Doncaster Sheffield Airport

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

ANNEX C TO PART B

PEEL

European Commission

Doncaster Sheffield Airport

Robin Hood

ANNEX C TO PART B:

Runway 02
Westerly Departure
UPTON 2C

Contents

1. Runway 02: Departures to the west (to UPTON)

1.1. The proposed RNAV SID procedure is referred to as the UPTON 2C and reflects as closely as practicable the intended nominal ground track of the previous conventional navigation SID named the UPTON 1C from Runway 02, which it replaces.

1.2. UPTON is a position-in the en-route ATS network in the vicinity of Moorthorpe. It is specified by NATS En-route Limited (NERL) as the position at which aircraft departing from DSA to the west must join the Route network.

1.3. The existing UPTON 1C SID uses distances measured from the GAM VOR (situated on Retford (Gamston) aerodrome) together with track guidance from the Ottringham (OTR) VOR located on the east coast some 35NM north-east of DSA. It also includes two segments to the north-west (360˚M and 333˚M) without navigational guidance from any ground-based navigational facility. This 'dead-reckoning' is not conducive to accurate or repeatable track keeping. The GAM VOR is to be withdrawn by NATS in 2019, in accordance with agreed CAA Policies, which means that it will no longer be available for its role in defining the UPTON SID from Runway 02.

1.4. During the period, June/July 2016, encompassing the busy summer period, 170 aircraft flights used the UPTON1C SID.

1.5. Figure 1 on the next page shows historic tracks of aircraft departing from Runway 02 on the UPTON 1C over the June and July period. The tracks end at the point at which aircraft pass 7,000ft amsl and therefore not all tracks end at the same distance from take-off as aircraft differ in climb capability.

1.6. There is a substantial difference between the intended track of the SID procedure (shown in magenta) and the actual tracks of departing aircraft (depicted in green), which appears to emanate from non-adherence to the short (1NM) unguided leg on track 360˚M before turning further left again onto the unguided leg 333˚M. The 360˚M segment is part of the Airport Noise Abatement measures and was intended to ensure that departing aircraft avoid overflight of Blaxton. Conversely, non-adherence to this segment has meant that the actual tracks of departing aircraft have flown closer to the conurbations of Aukley and Armthorpe than intended.

1.7. Most aircraft navigation systems will be navigating using an "RNAV Overlay", in which the conventional published procedure is interpreted by a navigation database coder into an RNAV "look-alike" code. However, the interpretation and coding of the short straight ahead (to D0.5) and 360˚M segments are not compatible with RNAV procedure design criteria. Thus, as a consequence, the NTK data depicted in Figure 1 shows a wider than intended dispersion of flight paths and a displacement of the core flight paths closer to Auckley and Armthorpe than would be ideal.

1.8. As detailed in Section 5 of Part A of the Consultation Document, once aircraft are above the upper limit of the NPR they may be tactically routed by radar ATC for integration with other traffic flows to expedite climb clearance with respect to other aircraft. It can be seen in Figure 1 that some aircraft have been cleared to turn directly towards UPTON when north of Armthorpe, although the majority have been left to follow the SID procedure (as interpreted by the RNAV overlays in their navigation systems as detailed above) to intercept the track from OTR VOR to UPTON.

