# Doncaster Sheffield Airport

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

ANNEX A TO PART B

PEEL

European Commission

Doncaster Sheffield Airport

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ANNEX A TO PART B:

# Runway 20 Westerly Departure UPTON 2A

# Contents

# 1. Runway 20: Departures to the west (to UPTON)

1.1. The proposed RNAV SID procedure is referred to as the UPTON 2A and reflects as closely as practicable flight paths of aircraft using the previous conventional navigation SID named the UPTON 1A.

1.2. UPTON is a position-on the en route ATS system in the vicinity of Moorthorpe. It is specified by NATS PC as the designated position for aircraft departing from DSA to join the Route Network.

1.3. The existing UPTON 1A SID uses the GAM VOR (situated on Retford (Gamston) Aerodrome) as the ground-based navigational aid to define the route to UPTON. The GAM VOR is being withdrawn by NATS in 2019 in accordance with agreed CAA Policies (see Part A of the Consultation Document).

1.4. Approximately 470 departing aircraft used the UPTON 1A SID within the period June to July 2016, encompassing a busy summer period. Figure 1 below shows historic tracks of aircraft departing from Runway 20 on the UPTON 1A over this 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.

*Note: The NTK system has limitations that does not allow for depiction of tracks by departure procedure and therefore Figure 1 also shows tracks going south.*

1.5. As detailed in Section 2.5 of Part A of the Consultation Document, once aircraft are beyond the upper limit of the NPR they may be tactically routed, with radar vectoring by ATC, for integration with other traffic flows. While most aircraft can be seen to be routing towards UPTON, there are tracks splitting off from the mainstream route; these tracks may be as a result of radar vectoring or aircraft following the NPR but not specifically flying the UPTON 1A SID.

1.6. While the flexibility to radar vector remains, Figure 1 below indicates that most aircraft tend to be left to fly the SID.

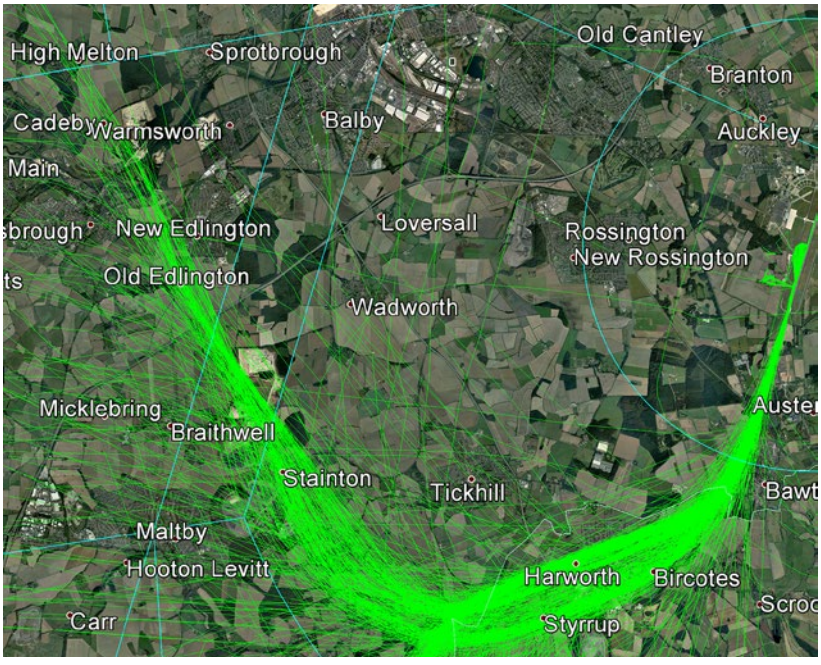



Figure 1: Runway 20 – Historic departure tracks for the period June-July 2016 via UPTON

# 2. The UPTON 2A SID procedure

2.1. The procedure is described as follows:

*Climb straight ahead to intercept a course of 209°M to CNS02, right to CNW06, right to CNW10 – CNW14 – 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 in Appendix A1 and Appendix A2.

