Leeds Bradford Airport

Leeds Bradford Airport Airspace Change Proposal

Addendum to Consultation Document

18 September 2017

Leeds Bradford Airport

Document Details

Reference	Description
Document Title	Leeds Bradford Airport Airspace Change Proposal
	Addendum to Consultation Document
Document Ref	70818 032
Issue	Addendum
Date	18 September 2017
Client Name	Leeds Bradford Airport
Classification	

Issue	Amendment	Date
Issue 1	Initial Issue	15 June 2017
Issue 1.1	Updated Coordinates	29 June 2017
Issue 2	Updated Environmental Information and Coordinates	14 July 2017
Issue 2 Addendum	Updated Environmental Information regarding NPRs and inclusion of SEL	18 September 2017

Approval Level	Authority	Name
Author	Osprey CSL	Mark Wakeman
Reviewer	Leeds Bradford Airport	Alan Siddoway

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1 Foreword by the Chief Executive Officer

“Welcome to this addendum of the Leeds Bradford Airport (LBA) airspace change consultation on proposed changes to the airspace around the Airport.

Following the launch of the consultation process in July, we have received feedback from several local communities. Concerns have been expressed that one of the proposed routes associated with the change did not fall wholly within the Airport’s existing Noise Preferential Route (NPR) swathe. This was not the intention, so following receipt of the feedback, we investigated to understand why the route did not appear to align more closely with the existing NPR swathe.

The main areas of concern were expressed by the communities of Menston and Burley in Wharfedale. The proposed new route for the DOPEK and LAMIX Standard Instrument Departures (SIDs) from Runway 32, (these aircraft depart from the Airport heading towards the northwest initially, before turning left on to a southerly heading) was not fully contained within the NPR swathe. It would appear that the diagram included within the Consultation Document was intended to represent the worst case scenario, but the route shown was specifically for a turbo-propeller (turbo-prop) aircraft. Turbo-prop aircraft are not required to follow the NPR as currently published within the UK Aeronautical Information Publication (AIP), in accordance with the Airport’s planning permission.

We have issued this Addendum to also include all of the new routes that will be flown by jet aircraft and turbo-prop aircraft. Updated diagrams now include Airbus A330 and Airbus A320, or equivalent, aircraft that are shown to be contained wholly within the existing NPR swathe. It can clearly be seen that the villages of Menston and Burley in Wharfedale are not expected to be overflown by jet aircraft flying the DOPEK and LAMIX SIDs. Despite the clarification regarding aircraft routes, Issue 2 of the Consultation Document, as published, contains the remainder of the planned changes.

We have also taken this opportunity to include more detailed environmental information to provide a clearer indication of the noise exposure levels associated with the new procedures. Details can be found within Annex A5, Annex A6 and Annex A7.

A considerable amount time has been invested in developing these procedures in consultation with a wide variety of third parties in accordance with the CAA regulatory processes. The changes that we are proposing will seek to ensure that our neighbours, national airspace and adjacent airports are not unduly affected by our proposal.

We would like to take this opportunity to thank you for your feedback to our consultation and we encourage you to take a look at how we have tried to work with the community in order to minimise any impact. The consultation process will be extended to ensure you have time to consider these changes and comment accordingly.”

David Laws
Chief Executive Officer

2 Why Has this Addendum Been Issued?

Following the launch of the Consultation in July 2017, we have received some feedback from the public about aspects of the proposed change that required further clarification. This Addendum provides that clarification and more detailed environmental analysis specifically regarding the potential impact of noise.

2.1 What Was the Public Concerned About?

We undertook to try to ensure that our newly proposed routes complied with our existing Noise Preferential Route (NPR) swathe. For Rwy 32, one of the new routes was shown to leave the NPR at an earlier point, and this might have meant that some houses were overflown that were not previously affected.

2.2 What Have We Done to Address This?

Leeds Bradford Airport (LBA) is keen to be a good neighbour and therefore we investigated why this procedure appeared to leave the NPR at an earlier point in the flight. Together with our Procedure Designers, we have now established that jet aircraft (e.g. Boeing 737 300, or Boeing 737 800 or equivalent) are expected to fly routes that remain within the existing NPR. The route previously depicted within the Consultation Document was that expected to be flown by turbo-propeller (turbo-prop) aircraft such as ATR 72 or DHC 8. These aircraft do not need to comply with the NPR, since their engines are quieter than those of jet aircraft.

2.3 Where Can I See the Effects of this Review?

Section 9 of Issue 2 of the Consultation Document has been re-written; the updated version is included within this Addendum in Section 3.

2.4 How Long Do I Have to Consider the Additional Information Within this Document?

In order that the additional information can be considered by all of the stakeholders potentially affected by this ACP, we have agreed to **extend the Consultation period by 2 weeks allowing a 7-week period** from the publication of this new information. This means that responses can be submitted until **Sunday 5th November 2017**. This extension period has been agreed with the CAA.

2.5 Consultation Process Concerns

The CAA's Safety and Airspace Regulation Group will oversee this consultation to ensure that LBA follows government guidelines and the process detailed within CAP 725. Should you have any complaints regarding our adherence to the consultation process, they should be referred to:

Airspace Regulator (Coordination)
Airspace, ATM and Aerodromes
Safety and Airspace Regulation Group
CAA House
45-59 Kingsway
London
WC2B 6TE
Email: airspace.policy@caa.co.uk

Please note that these contact details should only be used to submit a complaint about non-adherence to the consultation process. Responses to the consultation content (the proposed procedures and airspace) should be sent to LBA; details of how to do so are provided within the next section of this document.

2.6 How do I Submit my Response?

There are several ways to submit your response:

- Through a dedicated email address (also available through the website);
- By post;
- During public meetings.

2.6.1 Email

Osprey Consulting Services Limited (CSL) are supporting LBA deliver the Airspace Change. They have created a dedicated email address for responses, as follows:

Lbaconsultation@ospreycsl.co.uk

Please entitle your email LBA Consultation Response.

You can also submit your response directly through the website at:

http://www.leedsbradfordairport.co.uk/about-the-airport/airspace-change-proposal-consultation

2.6.2 Post

Please send your response to:

LBA Consultation Response

Osprey Consulting Services
Office 21
Think Tank
Ruston Way
Lincoln
LN6 7FL

2.7 Public Consultation Events

Leeds Bradford Airport would like to invite you to the following public consultation events:

- Tuesday 26th September 2017 – Yarnbury (Horsforth) RFC, Brownberrie Lane, Horsforth, LS18 5HB (3pm – 8pm).
- Wednesday 27th September 2017 – Highroyds Sports and Social Club, Guiseley Drive, Menston, LS29 6FS (3pm – 8pm).

The submission of written feedback during these meetings is welcome. We look forward to meeting you at one of these meetings.

2.8 What Should I Include in my Response?

We welcome any comments you have to make on the proposals, both positive and negative. We would also like to know if you have read the consultation material, but have no comments to make; we need to be sure that we have reached a representative proportion of consultees.

2.9 What Will Happen to my Response?

All responses will be treated confidentially and details of respondents will be passed only to our consultants, Osprey CSL, and to the CAA, which requires a full report on the consultation process and its results, together with copies of responses from all key stakeholders as part of the formal Airspace Change Proposal submission.

All responses will be recorded, collated and analysed in order to identify the key issues and themes that emerge. An assessment will be made to determine if the proposal can be modified to take these issues into account.

2.10 How will I know the Result of the Consultation?

The results of the Consultation will be collated within a Feedback Report, which will be published on the Airport website within a month of the closure date of the Consultation Period.

3 How Could the Change Affect Me?

The proposed airspace change will affect different people, with conflicting concerns in different ways. This section seeks to outline the potential effects to residents near the Airport and to other airspace users.

3.1 Overview

The proposed changes could affect people differently; for people living close to the Airport or within locations close to aircraft flight paths, there may be a change to the number and/or frequency of aircraft that are observed. This will therefore bring associated environmental effects, including changes to the locations where aircraft noise is observed, the amount of aircraft fuel burnt and therefore, changes to CO_2 emissions and local air quality.

It should be noted that the proposed airspace changes do not alter the number of flight movements or proportion of flights along flight paths and therefore this section only considers effects as a result of the route changes. This section includes the following assessments:

- Operational and procedural changes, particularly changes in locations overflown by aircraft and effect of PNB departures;
- Changes in noise and disturbance as a result of the proposed changes;
- Change to tranquillity, particularly for any Areas of Outstanding Natural Beauty (AONBs) and National Parks;
- Change to local air quality;
- Changes in carbon dioxide (CO_2) emissions as a result of fuel burn; and
- Changes for other airspace users.

The effects as a result of the airspace change are assessed against relevant guidance outlined in CAA CAP 725 and examples of best practice observed during other airspace change proposals.

The proposals have sought to minimise the noise effects of aircraft flying below 4,000 ft. For aircraft flying between the heights of 4,000 ft and 7,000 ft, the objective has been to balance the other environmental effects, namely fuel burn and climate change with noise. At heights above 7,000 ft, and consistent with relevant guidance, it is considered that noise is less significant and therefore fuel burn and climate change are the priority for the proposed changes.

3.2 Effects That May be Experienced Locally

This section discusses the potential effects that may be experienced locally due to the proposed airspace change.

3.2.1 Operational and Procedural Changes

This section discusses operational and procedural changes and is focussed on departing aircraft only; the procedural changes for arriving aircraft will seek to formalise the existing arrangements for arriving aircraft and therefore there will be no noticeable change for local residents due to arriving aircraft.

The proposed changes for departing aircraft will affect the locations in which aircraft fly. Furthermore, due to the procedural change as result of PBN operations, the proposed change will also result in aircraft being concentrated along flight paths instead of the lateral dispersion of aircraft that is observed today. This section therefore considers:

- Operational changes;
- Changes to vertical profiles; and
- Effect of PBN and concentrating aircraft along flight paths.

3.3 Overview of Operational Changes

Aircraft typically take off and land into wind and therefore the runway direction in which the Airport operates is determined by the prevailing wind direction. For a typical year, around 70% of aircraft operating at the Airport, use Runway 32, taking off towards the northwest and arriving from the southeast, and around 30% of aircraft use Runway 14, taking off towards the southeast and arriving from the northwest.

In 2016 (the situation immediately before this airspace change as the baseline year), the airport handled approximately 45,000 aircraft movements, 74% of which operated using Runway 32 and 26% using Runway 14.

Figure 1, Figure 2, Figure 3 and Figure 4 present an overview of the operational changes for Runway 32 and Runway 14 respectively. The figures show:

- The location of the Noise Preferential Routes (NPRs), which all jet aircraft are expected to fly within up to 4,000 feet and the proposed PNB procedures have been designed to remain within the NPR. **However, it should be noted that the NPRs are for jet aircraft and do not apply to turbo-prop aircraft**[1];
- The nominal location of the current aircraft B-RNAV departure routes (presented as green lines);
- The proposed PBN departure routes (presented as blue line); and
- A sample of radar data from August 2016 to show the actual locations of aircraft flight tracks and the lateral dispersion.