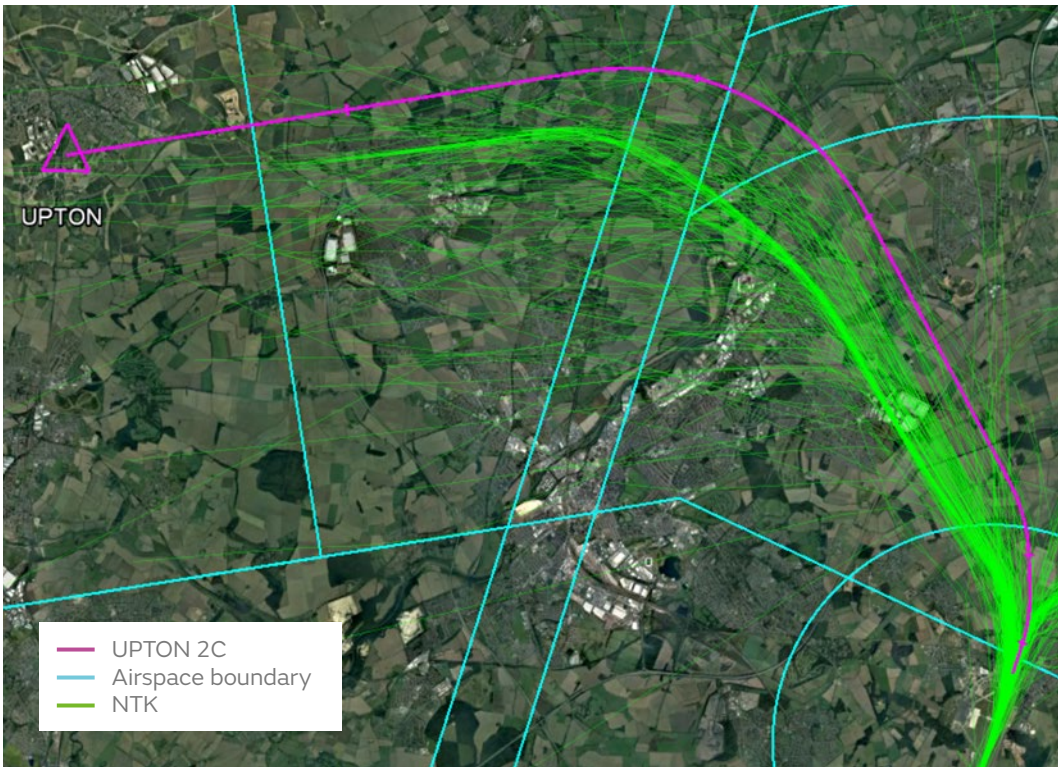


Figure 1: Runway 02 – Historic departure tracks for the period June-July 2016 via UPTON

2. The UPTON 2C SID procedure

2.1. The procedure is described as follows:

Climb straight ahead to intercept course 004° to CNN02, left to CNN08, left to CNN13 – UPTON.

2.2. A schematic diagram of the SID is shown in Figure 2 below and diagrams of the SID overlaid on Google Earth are shown at Appendix A1 and Appendix A2.

2.3. Once aircraft reach 500ft amsl or 0.5NM from departure, if this is later, they will deviate 15° to the left onto a track of 004˚M towards waypoint CNN02. Due to PANS-OPS limitation on procedure design, SIDs are not permitted to deviate by more than 15° after departure. This is the maximum amount of turn that can be incorporated into a departure procedure by the PANS-OPS procedure design criteria until a specified obstacle clearance has been achieved. The maximum speed limit of 210kt incorporated into this segment of the SID will ensure greater consistency of track keeping by departing aircraft with differing performance.

2.4. The subsequent turns towards UPTON are slightly wider and take the aircraft marginally further east and north than the UPTON 1C intended in order for the procedure to comply with the more stringent PANS-OPS design criteria for RNAV procedures that the conventional design did not have to abide by.

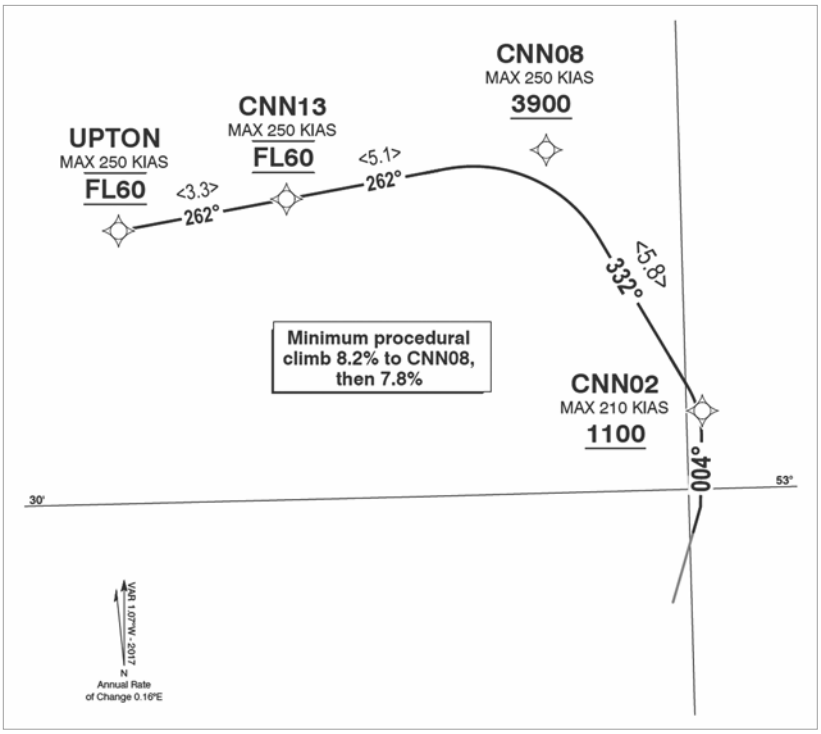


Figure 2: Schematic of UPTON 2C SID

2.5. Vertical constraints

2.5.1. The vertical profile of the proposed departure ensures aircraft are contained within controlled airspace. The airspace outside the control zone and below the Control Areas are used extensively by General Aviation traffic, including gliders, not necessarily in contact with or known to DSA ATC.