2.3. The SID deviates by 10° to the right 0.5NM after departure to minimise the impact felt by Bawtry, which is on the immediate extended centreline from the runway. Due to PANS-OPS limitation on procedure design, SIDs are not permitted to deviate by more than 15° after departure. The initial deviation only occurs at 0.5NM to allow aircraft to stabilise and adjust to the deviation allowing for better repeatability with 10° considered optimum for the environment.

*Note: A deviation of 15° or less is not considered a turn in PANS-OPS.*

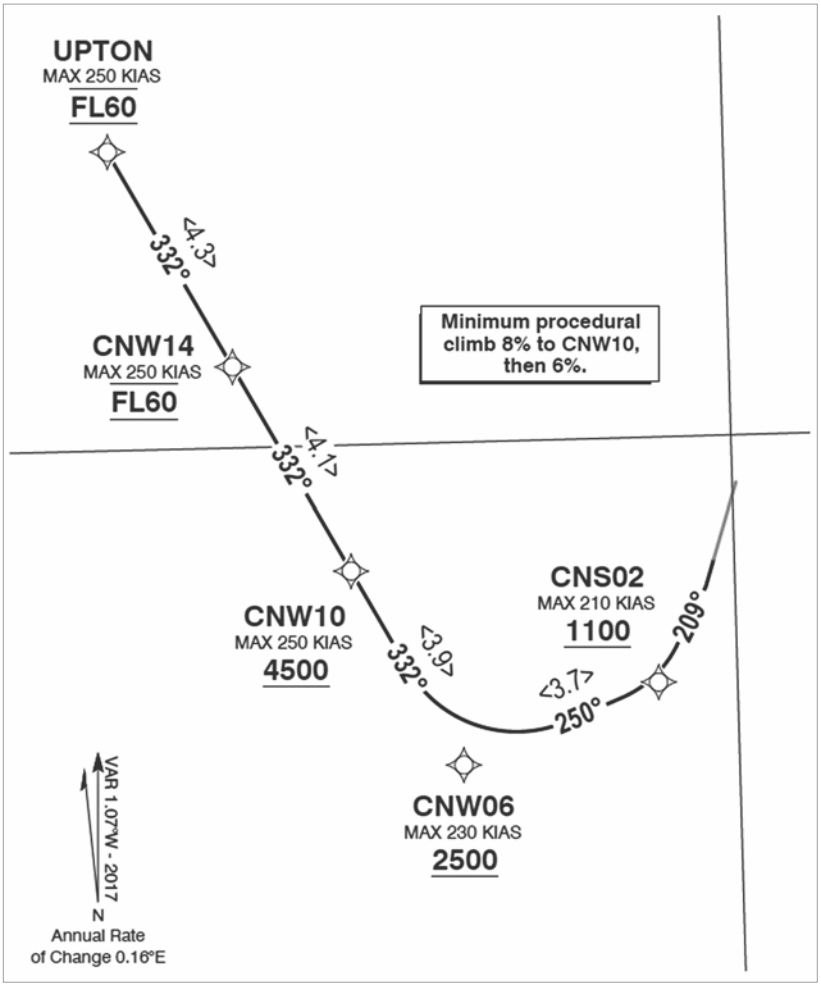



Figure 2: Schematic of UPTON 2A SID

2.4. In the determination of the 10° deviation, various options were considered as to the impact to the various deviations within 15°.

- Straight ahead – this option was not considered as this would have a larger impact to the community of Bawtry and Bircotes.
- Maximum deviation of 15° – this option effectively shortened the SID resulting in a higher than normal climb gradient requirement as well as impacting the community of Tickhill. Due to the close proximity of the CTA boundary to the north-west this would create an issue with containing an acceptable climb gradient within controlled airspace.
- The track of 209° (10° deviation) takes aircraft to the west of Bawtry while minimising the impact to Bircotes and Harworth when compared with what is flown today.

2.5. The subsequent turns towards UPTON take into account the communities of Bircotes, Harworth and Styrrup by moving the SID further north of the current flown tracks. As aircraft turn north the track keeps aircraft clear of Tickhill and slightly further east of Stainton after which aircraft should be well above 4,000ft routing towards UPTON.

