV200) approaches for each runway.
- 1.1.4. The combination of the airspace layout, the inbound routing infrastructure, and the proximity of nearby airfields and gliding areas, does not lend itself to a standard “T” or “Y”-Bar design for these RNAV IAPs. Thus the ‘best fit’ design that has been developed for DSA is an approach design extending from the landing runway end out to a 10NM final approach point. This design also ‘replicates’ the existing ILS Approach path. The RNAV IAPs will have only two points defined on them, the first is the Intermediate Fix (IF) and the second a Final Approach Fix (FAF).
- Note: In this instance, the Initial Approach Fix (IAF) and the IF are coincident, all further references to this waypoint will be the IF.*
- 1.1.5. The major operators have indicated that they will continue to use the ILS as the primary approach aid with some operators advising they anticipate ad-hoc use of the RNAV IAPs for training purposes to ensure that their flight crews are familiar with the procedure. As the ILS remains the primary approach aid, it would be incumbent on the pilot to request a RNAV IAP from ATC and would be subject to approval. It is envisaged that approvals would be accommodated depending on traffic complexity, i.e. during quieter periods more flexibility may be available to ATC.
- 1.1.6. The ILS is a highly reliable approach aid that enables aircraft to make approaches down to a minimum altitude (a minima) that RNAV approaches are not yet capable of. In layman’s terms, during inclement weather in which visibility is poor or low cloud is prevalent, pilots can descend aircraft further (to a lower minima) to gain sight of the runway visually enabling them to complete the approach. Failure to obtain these ‘visual clues’ result in aircraft having to fly a missed approach (more on this in [Section 2](#) below).

1.2. RNAV IAPs versus Conventional Instrument Approaches

- 1.2.1. The significant operational difference between ILS and RNAV IAP, other than that stated above, is that an ILS Approach requires an aircraft to intercept the localiser path, which is normally a straight line extending from the landing runway. In the case of the RNAV IAP, ATC release an aircraft to self-navigate to the intercept point, which is in this case, called the IF, then fly via the FAF before landing.
- 1.2.2. The RNAV IAP IF and FAF are 'points-in-space' defined as 'fly-by' waypoints whereby the aircraft on-board systems will calculate a smooth turn, onto the next leg of the procedure.
- 1.2.3. The aircraft on-board navigation systems determine the optimum vertical flight profile for the aircraft, with the objective of maintaining a continuous stable descent profile. The IAP design specifies the minimum altitude at the IF (for obstacle clearance and procedure design purposes). Typically, aircraft will be between 2,000ft and 3,000ft as they turn at the IF towards the FAF, situated on the extended runway centreline.
- 1.2.4. The benefit of these RNAV profiles is that they result in an element of predictability and consistency for these routes and allow pilots to plan a more continuous descent profile by them knowing, ahead of schedule, the distance to touchdown and any level or speed restrictions that are in place. This continuous descent profile is beneficial to the environment in reducing fuel burn and reducing the noise footprint.
- 1.2.5. **Figure 29**, indicates aircraft arrivals over a 2-month period between June and July 2016, i.e. during the busier summer months. The central thick black line indicates the runway with the red lines indicating the final approach directions. The thin grey lines indicate NTK data, i.e. individual aircraft tracks during the defined period. You will notice that arrivals for RWY 02 from the west are positioned (vectored) by ATC to the east before turning back towards the approach path; this is due to airspace constraints to the west of the runway centreline whereby aircraft are unable to descend in the available space to be low enough for the approach.
- 1.2.6. The broad distribution of radar vectored arrival tracks (**Figure 29**) indicates a swathe of arriving traffic spread over a large area. There is no expectation for the distribution of arriving aircraft to change as radar vectoring to the ILS will remain the primary approach and landing methodology. The ILS is regularly maintained and has experienced only a single failure within the past 5 years.
- 1.2.7. In the event of an ILS failure resulting in extended use of RNAV IAPs, the expected distribution of arriving aircraft may be as depicted in **Figures 30 and 31**. However, a precise depiction of these arrival tracks is not possible due to the RNAV IAPs not having a normal Y or T-Bar extension. Radar vectoring of arriving flights will still be necessary, particularly for runway 02 from the west, prior to ATC releasing the aircraft back onto its own navigation to carry out the IAP.