2.5.2. The upper limit of the SID procedure is FL60 and this is specified at waypoint CNN13, which is the procedural upper limit of the SID procedure to define the ATC procedural interface arrangements between NATS PC en-route Sectors and DSA ATC. However, on a day-to-day basis, under normal operational conditions, departing aircraft will have been transferred to PC long before reaching FL60 and will have been given further climb clearance by PC without needing to level out.

3. Differences between the UPTON 1C and the UPTON 2C SIDs

3.1. Diagrams showing the proposed UPTON 2C SID overlaid on the actual tracks of aircraft operating on the previous UPTON 1C are shown at Appendices A1 and A2.

3.2. The current and proposed SIDs are depicted in Appendix A1. The similarities in the design are self-evident. There is little change, in design terms, with a displaced track running parallel to the current SID between the first and second turns. The displacement is on the basis of RNAV design criteria rather than trying to fully replicate the current design.

3.3. It is seen from the diagrams at Appendix A2 that the route of the proposed UPTON 2C SID procedure closely replicates what was intended by the previous design vice what is currently flown. The increased accuracy of navigation performance in the RNAV SID (versus conventional) should result in a narrowed swathe of traffic thereby impacting fewer communities.

4. Other options considered

4.1. Do nothing:
This option cannot be considered as the current UPTON 1C SID is partly predicated on the GAM VOR, which is being withdrawn. While the OTR VOR forms part of the SID it does work in conjunction with the GAM VOR. The distance and location of the OTR VOR, as a stand-alone aid, does not fully support the existing array of SIDs at DSA nor does it fit in with the UK FAS in terms of moving towards RNAV capabilities.

4.2. Replicate the existing UPTON 1C SID:
This option is feasible and is the intent however, PANS-OPS for RNAV design criteria mean that slight adjustments must be made to meet regulatory approval.

4.3. Radical New Design:
The current SID designed meets the most appropriate track and distance to position UPTON. While shorter routing is available, i.e. inside of the current SID as indicated by the NTK data, the communities of Auckley, Branton, Old Cantley, Armthorpe, Edenthorpe and Kirk Sandall would be effected by aircraft flying directly overhead. Tracking further north before turning west is also not feasible due to the SSSI defined area of Hatfield Moors as well as impact to the communities of Hatfield and Stainforth.

5. Environmental assessment

5.1. The nominal route of the SID very closely replicates the intended flight path of the current SID but not the actual flight paths of aircraft shown by the NTK data. The reasons why the actual flight paths currently differ from the intended flight path is explained in the earlier sections of this document.

5.2. The introduction of RNAV procedure design will result in a more predictable and repeatable flight path and will improve overall airspace efficiency. It has been designed to avoid, by a greater margin, overflight of a number of communities which are affected today such as Auckley, Branton, Old Cantley, Armthorpe, Edenthorpe and Kirk Sandall. It is acknowledged that this SID passes over the western portion of Dunsville as does the original SID flight path. In designing the proposed SID, various options were considered as the intent was to avoid overflying communities as far as possible. PANS-OPS design is not linear in that a series of lines depict a flyable route, the design element is dynamic and a tweak at one point impacts other elements of the route design. As such, the proposed UPTON 2C is the best-case design to achieve the vertical element and leave the resultant turns intact without increasing the number of communities affected. In design terms, the climb gradient indicates an aircraft would pass ±3,000ft above Dunsville, in reality an aircraft can be expected to pass anywhere between 4,000ft to 4,500ft when passing this community. The reason for this difference is that SIDs are designed from a point 50ft above the end of the departure runway known as the Departure End Runway (DER). Aircraft are required to get airborne at a point before the end of the runway to allow sufficient available runway space for an aborted take-off. At DSA, aircraft typically get airborne between halfway to two-thirds down the runway and by the DER are generally 500ft to 1,000ft above the runway surface. Furthermore, an operational capability survey to all operators indicated that most aircraft operating from DSA utilising the UPTON 1C departure are able to achieve a climb gradient on 10% or better.

5.3. The Airport Noise Contours are specific to each runway rather than each individual SID and are therefore detailed in Part A Section 4.

5.4. It is anticipated that the speed limits for the initial turn of the SID, together with a specified track towards UPTON, will reduce the spread of aircraft tracks around the initial turn and the subsequent turn towards UPTON, thereby significantly reducing the number of people affected by departing aircraft on this route.