It should also be noted that for each proposed PBN route it is expected that different sized aircraft will perform slightly differently, with smaller aircraft climbing faster, resulting in earlier initial turns. The climb performance of aircraft is expected to result in three separate flight paths with the difference in the location of the initial turn around ± 30-metres apart. The aircraft can be broadly categorised into the following groupings:

- Propeller driven passenger aircraft (for example ATR-72);
- Small to medium sized aircraft (for example Airbus A320 or Boeing 737-800); and
- Medium to large sized aircraft (for example Airbus A330 or Boeing 767-300).

3.3.1 Runway 32

For Runway 32 departures, the current B-RNAV departure routes (NELSA and DOPEK/LAMIX) will be replaced with PBN departure routes. The end waypoints used for the proposed departure routes will not change and the new Runway 32 departure will also retain the names NELSA and DOPEK/LAMIX. It should be noted that although there are three Runway 32 departures, DOPEK and LAMIX follow the same path up to Flight Level (FL) 70 (approximately 7,000 ft) and therefore for simplicity are considered as being one route (DOPEK/LAMIX).

It can be seen from Figure 1 and Figure 2 that introducing PBN departure routes for Runway 32 (accounting for approximately 70% of all annual departures) the location of the initial turns on both the NELSA and DOPEK/LAMIX routes will occur earlier than is seen

[1] Turbo-prop aircraft are not required to follow the NPR in accordance with the Airport's planning approval.

today. It can also be seen from the sample of radar data, that currently aircraft are dispersed across the flight paths, particularly when turning, and this results in aircraft overflying numerous locations in any given period within an apparent swathe.

The proposed airspace change and introduction of PBN departure routes for Runway 32 will result in aircraft departures flying closer to, or over, some new areas; particularly Burley Woodhead and Baildon. However, the overall number of locations overflown will reduce because aircraft will be more concentrated along the PBN SIDs. It is also evident that the proposed jet aircraft routes remain with the existing NPR swathe. **The route for turbo-prop aircraft is not subject to the NPR restriction**, but consideration has been given to ensure that the design remains within the NPR envelope for as long as possible to route aircraft around and to the north of Menston.

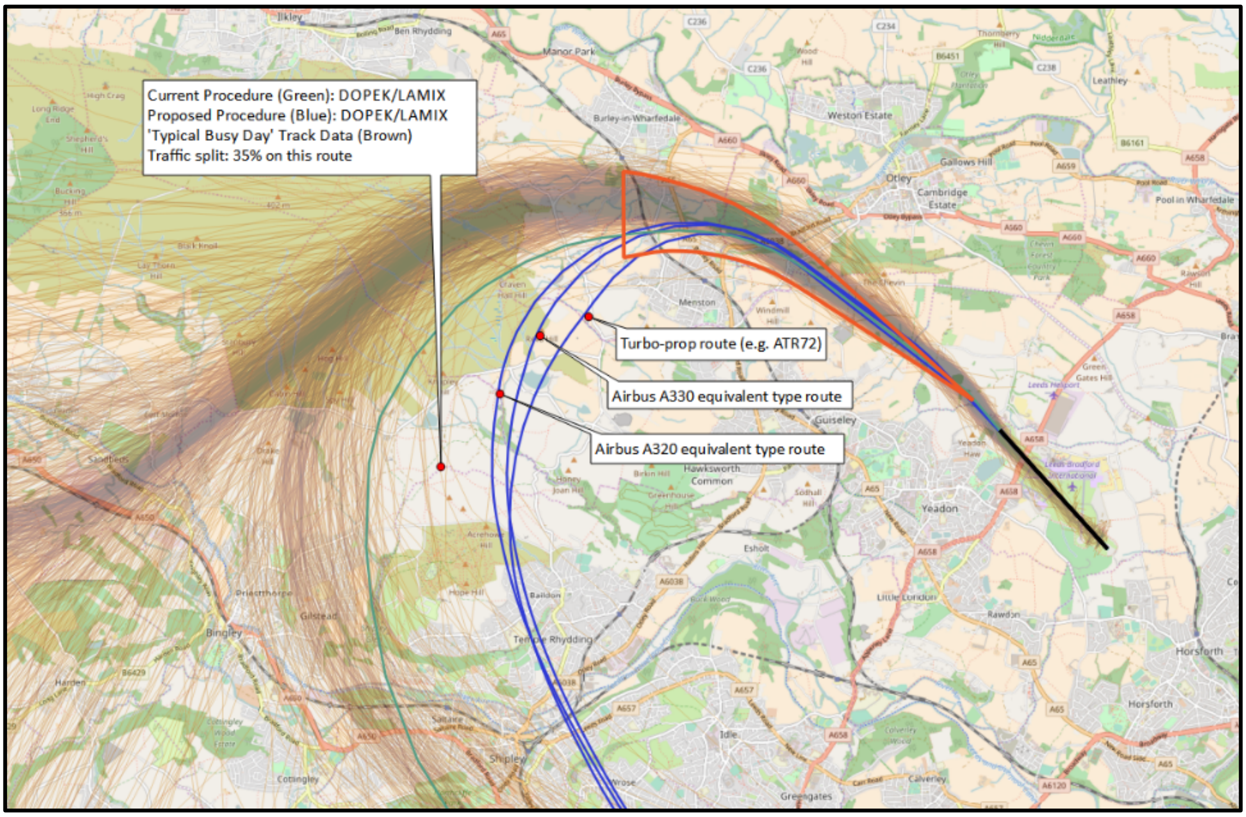


Figure 1 - Rwy 32 SID Routes DOPEK/ LAMIX

As can be seen from Figure 1, all the proposed jet routes remain within the NPR swathe. We have modelled the routes that will be expected to be flown by Airbus A330 equivalent aircraft and Airbus A320 or equivalent aircraft, to demonstrate that they will remain within the existing NPR, irrespective of weight and performance. The route that is likely to be flown by turbo propeller (turbo-prop) aircraft is also shown. Whilst this follows the NPR for the most part, it does leave the existing NPR envelope, on the inside of the turn, slightly earlier.

For the replacement NELSA PBN SID, depicted within Figure 2, it can be seen that all aircraft types are expected to fly within the existing NPR envelope.

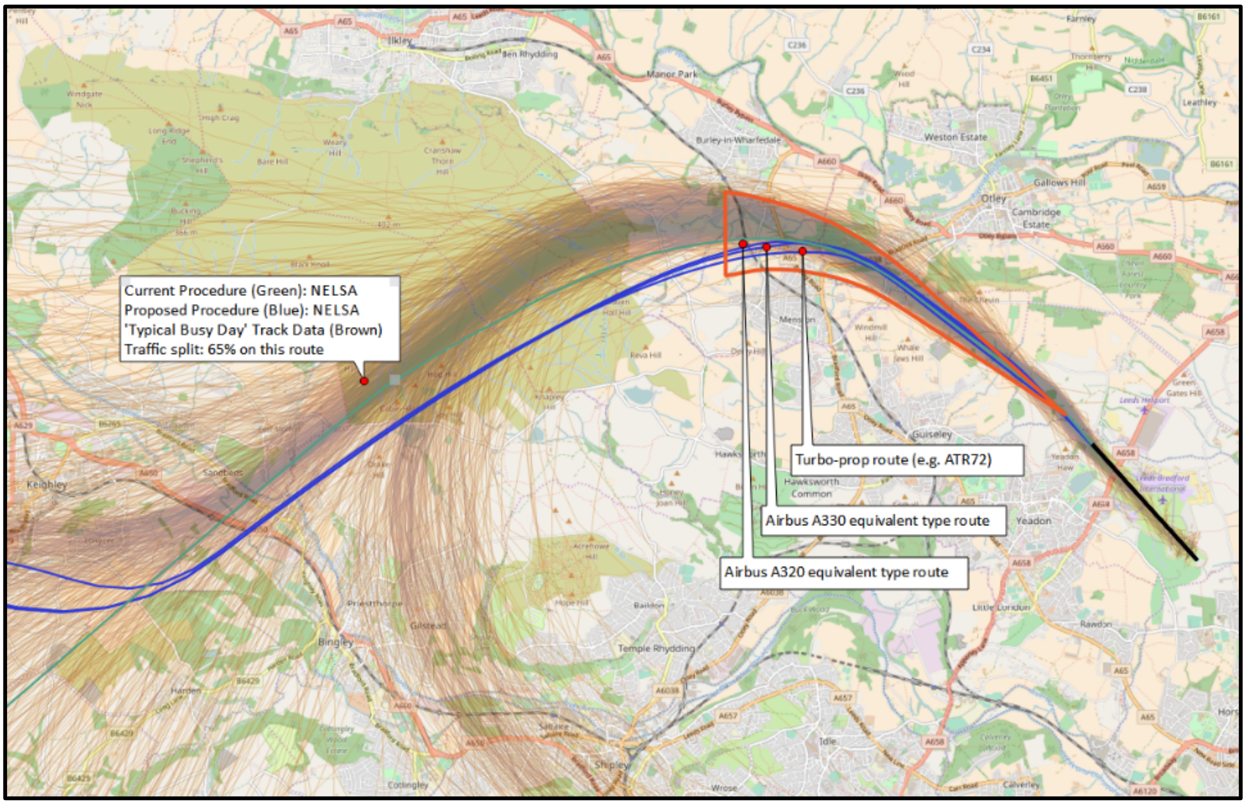


Figure 2 - Rwy 32 SID Routes NELSA

3.3.2 Runway 14

For Runway 14 departures, the current B-RNAV departure route will also be replaced with PBN procedures and, as with Runway 32, the DOPEK/LAMIX SID will remain extant. However, the current POLE HILL route, which turns westerly after departure will be replaced with a new route called ELEND, which establishes its initial turn later than the current POLE HILL route. The change in design was required due to integration requirements with the en-route network, above FL70 (approximately 7,000 ft) prescribed by NATS Prestwick Area Control Centre (ACC).

It can be seen from Figure 3 that there is little discernible flight path change in the proposed DOPEK/LAMIX route; furthermore, because there is no turn along the SID after departure, the dispersion of aircraft flying this route today is much less than is seen on other departure routes.

The current POLE HILL departure route, which serves approximately 65% of Runway 14 departures, will be changed to become the ELEND SID. The change will not affect the number of departures along the route; however, due to the required interaction with the en-route network, the initial turn will occur much later than is seen today; see Figure 4. This will therefore result in aircraft flying straight ahead initially after take-off, and making the initial turn over Rothwell Haigh and the jet route overflying Thorpe on the Hill.

Whilst the lateral routes have altered, it is important to consider that changes have also been made to the climb profiles. Aircraft will be able to climb to higher altitudes at a quicker rate than with the existing SID profiles and this will help minimise the noise exposure to communities from aircraft on departure. Further detail can be found within section 3.4 below.