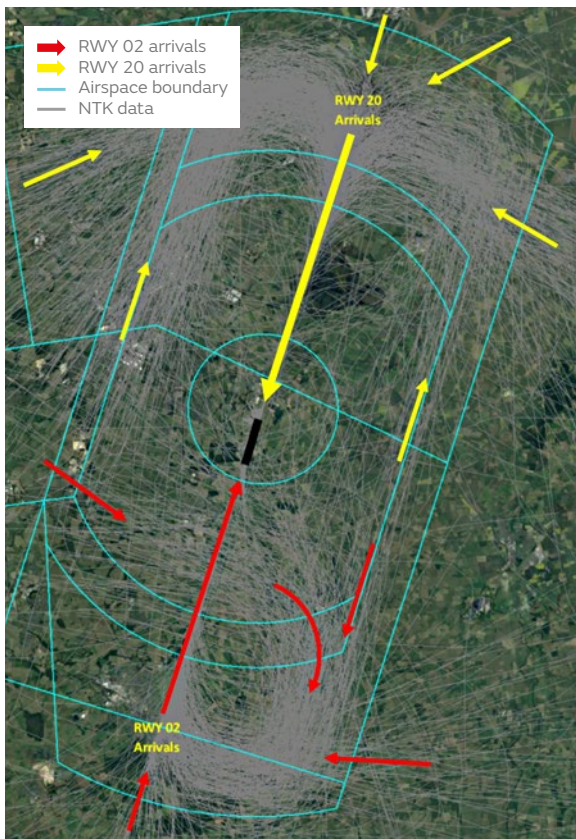


Figure 29: Current Arrival Aircraft Swathe for both runways (June/July 2016)

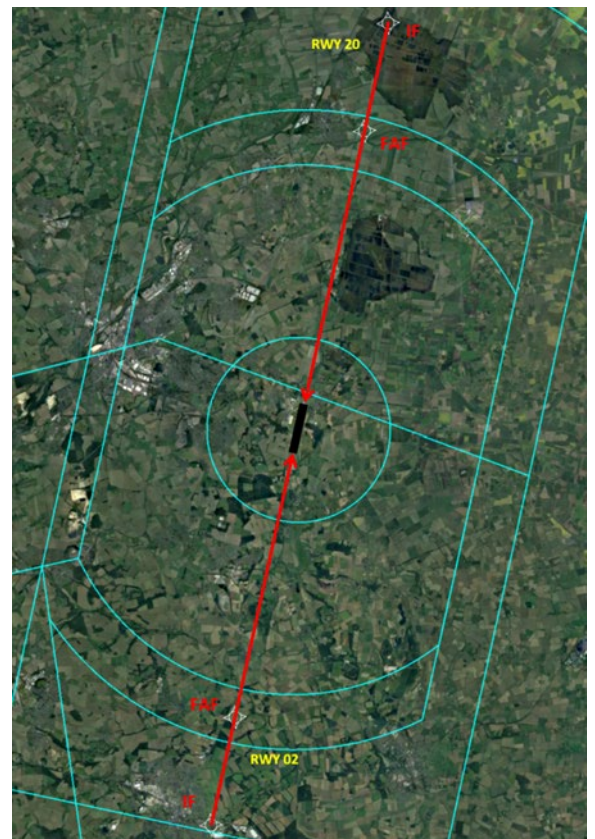


Figure 30: Proposed RNAV IAP Design for both runways

1.2.8. The blue-toned polygon shape, in Figure 31 above, indicates the expected swathe area for the RNAV IAPs within which aircraft will be released by ATC to self-navigate to the IF, i.e. ATC will not vector aircraft within the blue-toned shape; aircraft will navigate towards and 'fly-by' the IF and the FAF for the approach. Underlying the blue-toned area is the current aircraft tracks as depicted from NTK data (light yellow). From the two swathes, it is evident that there will be little change in how aircraft will track over the ground.

1.2.9. In Figure 32, the blue-toned polygon shape differs slightly to that depicted in Figure 31, this is attributed to the fact that aircraft inbound from the west for RWY 02 are required to be vectored to the east before intercepting the ILS for landing. Traffic inbound to RWY 20 are vectored to intercept the ILS from both the west and the east.

The blue-toned polygon shape, again depicts the expected traffic dispersion for the RNAV IAPs within which aircraft will be released by ATC to self-navigate to the IF. The blue-toned shape indicates that aircraft will commence their approaches slightly north of the current swathe area with no significant change as to how aircraft will track over the ground prior to joining the RNAV IAP.