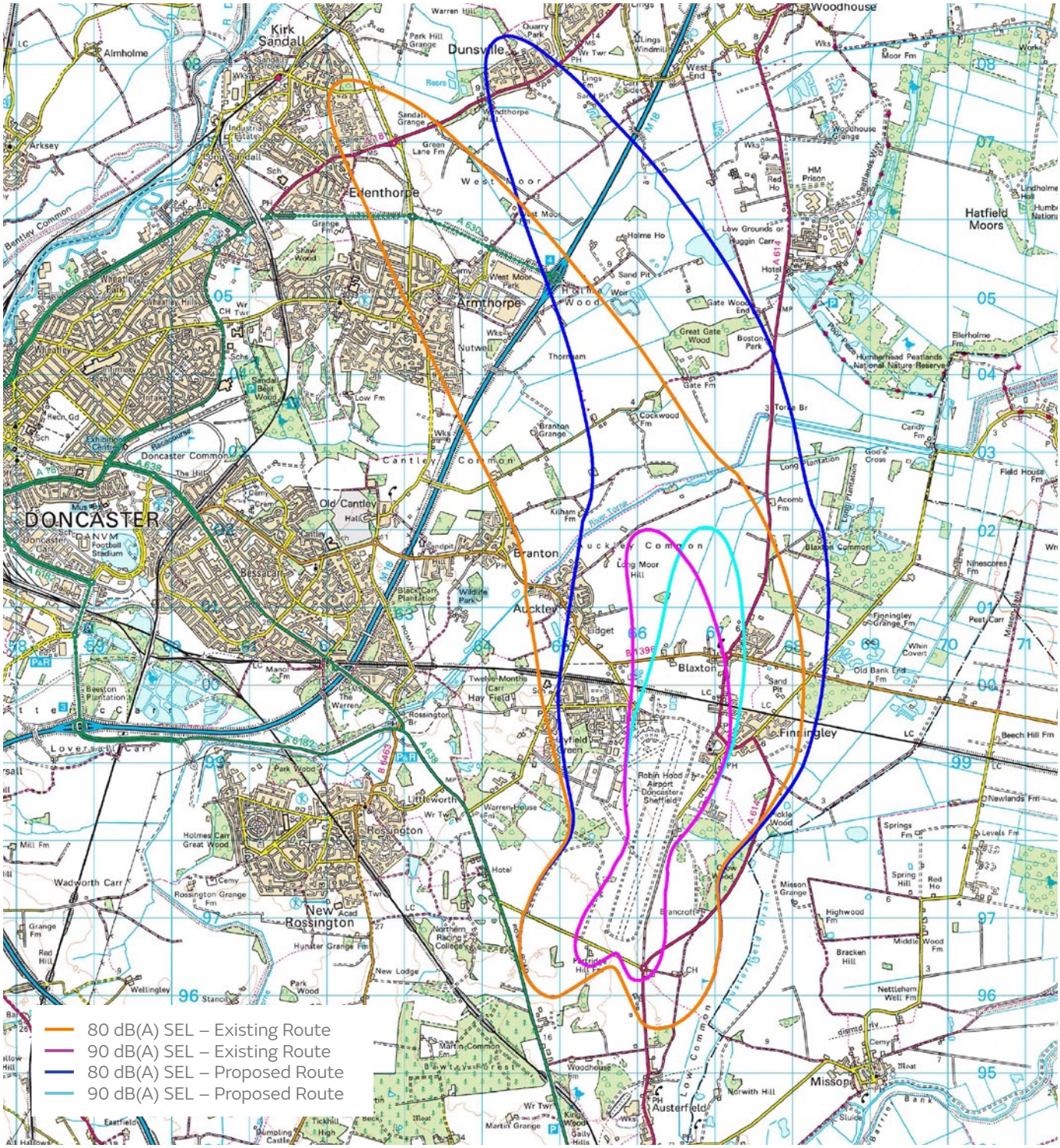
5.5. The Chart at Appendix A3 shows the 80 and 90 dB(A) departure footprints of both SIDs. The area and population affected within these footprints does see change against the population counts. The communities of Auckley, Branton, Old Cantley, Armthorpe, Edenthorpe and Kirk Sandall all benefit from the introduction of the proposed SID.

5.6. The introduction of RNAV SIDs with a navigation standard of RNAV-1 will result in improved repeatability of tracks and adherence to intended tracks in accordance with CAA policy and DfT guidance.

5.7. Therefore, it is concluded that the impact of the proposed SID procedure brings an overall environmental benefit to communities on the ground as well as to improved flight profiles.

Appendix A1: Diagram of UPTON 2C SID overlaid on OS topographical map

Appendix A2: UPTON 2C and historic tracks of aircraft flying the UPTON 1C



Appendix A3: Departure swathes for UPTON 1C and UPTON 2C SIDs

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

Annex C to Part B:
Runway 02 Westerly Departure UPTON 2C

Version 2.0
Published 25 September 2017

Doncaster Sheffield Airport
Heyford House
First Avenue
Doncaster DN9 3RH

flydsa.co.uk