## 2.6. Vertical constraints

2.6.1. The SID applies two altitude requirements in the initial climb-out phase of departure of 1,100ft and 2,500ft to ensure aircraft remain within the profile and controlled airspace. While the current CAA Policy allows SID designs to leave controlled airspace, we have applied level requirements to ensure that the SID remains contained within controlled airspace.

2.6.2. The first altitude restriction imposed by the airspace is to cross position CNW10 at 4,500ft or higher. This retains departing aircraft to a minimum of 500ft above the base of controlled airspace (CTA-9). The uncontrolled airspace beneath the CTA in this area is used extensively by General Aviation traffic, including gliders, who may not be in contact with or known to DSA ATC. The climb gradient required to reach 4,500ft by CNW10 is 8%, which is currently achieved or exceeded by aircraft departing from Runway 20.

2.6.3. The second altitude restriction is to cross CNW14 (4.3NM before UPTON) level at FL60, once again defined to ensure continuous containment within controlled airspace. This is also the procedural upper limit of the SID procedure to define the ATC interface arrangements between NATS PC en-route Sectors and DSA ATC. 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.

# 3. Differences between the UPTON 1A and the UPTON 2A SIDs

3.1. Diagrams showing the proposed UPTON 2A SID overlaid on the actual tracks of aircraft operating on the previous UPTON 1A are shown in 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, until the turn south of Tickhill, after which the SID turn has improved, i.e. less steep, and avoidance of communities en-route to UPTON considered.

3.3. The existing conventional SID was designed to take the initial communities into consideration but due to issues related to operators (airlines) using non-regulated RNAV overlays, the actual track over the ground differed to what was planned, the result of this was a varied interpretation of the procedure, a swathe. The proposed RNAV SIDs differ in so far that the designs are regulated, i.e. no use of airline initiated overlays, resulting in increased accuracy and repeatability. Ultimately, what is proposed will result in the concentration of traffic on the proposed track.

3.4. It is seen from the diagram in Appendix A2 that the latter portion of the proposed UPTON 2A SID procedure replicates, as closely as practicable, what is currently flown rather than what was previously designed. The increased accuracy of navigation performance in 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 1A SID is predicated on the GAM VOR which is being withdrawn. The SID, without the ground-based navigational aid, cannot be flown. In addition, there are no alternative ground-based navigational aids in the vicinity.

4.2. Replicate the existing UPTON 1A SID:
This option is not feasible as the turn towards UPTON is tighter than what is currently flown. In addition, the SID flies out on a track that intercepts another track from the GAM VOR creating a displaced track to UPTON, seen as a kink. The existing UPTON 1A does not lend itself to being replicated to RNAV criteria, in particular the bank angle turn to UPTON and the 'kink' track adjustment are not necessary with today's technological capabilities.

4.3. Radical New Design:
A review of the outlying areas discounted routing the SID any further west due to airspace constraints and the likely impact on communities. The aircraft would have to achieve a higher than normal climb gradient to achieve controlled airspace containment. Furthermore, the community of Maltby, would be significantly impacted. Additional consideration was given to the General Aviation community, routing further west would significantly impact the glider community.

# 5. Environmental assessment

5.1. The nominal route of the proposed SID reflects both the current SID and the NTK data (representing where aircraft truly fly). The more predictable and repeatable design will improve overall efficiencies in terms of noise where the selected design has attempted to avoid flying directly over communities.

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

5.3. 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 reducing the number of people affected by departing aircraft on this route.