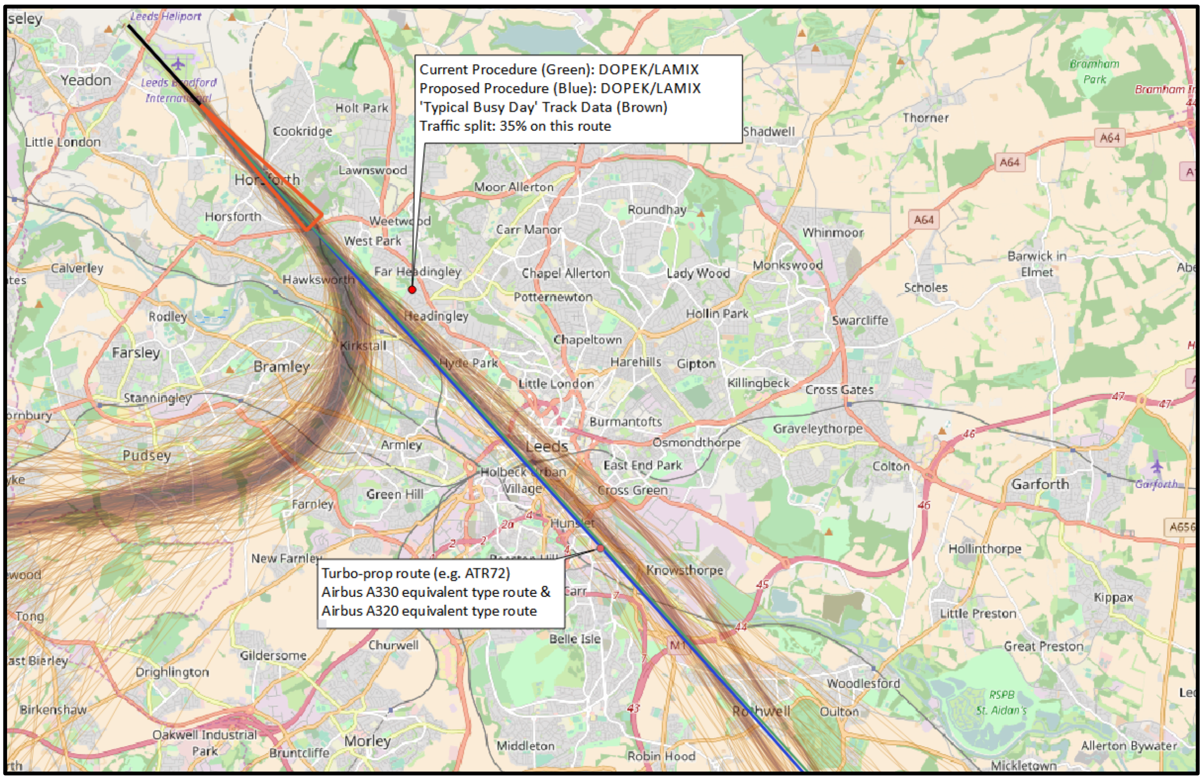


Figure 3 - Rwy 14 SID Routes DOPEK/LAMIX

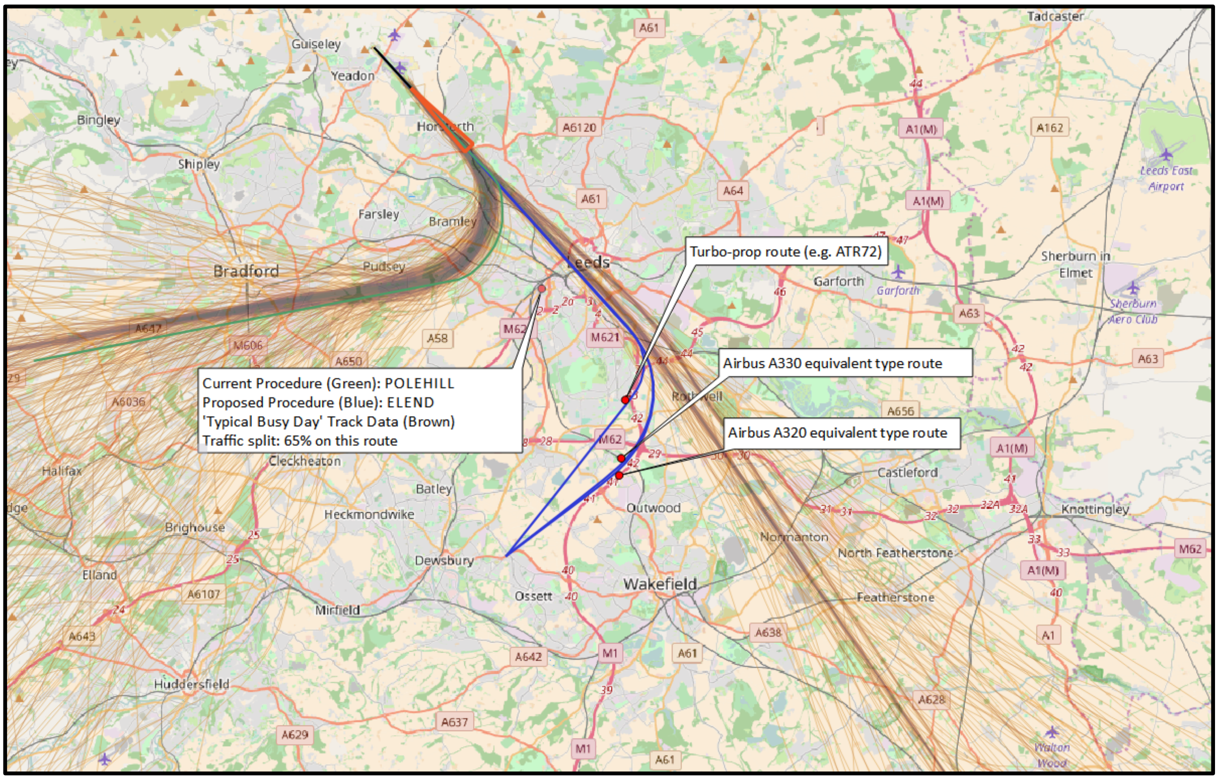


Figure 4 - Rwy 14 SID Routes ELEND

3.4 Aircraft Vertical Profiles

In addition to altering the location of aircraft flight paths, an airspace change may also alter the vertical profiles of aircraft, resulting in aircraft being lower or higher over the ground. A primary reason for the Leeds Bradford Airspace Change is to allow aircraft to make best use of modern performance characteristics, one of which is to allow aircraft almost unrestricted climb rates to maximum performance. This will therefore result in aircraft being at a similar or higher height than they are today.

3.4.1 Effect of Concentrating Aircraft

As part of the proposed airspace change proposal, the current B-RNAV routes will be replaced with PBN routes, which, due to the increased navigational performance of aircraft, will result in aircraft concentrated along defined flight paths and will therefore reduce the extent of areas of overflight. The effect of concentrating aircraft traffic along flight paths is a concentration of energy across a smaller area, leading to higher noise levels concentrated along the centreline but reduced on the periphery.

3.5 Noise

Noise can have an effect on the environment and on the quality of life, health and well-being of individuals, communities and natural resources. For these reasons, noise is often recognised as being an important consideration for those living close to an airport and in locations overflown by aircraft.

The Airport has an overall aim to be "*recognised as a pioneering organisation for the management and control of noise among airports of a comparable size, and demographic characteristics*" and therefore the airspace change proposal routes in respect of noise have been determined to align with this aim.

3.5.1 Noise Indicators

The noise effects of the proposed airspace change up to 7,000 feet are presented as:

- Daytime noise exposure contours expressed a $L_{Aeq,\ 16hr\ 92\text{-}days}$.
    - An L_{Aeq} contour or equivalent continuous noise contour is a representation of the 'average' or 'typical' level of noise throughout the period. These contours are typically produced for UK airports to represent the average summers day of operations that occurs between 16th June and 15th September from 7am until 11pm, which, is considered to represent the busiest time of year for UK airports;
- Maximum sound level footprints for the most frequent and noisiest daytime aircraft, expressed as L_{Amax}.
    - An L_{Amax} contour shows the loudest noise experienced from a single aircraft operation. L_{Amax} levels are often used when describing how loud everyday items are for example a vacuum cleaner or lawn mower; and
- Noise footprints for the noisiest and most frequent aircraft operating at night, expressed as Sound Exposure Level (SEL).
    - An SEL footprint shows the total noise energy contained in a 1-second burst of the aircraft operation and is often used to measure disturbance as a result of night-time aircraft operations.

3.5.2 Noise Assessment Scenarios

For the noise assessment, two scenarios have been considered:

- The current level of noise based upon the situation immediately before the airspace change, i.e. baseline (2016); and

- The predicted level of noise immediately after the airspace change, i.e. assuming baseline aircraft operations, but, with the proposed routes and procedures operated.

The CAA CAP 725 "*situation after traffic has increased*" has not been considered because whilst traffic levels are expected to increase, that increase is part of the overall growth of the Airport and not because of this airspace change proposal.

3.5.3 Noise Modelling

As part the airspace change proposal a noise model has been developed using the US Federal Aviation Administration's (FAA) Integrated Noise Model (INM) version 7.0d. This noise model has been validated against noise and track data from the airport's Noise and Track Monitoring System (NTMS) to represent actual levels of aircraft noise at the Airport.

3.5.4 Daytime Noise Exposure ($L_{Aeq,\ 16hr}$)

The assessment of noise exposure is based on the outputs of noise modelling and compares the baseline level of noise, i.e. that which represents the $L_{Aeq,16hr\ 92\text{-}days}$ for 2016 with the level of noise that is predicted to occur immediately after the airspace change. The situation immediately after assumes the same number and frequency of aircraft operations as the baseline, but with the proposed PBN procedures assumed. Whilst the modelling was able to show the impact of the lateral route changes, it was not able to indicate the changes expected in climb profiles. The contours therefore show the theoretical worst case noise exposure; in reality we expect the actual noise levels to be lower than those modelled.

A comparison of the $L_{Aeq,16hr\ 92\text{-}days}$ noise contours is presented in Figure 5 and a summary is presented in **Error! Reference source not found.** and shows the population and area encompassed by the noise contours. It should be noted that consistent with guidance set-out in CAA CAP 725 the population is rounded to the nearest thousand and area to the nearest 100 metres. The population dataset used for this study was obtained under license for this project from CACI OS Address Point Dataset.