1.2.10. The ability of the aircraft to self-position does not preclude ATC from vectoring aircraft tactically, if required, on an individual basis and routing them directly to final approach. Retaining this option is essential to ensure safe separation between aircraft is maintained. It also gives controllers the flexibility to optimise spacing on the final approach, and in so doing, achieve efficiencies that ultimately reduce delays.



Figure 31: RWY 02
Expected Swathe for
the RNAV IAPs



Figure 32: RWY 20
Expected Swathes for
the RNAV IAPs

2. Missed Approach Procedures

2.1. Definition

- 2.1.1. A Missed Approach Procedure (MAP) is followed if an approach cannot be completed to landing. The IAP specifies a point where the missed approach begins, and a position or an altitude where it ends.
- 2.1.2. A MAP is specified for all airfield and runway Precision Approach and Non-Precision Approach procedures. The MAP takes into account obstacle clearance requirements and other instrument procedures in the vicinity. Only one MAP is established for each approach procedure.

2.2. Proposed Amendments

- 2.2.1. The existing ILS has a published conventional MAP for each runway, this will not be changed as a consequence of this ACP. The ILS remains the primary approach aid and is not altered by this ACP.
- 2.2.2. This section details the proposed RNAV IAP MAPs for both runways 02 and 20 at DSA. Due to the procedure design criteria for RNAV IAPs detailed in ICAO PANS-OPS, it is not possible to replicate the existing conventional MAPs as RNAV procedures. The proposed MAPs for the RNAV IAPs are depicted in Figures 33 and 34.
- 2.2.3. An RNAV hold has been established in the same position as the current NDB hold.

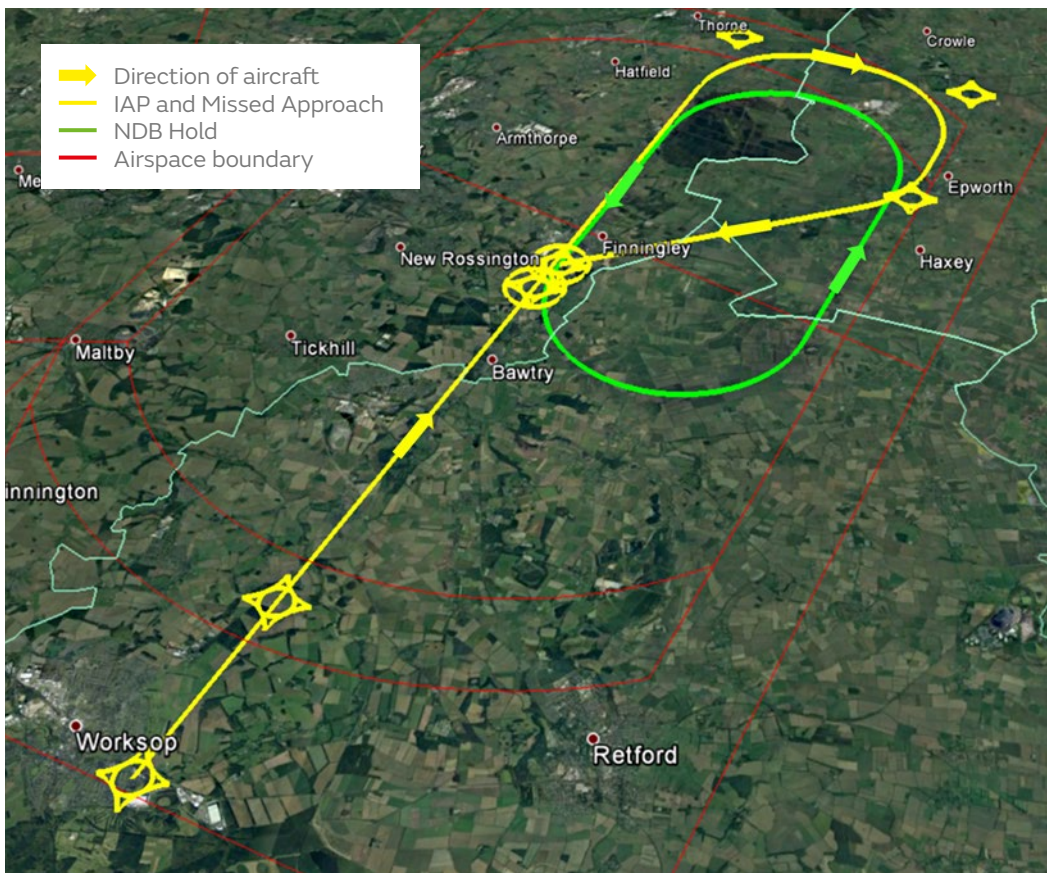


Figure 33:
RWY 02
Missed
Approach
Procedure

2.2.4. It is important to stress though that carrying out a MAP is essentially not a normal situation. Most IAPs are completed successfully to a safe landing.