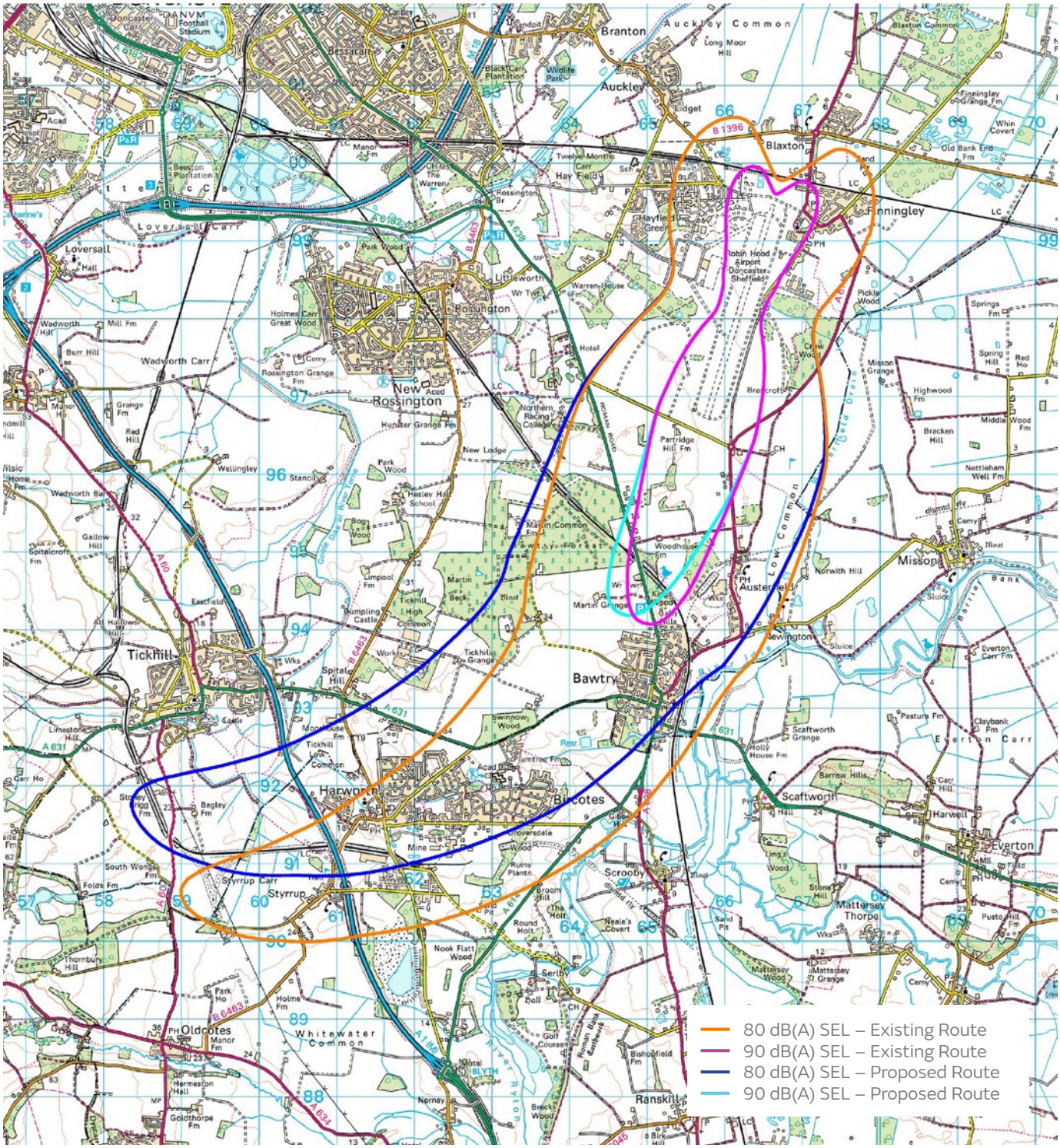
5.4. The Chart at Appendix A3 shows the 80 and 90 dB(A) departure footprints of both SIDs. The area and population affected within these footprints does not change against the population counts. This is predominantly against the fact that the initial section of the SIDs do not differ. It must be further noted that the departure footprint for the UPTON 1A was based on an average track of a wide swathe of aircraft, i.e. in reality, more people were impacted than the theoretical average footprint.

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

5.6. The impact of the proposed SID procedure should bring an overall environmental benefit to communities on the ground as well as to improved flight profiles and reduced fuel burn for aircraft operators.


Appendix A1: Diagram of UPTON 1A and UPTON 2A SIDs


Appendix A2: UPTON 2A SID and historic tracks of aircraft flying on the UPTON 1A




Appendix A3:
Departure Footprints for
UPTON 1A and UPTON 2A

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Annex A to Part B:
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Figure 1, Appendix A2
Image © 2016 Google,
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Appendix A1
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Appendix A3
Bickerdike Allen Partners.
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