Contour ($L_{Aeq,\ 16hr}$)	Situation Before ACP (i.e. 'Current Procedures')		Situation Immediately After ACP (i.e. 'Proposed Procedures')	
	Population (1,000s)	Area (km^2)	Population (1,000s)	Area (km^2)
54 dB	16.1	15.6	16.5 (+0.4)	15.8 (+0.2)
57 dB	5.1	8.7	5.3 (+0.2)	8.8 (+0.1)
60 dB	1.5	4.8	1.5 (+0)	4.9 (+0.1)
63 dB	0.3	2.6	0.3 (+0)	2.6 (+0)
66 dB	0	1.4	0 (+0)	1.4 (+0)
69 dB	0	0.8	0 (+0)	0.8 (+0)

Table 1 - Table of Noise Contours for Current and Proposed Procedures

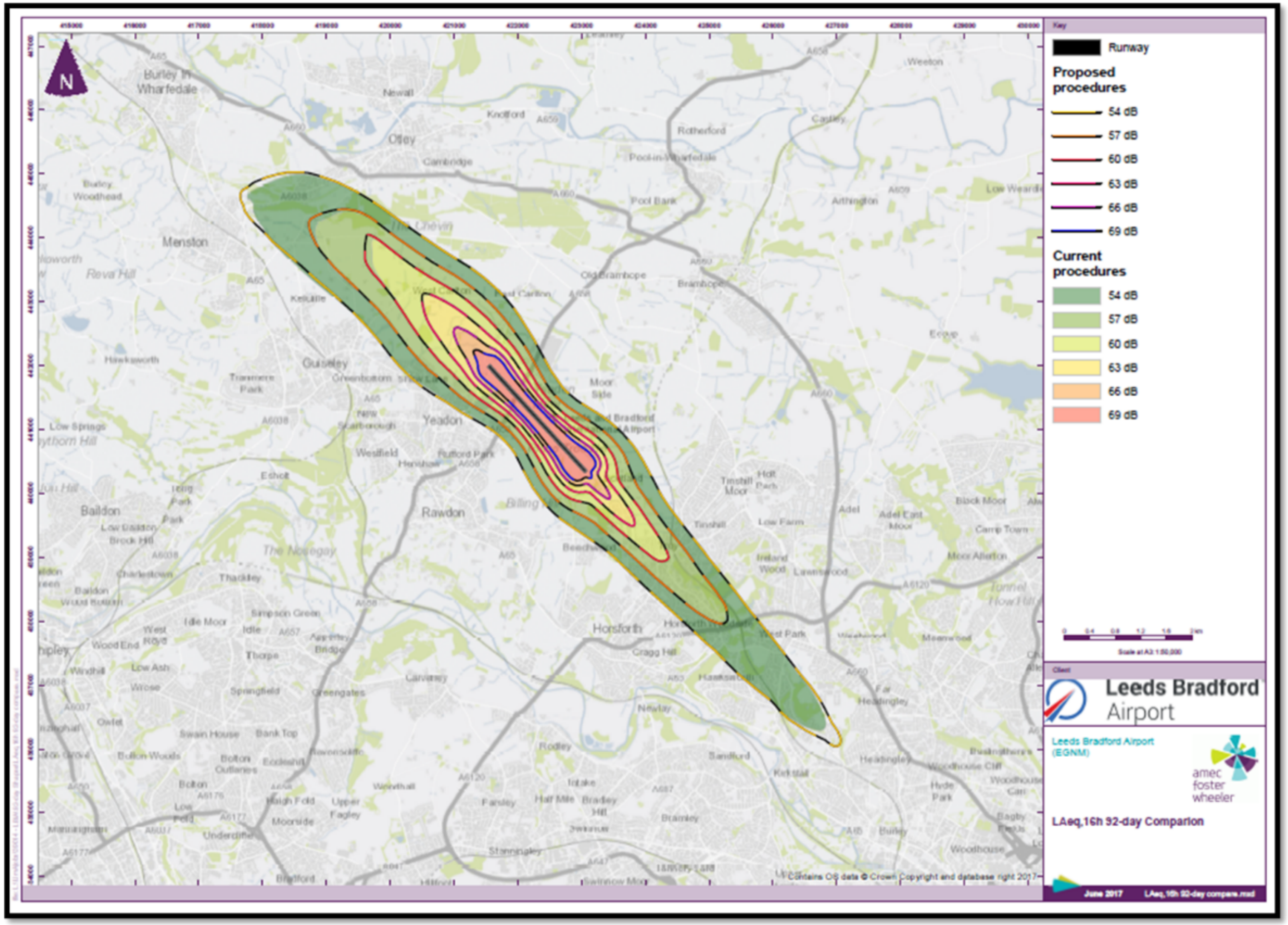


Figure 5 - Noise Exposure Contour Comparison

It can be seen from **Error! Reference source not found.** and Figure 5 that there is a slight increase in the size of the noise exposure contours. This effect is a result of the PBN procedures that concentrate aircraft along routes and is explained within the section entitled "The Effect of Concentrating Aircraft" in section 3.4.1.

Of significance to the assessment of noise exposure are the 54 dB and 57 dB noise contours. The use of the 57 dB noise contour historically represented the "onset of significant community annoyance" and is mandated by CAA CAP 725.

In summary it can be seen from Table 2 that there is:

- An increase of approximately 400 people encompassed by 54 dB $L_{Aeq,16hr}$ contour; and
- An increase of approximately 200 people encompassed by 57 dB $L_{Aeq,16hr}$ contour.

Based on the increase in levels of noise above 57 dB $L_{Aeq,16hr}$ the following postcode locations are likely to be encompassed by noise exposure levels in excess of 57 dB $L_{Aeq,16hr}$ as result of the proposed procedures:

- Lambert Terrace, Horsforth, LS18 5DF.
- Springfield Close, Horsforth, LS18 5DG.
- King George Road, Horsforth, LS18 5PY.
- Banksfield Grove, Leeds, LS19 7LN.
- West Chevin Road, Otley, LS21 3DJ.
- Moor Top, Ilkey, LS29 6RR.

Figure 6 presents noise change contours, energy comparison, for the $L_{Aeq,16hr}$. The contours show where levels of noise change by:

- ± 1-2 dB.
- ± 2-3 dB.
- ± 3-6 dB.
- ± 6-9 dB.
- ± >9 dB.

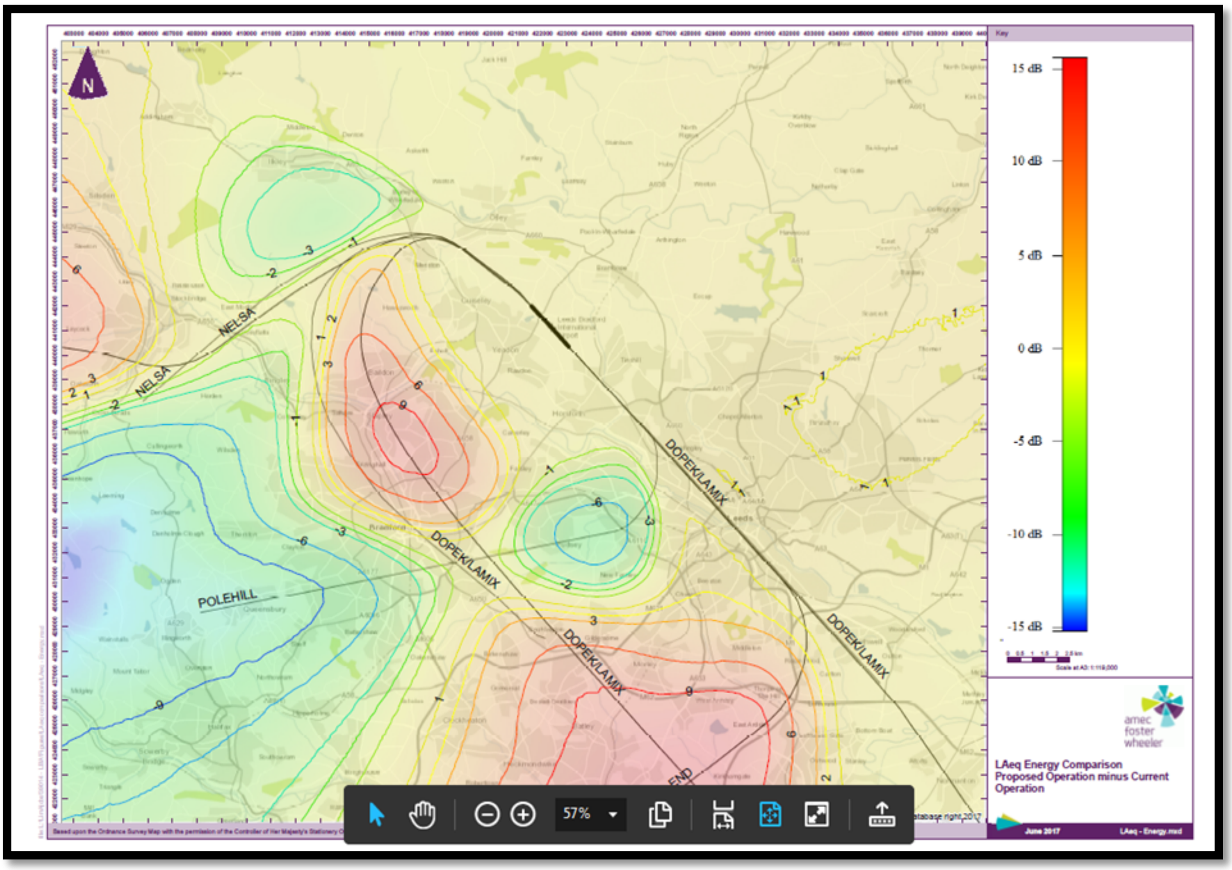


Figure 6 - LA_{eq} Energy Comparison

It can be seen from Figure 6 that the effect of concentrating aircraft along flight paths increases the noise levels experienced along the centre of the flight paths. Furthermore, it can be seen that there is a change in noise levels, particularly from aircraft using the ELEND SID that results in an increase of up to 9 dB around Middleton and East Ardsley, as shown.

3.5.5 Maximum Sound Level (L_{Amax})

In addition to noise exposure, the highest levels of daytime noise based on the L_{Amax} indicator are presented. L_{Amax} footprints show the loudest noise levels as a result of a single overflight. The noise contours presented are for the noisiest aircraft in operation at the airport, namely the Boeing 737-300 and for the aircraft with the highest number of operations in 2016, namely the Boeing 737-800. The noisiest aircraft was determined based on levels of noise as recorded by the Airport's permanent noise monitoring terminals, which are located underneath the NPRs and therefore overflown by the vast majority of aircraft. It should be noted that our existing operators are currently in the process of replacing the Boeing 737-300 fleet with Boeing 737 800 aircraft and therefore we can expect some improvements, (reductions), in the highest levels of noise.

The L_{Amax} contours have been prepared for each current and proposed PBN departure route and a comparison between the routes are presented. These contours are based on a single aircraft event per route and therefore, the dispersion of aircraft on the current SIDs is not taken into account. ***It should therefore be borne in mind that in any given year for the current departure routes, the L_{Amax} levels presented may occur up to 1.5***

km laterally in both directions laterally due to current aircraft dispersion across the conventional flight paths, particularly when turning.