However, the MAP represents a safe procedure which can be used when the IAP cannot be completed successfully. Given the circumstances for a MAP to be flown, it is extremely rare that it is used.

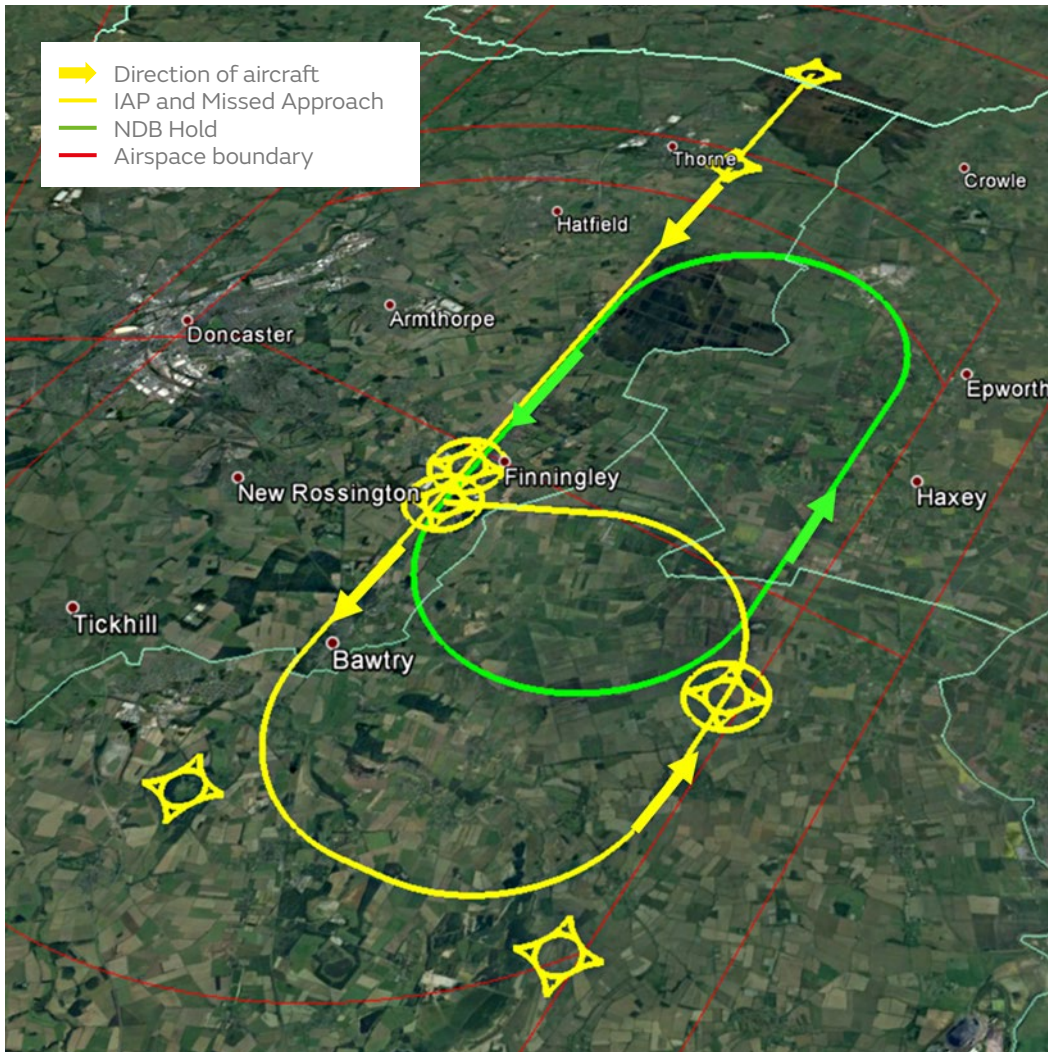


Figure 34:
RWY 20
Missed
Approach
Procedure

3. Summary of Part C

DSA is planning to implement RNAV (GNSS) IAPs in line with the future airspace requirements detailed in the UK FAS. The RNAV IAPs will be a secondary (redundancy) approach aid to the existing ILS for the foreseeable future and are designed without the conventional Y or T-Bars due to airspace constraints.