The complete set of L_{Amax} figures are presented in Section 6; a summary of the changes in L_{Amax} levels are shown in Table 2 below:

Departure Route	Areas of potential L_{Amax} increase	Areas of potential L_{Amax} reduction
RWY32 NELSA	- Burley in Wharfedale	- Burley Woodhead - Burley Moor - Menston (South)
RWY32 DOPEK/LAMIX	- Burley in Wharfedale - Shipley (Northeast)	- Menston (Central and South) - Bingley
RWY14 POLE HILL (ELEND)	- Burley (surrounding area) - Headingley - Far Headingley (South) - Hyde Park (South) - Woodhouse (West)	- Sandford (East) - Bramley - Gamble Hill - Kirkstall (South) - Upper Armley
RWY14 DOPEK/LAMIX	- No significant changes	- No significant changes

Table 2 - Summary of changes in L_{Amax} levels

3.5.6 Night-time Sound Exposure Level (SEL)

The current night-time restrictions at the Airport were imposed as part of planning permission 29/11/93/FU. This planning permission was granted in 1994 and permitted 24-hour operations at the Airport. As part of the planning permission, night-time was defined as 2300hrs to 0700hrs and several night restrictions were imposed, including:

- The provision of a noise insulation scheme (NIS) for residents defined by the extents of the 90 dB SEL Boeing 737 and Boeing 757-200 aircraft;
- The implementation of an improved scheme for the monitoring, reporting and review of:
  - Noise Preferential Routes (NPRs) for departing aircraft;
  - Departure and landing procedures; and
  - Target night-time noise levels.

The airspace change proposal has been designed to operate within the Airport's planning permission permitting 24-hour operations. The current NIS is based upon aircraft following the Airport's NPRs and the airspace change proposals for jet aircraft have been designed to remain within the NPRs. However, as discussed previously, although the proposed jet aircraft departure routes operate within the NPR, there will be a change in locations overflown by aircraft below 7,000 feet and as such an assessment has been made regarding the 90 dB SEL contour with the proposed routes.

The SEL contours have been prepared for each route and a comparison between current and proposed PBN departure routes scenarios is presented. These scenarios have been modelled for both the noisiest aircraft currently operating at the airport the Boeing 737-300 and the most frequent aircraft type to 737-800.

The complete set of SEL contours are shown in Section 4 (80dB Contours) and Section 5 (90dB Contours); a summary of the changes in SEL levels are shown in Table 3:

Departure Route	Areas of potential SEL increase	Areas of potential SEL reduction
RWY32 NELSA	- No significant changes	- Burley in Wharfedale
RWY32 DOPEK/LAMIX	- Hawksworth - Baildon - Shipley (Northeast)	- Micklethwaite
RWY14 POLE HILL (ELEND)	- From Headingley to Robin Hood, through Leeds city centre	- Pudsey - Bradford
RWY14 DOPEK/LAMIX	- No significant changes	- No significant changes

Table 3 - Summary of changes in SEL levels

3.5.7 Tranquillity

An airspace change proposal may also effect the location of aircraft overflying areas that are prized for their tranquillity for example Areas of Outstanding Natural Beauty (AONBs) and National Parks. The following AONBs and National Parks are close to the Airport and as such have the potential to be overflown by the proposals:

- Nidderdale AONB;
- Forest of Bowland AONB;
- Howardian Hills AONB;
- Peak District National Park;
- North York Moors National Park; and
- Yorkshire Dales National Park.

Figure 7 shows the location of neighbouring AONBs and National Parks in relation to the current and proposed aircraft arrival and departure routes. Since there is no change to the arrival routes, other than to formalise the current practice of airlines, there will be no noticeable change for AONBs National Parks.

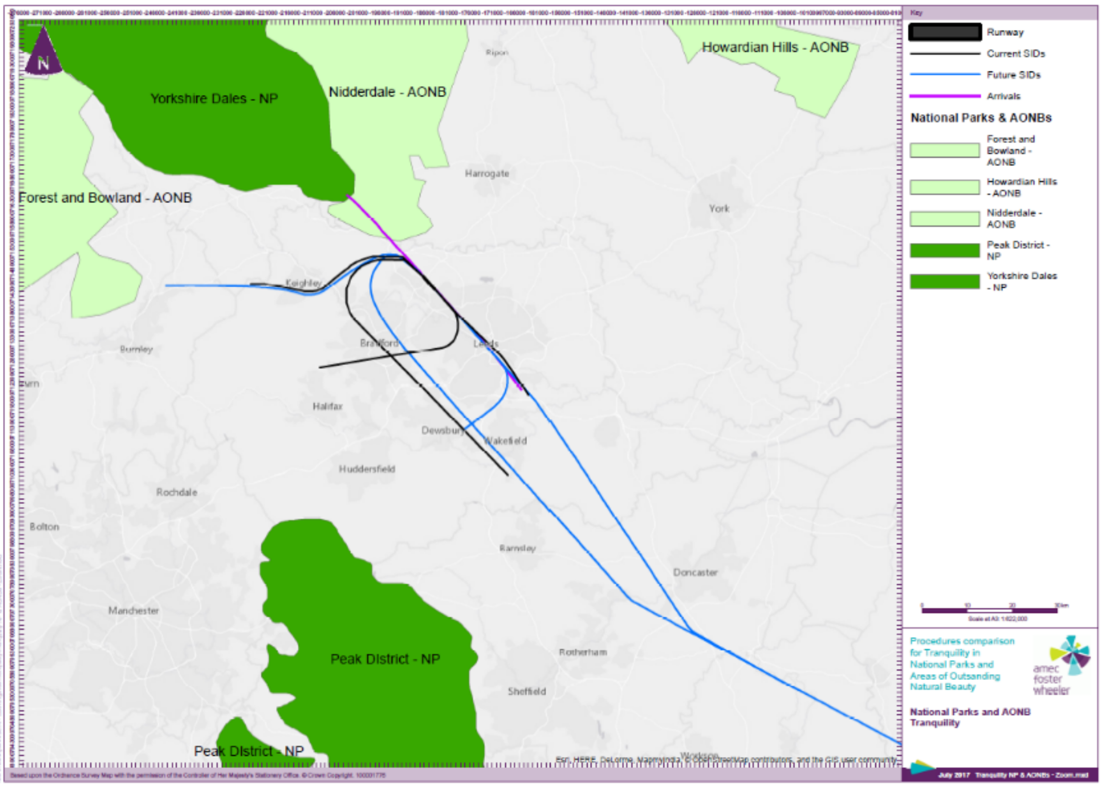


Figure 7 - Location of AONBs and National Parks

3.6 Fuel Burn and Carbon Dioxide

The proposed changes are expected to result in a net reduction in the emissions of carbon dioxide (CO_2). For arriving aircraft, the new arrangements will allow a more continuous approach path, reducing the number of track miles and bursts of acceleration needed on approach. The new approach arrangements will also be more predictable, allowing aircraft operators to optimise their fuel load to the actual routing they will follow; small savings in fuel consumption at the end of a flight can result in potentially significant savings in CO_2 emissions over the course of the flight, since the weight of the extra fuel does not need to be carried for the whole journey.

Regarding departures, the new arrangements will again reduce track miles and increase route predictability, both of which will lead to reductions in CO_2 emissions. Under the present arrangements, aircraft heading south and east are expected to follow the DOPEK/LAMIX SIDs which extend to about 50 nm (90 km) from the airport before being handed over to NATS ACCs and being routed more directly to their destinations. The new SIDs finish around 40 nm closer to the airport, so the handover to NATS and the subsequent routing occur much sooner, allowing the aircraft to cut off the final part of the SID and head directly towards their destination, saving track miles.

Depending on the destination, this could save several tens of nautical miles. Other SIDs offer greater or lesser potential for reductions in track miles, between nearly none and about 40 nm. Assessments have been conducted by an Airport-based airline regarding the potential fuel burn that will be achieved by utilising the new procedures. For a Boeing 737-800 aircraft, an estimation of 110 kg per minute of fuel burn was used to compare the new departure routes with the current SIDs. This means that a Boeing 737-800 achieving a reduction of 20 nm would lead to a saving of approximately 500 kg of fuel and 1,500 kg of CO_2 per departure. Further, assessments have been conducted assuming a full SID is flown and against the realistic saving against the flight planned route. The potential estimated fuel savings per flight are identified at Table 4:

Current SID	Proposed SID	Distance reduction / NM	Fuel saving (SID) / kg	Fuel saving (Flight Plan) / kg
NELSA 3W	NELSA 1R	0.5	10-15	10-15
POL 2X	ELEND 1B	10	275	110-220
LAMIX 2W	NMS03 1R	23	500	150-200
LAMIX 2X	NME 12R	37	80-1000	100-200

Table 4 - Potential Fuel Savings Achieved by the New SIDs

There are approximately 10,000 departures per year from the Airport of aircraft in the Boeing 737 (i.e. Code C) size range, so making the cautious estimate that these departures would save on average 10 NM each, this would represent a saving of around 2,000 tonnes of fuel and 7,000 tonnes of CO_2 per year. The 5,000 (approximate number) departures per year by smaller aircraft would make additional fuel and CO_2 savings.

In practice, under the current arrangements, aircraft are often able (under ATC control) to depart from the SID early, so some of the benefits of reduced track miles compared to the published route are already felt. However, pilots still need to carry sufficient fuel to be able to follow the full SID, defined by ICAO and the CAA, even if they end up not doing so and not needing the fuel. The improved predictability from the new arrangements will allow pilots to load only as much fuel as they will actually need, reducing unnecessary weight and saving fuel that way.

Assuming a saving of 200 kg of fuel saved per aircraft, the introduction of the new procedures would reduce CO_2 emissions by 1,900 tonnes per year.

3.7 Local Air Quality

When considering air quality, it is normally only the concentrations at ground level (or more precisely, 1.5 m above ground level) that are of concern, since this is the normal human breathing zone. It is customary for airport air quality studies to include the whole aircraft landing and take-off cycle, including operations on the ground and in the air up to 3,000 ft (or 1,000 m) above ground level. However, it is generally considered that emissions from aircraft become negligible, in terms of their effect on air quality, once the aircraft are more than around 100–200 m above the ground. There are two reasons why elevated aircraft emissions are expected to be less significant than ground-level emissions:

- There is a greater degree of mixing and dispersion before the pollutants reach the ground. This is the same reason that large point sources such as industrial installations discharge from tall chimney stacks; and
- As well as being higher, aircraft are more spread out spatially as they follow different routes at elevation, so emissions are more diffuse.

An unpublished study carried out by Amec Foster Wheeler for Heathrow Airport carried out a literature review and dispersion modelling to investigate in detail how aircraft emissions at height affect ground-level concentrations. This study concluded that once departing aircraft are more than 120 m above the ground or arriving aircraft are more than 20 m above the ground, their emissions make a negligible contribution to ground-level concentrations of pollutants. Typically, aircraft below these altitudes are within the airport boundary — when aircraft are flying over the boundary fence they are high enough to have negligible impact on ground-level concentrations. The impact continues to drop off as heights increase.

Given that the proposed LBA airspace changes are at altitudes substantially greater than these, there is negligible impact from the emissions on local air quality and the changes will have an imperceptible effect on local air quality.

Under the national arrangements for improving air quality, local authorities have a duty to declare an Air Quality Management Area (AQMA) in locations where there is a risk of exceeding legal limits. The nearest AQMA to the Airport is approximately 6 km southeast of the airport, in a location where local road traffic conditions are the primary cause of poor air quality. At this distance, the contribution from the Airport, and especially from the aircraft at the height of the airspace changes under consultation here, will be exceedingly small and immaterial.

3.8 Effects on Other Airspace Users

During the development of this proposal, we shared our plans and sought input from a range of other local aviation organisations. We outline here the potential effects and mitigations arranged to minimise any impacts of the change.

3.8.1 Warton Aerodrome

Warton Aerodrome is located on the west coast of the UK near Preston. It is run by BAE Systems and is used extensively for Research, Test and Development of several military aircraft types. Air Traffic Control (ATC) at Warton has special permission to control aircraft through CAS for extended distances, and frequently control aircraft in the vicinity of LBA. We have discussed Warton's requirements with them and we are developing a Letter of Agreement (LoA) that will allow Warton controllers to operate autonomously within LBA CAS, under specified conditions.

3.8.2 RAF Linton-On-Ouse and RAF Leeming

RAF Linton-on-Ouse is located within the Vale of York, east-north-east of LBA and provides pilot training. The extension of airspace to the east of LBA has the potential to limit the vertical space available for RAF Linton-on-Ouse controllers to use for the safe separation and sequencing of their aircraft. The raising of the base level of CTA9 during the hours of 0900-1800 local will alleviate these issues. Furthermore, a LoA is being developed that will allow RAF Linton-on-Ouse controllers to control aircraft within LBA airspace under specified conditions to allow greater flexibility when the full extent of CTA9 is active.

RAF Leeming is also located within the Vale of York, north-north-east of LBA, and operates Hawk T1 and Tutor aircraft. The extension of airspace to the north-east of LBA will partially subsume one of the flight procedures that RAF Leeming uses to hold aircraft prior to recovery to the airfield. A LoA is being developed to allow RAF Leeming controllers to provide services to aircraft within LBA CAS.

We have also identified that there is potential for a portion of LBA airspace to be delegated to RAF Linton-on-Ouse or RAF Leeming when LBA is operating on Runway 32, as indicated (red) in Figure 8. This potential remains under discussion and will need to be subject to safeguarding considerations for the LBA procedures before the boundary shown in Figure 8 can be verified.

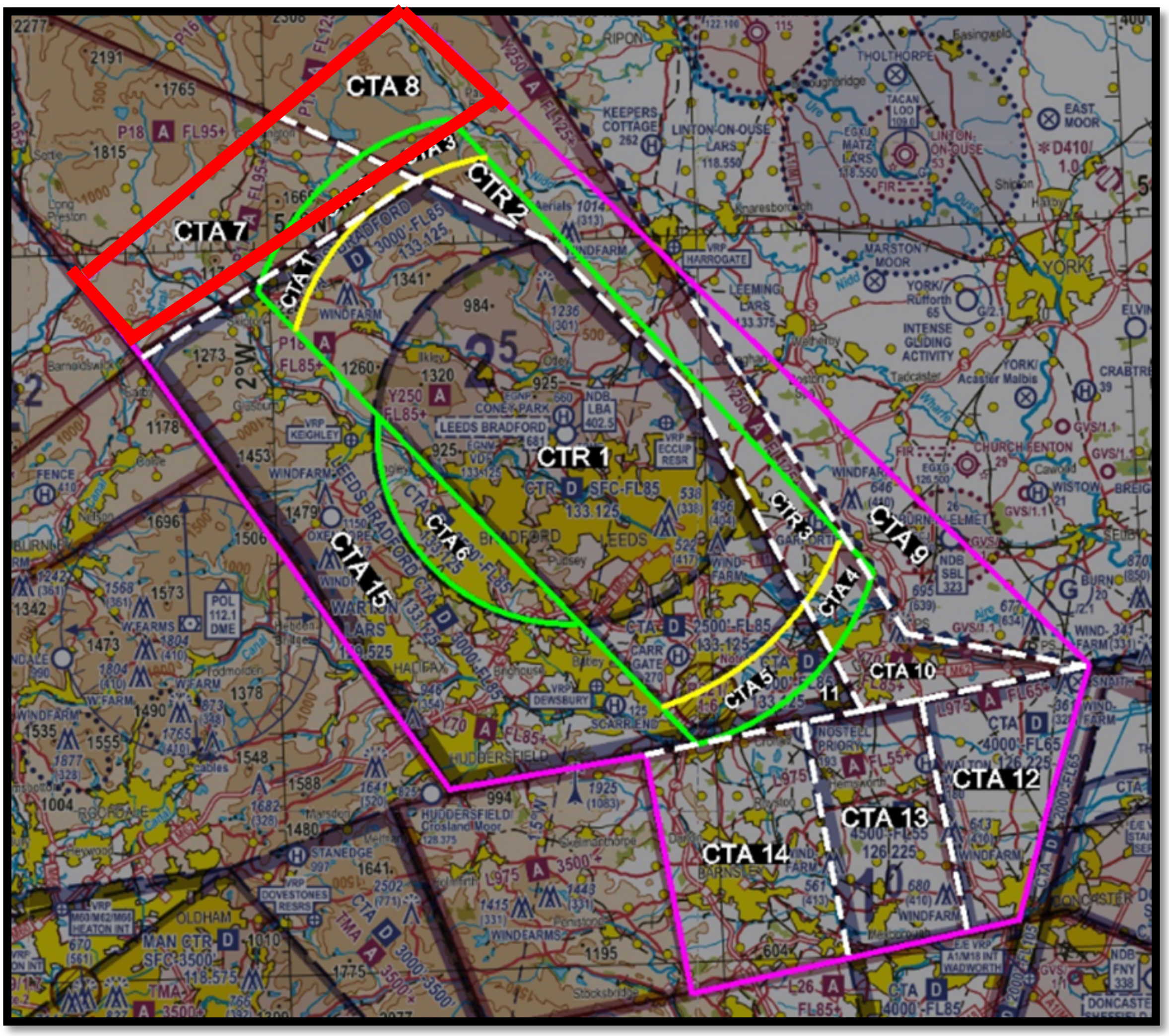


Figure 8 - Airspace (outlined in red) That Could be Delegated to the RAF when LBA is Using Runway 32, if required.

3.8.3 Sherburn-in-Elmet and Leeds East Airports

Sherburn-in-Elmet Aerodrome is the home of the Sherburn Aero Club, a large flying club and flying training school. Leeds East Airport occupies the site of the former RAF Church Fenton; at present it provides services to privately-owned aircraft, with aspirations to develop a passenger service. Both aerodromes lie to the east of LBA are developing GNSS procedures. We have been in discussion regarding how LBA might support these aerodromes through the provision of radar services and to ensure that our procedures de-conflict.

3.8.4 Doncaster Sheffield Airport

Some of the lower airspace immediately south of LBA's current airspace is controlled by Doncaster Sheffield Airport (DSA). Although DSA is the controlling authority, currently LBA traffic routinely transits through the airspace, with DSA approval. The combined number of aircraft movements for both airports through this airspace is significant. We have discussed our future plans with DSA to ensure that their ATC would continue to support LBA aircraft transiting through its airspace. Our plans were positively received and some relatively minor amendments were made to the approach tracks to ensure de- Local Gliding Clubs

3.8.5 Glider Operations

A large number of gliding clubs operate in the airspace surrounding LBA. The nature of glider flight means that glider pilots are unable to comply with instructions to maintain a set course or altitude, making adherence to a CAS crossing clearance problematic. Additionally, the majority of gliders are not fitted with radios, or the glider pilots do not possess a licence to operate a radio. This results in the boundaries of CAS being viewed as “barriers in the sky” by glider pilots and an extension of CAS restrictive to their operations.

Several meetings have been held with local gliding clubs to identify the principle elements of the proposal that cause them concern. There were two main areas identified as being particularly restrictive to their instructional or recreational flights, as follows:

- CTAs 12,13 and 14 – the lower altitude of 3,500 ft proposed for these areas would restrict climbs within thermals to facilitate transits, effectively cutting off glider transits north/south on the east of the UK;
- CTAs 9 and 10 – the lower altitude of 3,500 ft would restrict north/south transits. Additionally, the airspace proposed for CTA 9 is currently utilised for wave soaring flights in excess of 8,000 ft.