The final approach track replicates that of the existing ILS procedures. There is little expected change to how aircraft will track over the ground when flying the RNAV IAP resulting in minimal change to the impact on the environment.

PART D:
The consulting process

1. Introduction

1.1. Who are we consulting?

- 1.1.1. Given the nature of the proposed changes the CAA requires DSA to conduct a full stakeholder consultation in accordance with CAP725. We are therefore consulting all those who are most likely to be affected by the changes. The consultation will run from 25 September to 15 December 2017.
- 1.1.2. The consultation is not limited to these groups or individuals though and is freely available to the public via the DSA website. We welcome the views of the public and other interested parties who may or may not be affected by the proposed changes.
- 1.1.3. We are consulting the airspace users who will most likely be using the proposed procedures; the airlines using DSA and other aircraft operators based at DSA who require regular access to the Route Network, as well as off-airport operators who may be affected by the proposals.

1.2. Further clarification

1.2.1. Whilst we have endeavoured to explain the proposed procedures and airspace changes as simply as possible, it is expected that some consultees may not be familiar with aviation terminology, particularly with the technical aspects of IFP design. The offer is made for those seeking clarification to contact us via email (see Part D, Section 2). We ask that any such queries are submitted as early as possible in order that any subsequent responses to the consultation can be submitted within the consultation period.

1.2.2. We have a list of “Frequently Asked Questions” that may arise from the consultation. These are posted separately on the DSA website and will be updated should the need arise.

1.2.3. Consultees are reminded that this consultation is not about:

- The criteria used to design the IFPs;
- Future growth of DSA;
- The removal of the GAM VOR;
- Air Traffic Movements at DSA not associated with the RNAV SIDs, ODDs and IAPs, such as training flights;
- The CAA process for conducting airspace change; or
- Department for Transport (DfT) Policy on Airports and Airspace.

1.2.4. Any comments in your responses which are about these aspects will be noted but discounted from the analysis. A list of the consultees is given separately at Appendix A to Part A.

1.2.5. If you have any queries about what is presented in this document, please contact the Focal Point (as detailed below) as soon as possible. Please indicate clearly that this is a **QUERY** about the consultation.

Note: If using the email link detailed below you will receive the electronic automatic email acknowledgement. We will be checking emails regularly and will respond to your query as soon as possible.

1.2.6. A summary of the key issues raised in the consultation and further details of the next steps will be provided in a feedback report which will be published on the DSA website once the consultation period has ended. No personal details of respondents will be included in the report.

2. Responding to the consultation

2.1. Email responses

2.1.1. You are invited to respond to the consultation via a dedicated email address: dsaconsultation@peelairports.com or follow the links on the DSA website to: flydsa.co.uk/about-us/dsaconsultation

2.1.2. Please indicate clearly that this is your **RESPONSE** to the consultation. DSA has a strong bond with its communities and we would like a rounded response to this consultation.

It is important that a full array of opinions is captured to see where improvements can be achieved, but in the same vein positive responses are also valued to monitor the acceptance of what DSA is trying to achieve. In so doing, it would be particularly helpful if emails highlight the response being made as follows:

- **SUPPORT**
In favour;
- **NO COMMENT**
A nil return is considered helpful even if you have nothing to add;
- **NO OBJECTION**
Neither especially in favour or not in favour;
- **OBJECT**
Not in favour.

For example:
*RESPONSE: SUPPORT –
Name, Organisation etc.;*
and then any comments you may have.

2.1.3. Responses or clarifying questions made through social media channels will not be considered or answered. Please refer to point 1.2.5 for guidance regarding a query.

2.2. Post

2.2.1. If you cannot submit your response by email you may do so in writing to the following address:

Airspace Consultation
Doncaster Sheffield Airport Limited
Heyford House, First Avenue
Doncaster DN9 3RH

2.2.2. In responding by post, please use the same methodology in the title of your letter as articulated in paragraph 2.1.2 to highlight the nature of your response.

2.3. Acknowledgement of responses

2.3.1. Email responses will be electronically acknowledged by automatic response email. Responses sent by post will not be acknowledged; if confirmation of receipt is required please use a recorded delivery service. Responses received after the closing date will be logged and stored but not analysed.

2.3.2. We will not enter into correspondence with individual respondents on issues relating to this consultation other than to answer clarifying questions until the consultation period has ended and all responses have been collated and analysed.