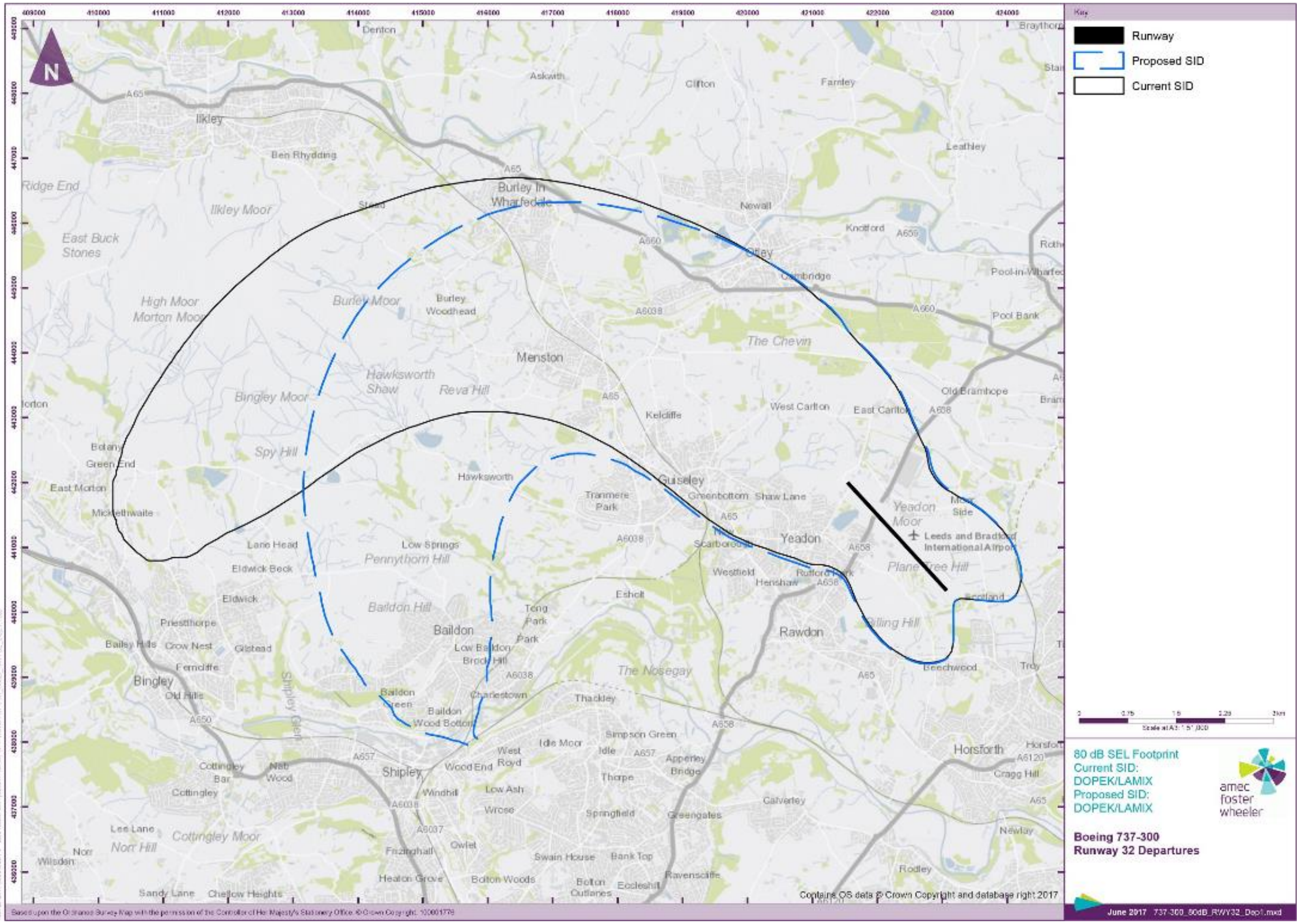
As described within the Consultation Document Issue 2 section entitled “The Proposal” LBA is proposing to restrict the use of some of the procedures to the south-east of the Airport in order to raise the base level of the airspace during the hours of 0900 – 1800 local. Whilst this will not raise the base altitudes/levels to those required to support the full scope of flying requested by the gliding community, we believe it is the best compromise that we are able to achieve.

4 Night Time Sound Exposure Level (SEL) Contours 80 dB Contours

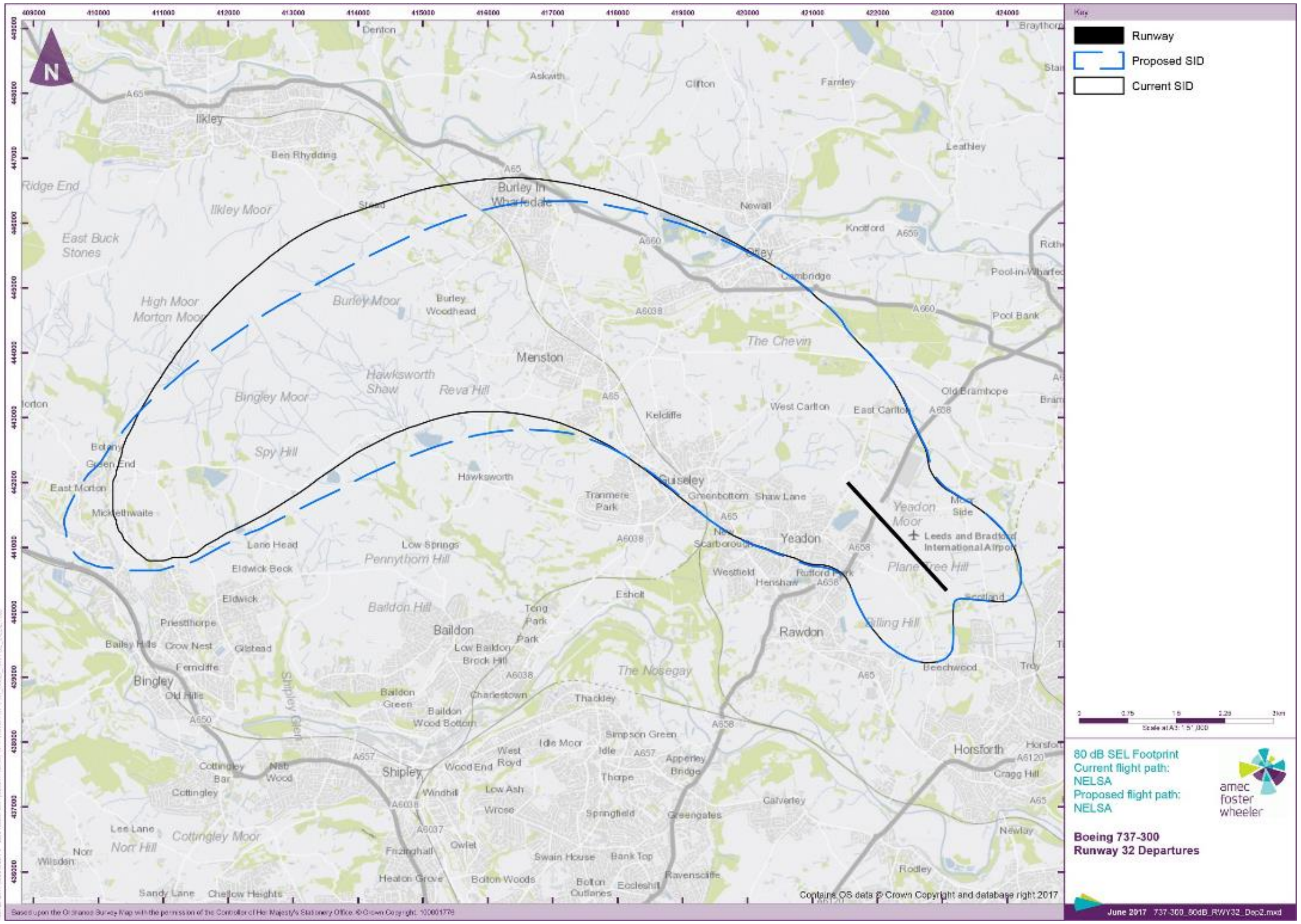
4.1 Overview

This section contains a series of contour charts showing the **80 dB contours** for each aircraft type, from each rwy, on each departure direction.