2.4. Confidentiality

- 2.4.1. The CAA requires that all consultation material, including copies of responses from consultees and others, is included in any formal submission to the CAA.
- 2.4.2. DSA undertakes that, apart from the necessary submission of material to the CAA and essential use by our consultants for analysis purposes, DSA will not disclose any personal details or content of individual responses to any third parties. Our consultants are signatories to confidentiality agreements in this respect. The CAA will however publish all consultation material including responses received (albeit redacted) on their website.
- 2.4.3. DSA will treat all responses with due care and sensitivity. If you do not want your personal details to be forwarded to the CAA, please let us know. All data passed to the CAA is bound by the Data Protection Act.

3. Post consultation process

3.1. Analysis of the consultation feedback

- 3.1.1. DSA will consider all relevant feedback received from consultees, taking into account the guidance from Government and the CAA and the various CAA policy requirements.
- 3.1.2. A summary of the key issues raised in the consultation and conclusions drawn from the responses, together with further details of the next steps will be provided in a feedback report which will be published on the DSA website after the end of the consultation. The report will form part of the formal ACP to be submitted to the CAA and will also be added to the CAA's website.
- 3.1.3. All the feedback from the consultation will be made available to the CAA as part of the ACP. This will allow them to assess independently whether we have drawn the appropriate conclusions from the feedback received whilst, at the same time, complying with the procedure design and consultation requirements.
- 3.1.4. It is essential to note that whereas some changes may be individually desirable from a community point of view, they may not be feasible for procedure design or operational reasons or may be outweighed by dis-benefits to other communities.
- 3.1.5. It will be the CAAs decision whether or not to approve the proposals that we submit following this consultation. In reaching that decision they will assure themselves that the procedures and the airspace proposals submitted are safe and in compliance with their procedure design requirements and that we have correctly complied with their environmental analysis and consultation requirements.

3.1.6. The CAA's decision will be published on their website via the ACP Portal.

3.1.7. Approximately 12 months following the introduction of the proposed procedures, the CAA will conduct a Post-Implementation Review (PIR) to satisfy itself that the objectives and benefits of the procedures have been achieved and that the ATM System is working as stated in the ACP documentation. The findings of the PIR will also be published on the CAA website.

3.2. Compliance with the consultation process

3.2.1. If you have any concerns regarding our compliance with the consultation requirements set out in the CAA's guidance for airspace change (CAP725) you may direct your concerns to the CAA at:

Airspace Regulator (Co-ordination)
Airspace Regulation
Safety and Airspace Regulation Group
CAA House
45-59 Kingsway
London WC2B 6TE

Email: airspace.policy@caa.co.uk

3.2.2. Please note that this address must not be used for direct responses to the consultation; doing this will make it unlikely that your views will be captured.

3.2.3. Furthermore, please note that the CAA will respond only to concerns about DSA's compliance with the process. They will not comment on the proposal itself.

4. Summary of Part D

4.1. What happens next?

- 4.1.1. This consultation runs from 25 September to 15 December 2017, a period of 12 weeks, during which consultees can consider the proposed procedures and submit responses as detailed in Section 2.
- 4.1.2. On completion of the consultation we will analyse all responses submitted and compile a report of the consultation. We will identify any major themes that emerge from the consultation and make a response to them in the report. The report will be posted on the DSA website and the CAA's ACP Portal and will form part of the formal ACP.
- 4.1.3. Where it is identified that a change to the proposed procedure designs may be of overall benefit, taking due regard of the safety, procedure design criteria and airspace management constraints, we will consider implementing changes. As stated previously, some changes may be individually desirable from a community point of view but they may not be feasible from a procedure design perspective, for operational reasons or the change may be outweighed by negative impacts to other communities.
- 4.1.4. DSA will then compile a formal ACP for submission to the CAA, together with the proposed procedure designs. We expect to make this submission in February 2018.
- 4.1.5. The CAA will assess the ACP in accordance with CAP725 and the procedure designs in accordance with the provisions of CAP778 and CAP785. A regulatory decision on the ACP is expected in June 2018.
- 4.1.6. Should the CAA approve the ACP and the associated procedure designs then we expect the procedures will be promulgated in the UK AIP for implementation in November 2018.

Doncaster Sheffield Airport
Airspace Change Proposal
for the Introduction of RNAV (GNSS)
Departure and Approach Procedures


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An aerial photograph of the Doncaster Sheffield Airport, showing the runway, taxiway, and terminal building. The image is overlaid with a teal color. A horizontal teal line is positioned across the upper third of the image. The text is located in the lower-left quadrant of the image.

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