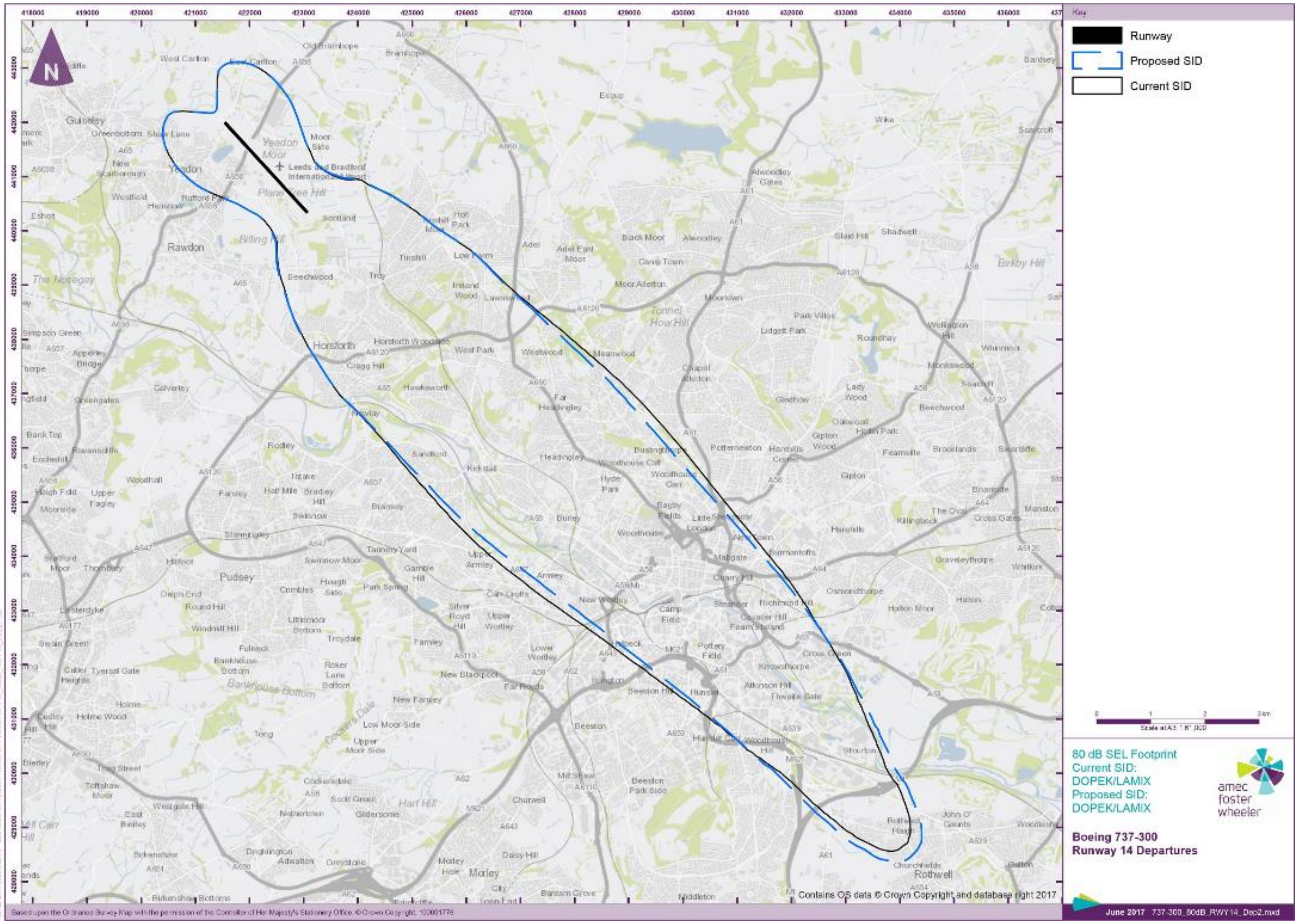
4.2 737-300 Rwy 32 DOPEK/ LAMIX SID



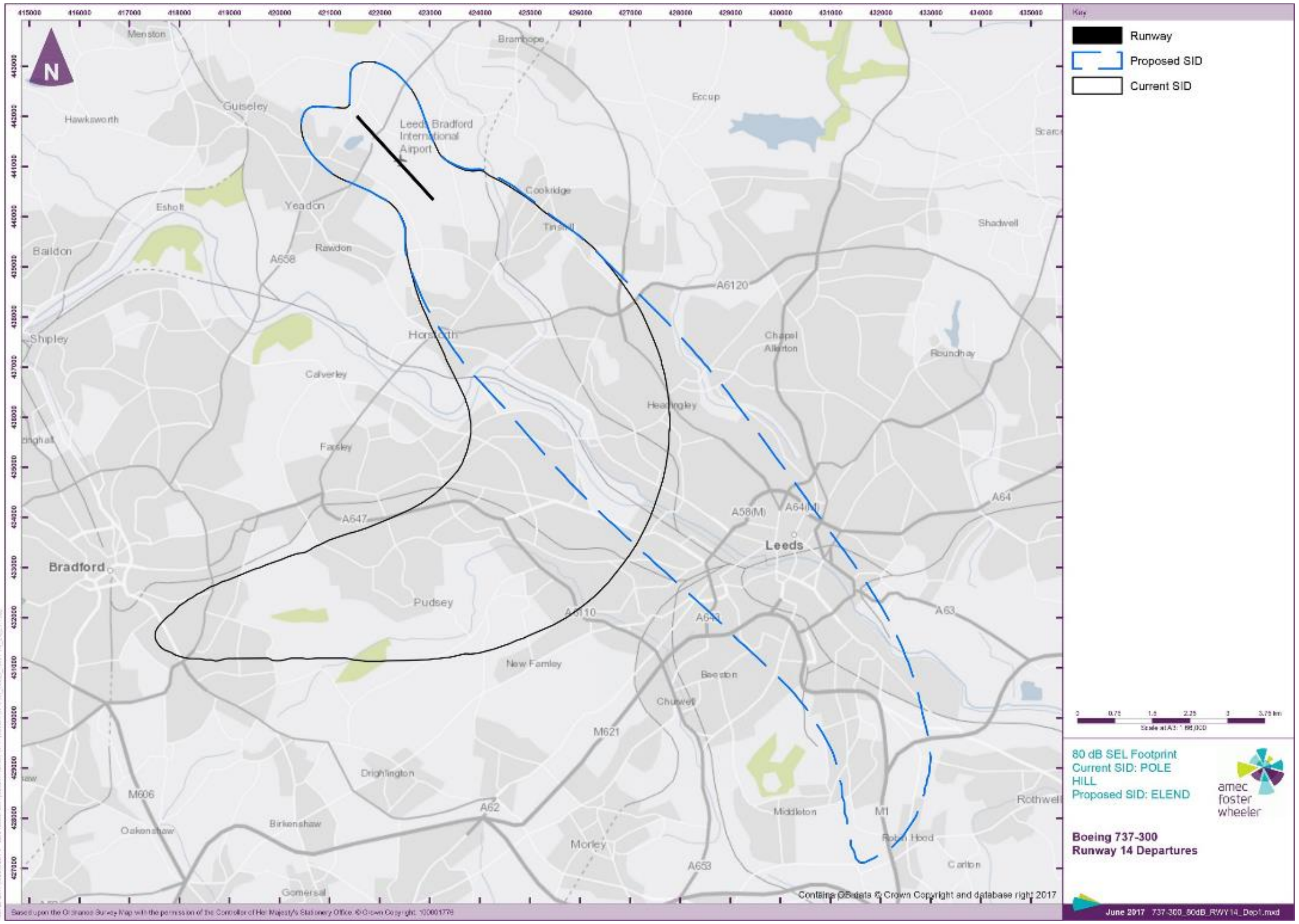
4.3 737-300 Rwy 32 NELSA SID



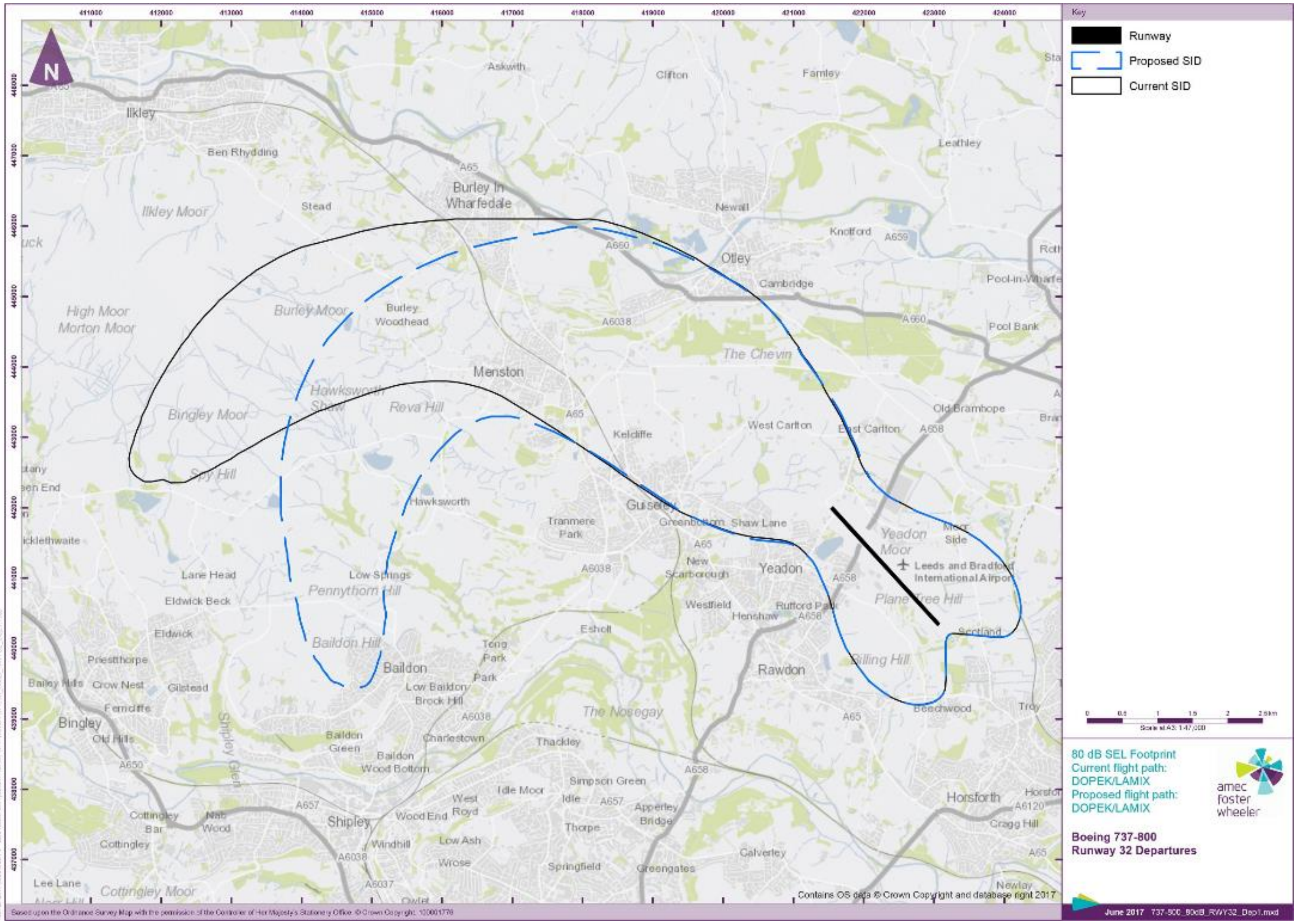
4.4 737-300 Rwy 14 DOPEK/ LAMIX SID



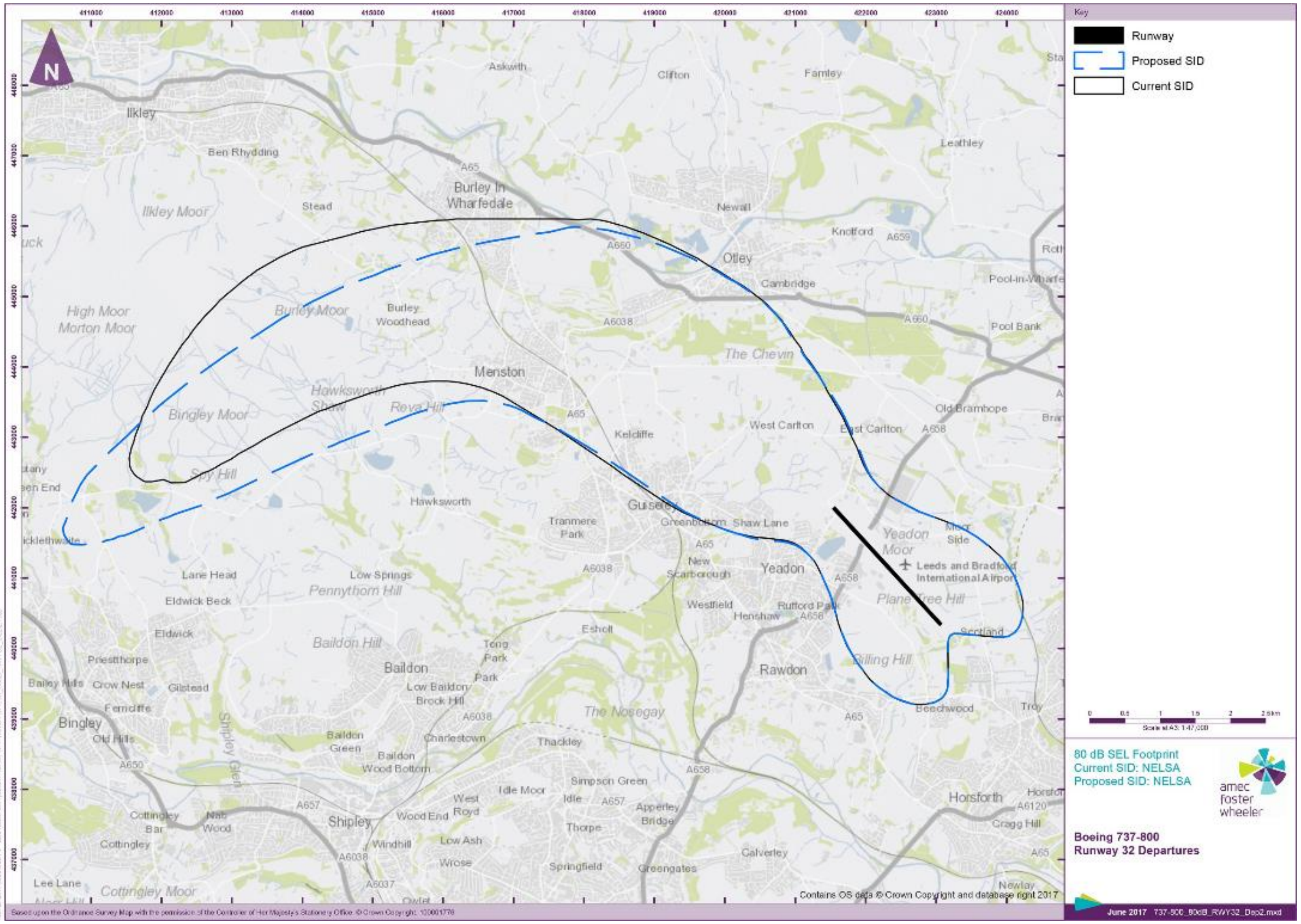
4.5 737-300 Rwy 14 ELEND SID



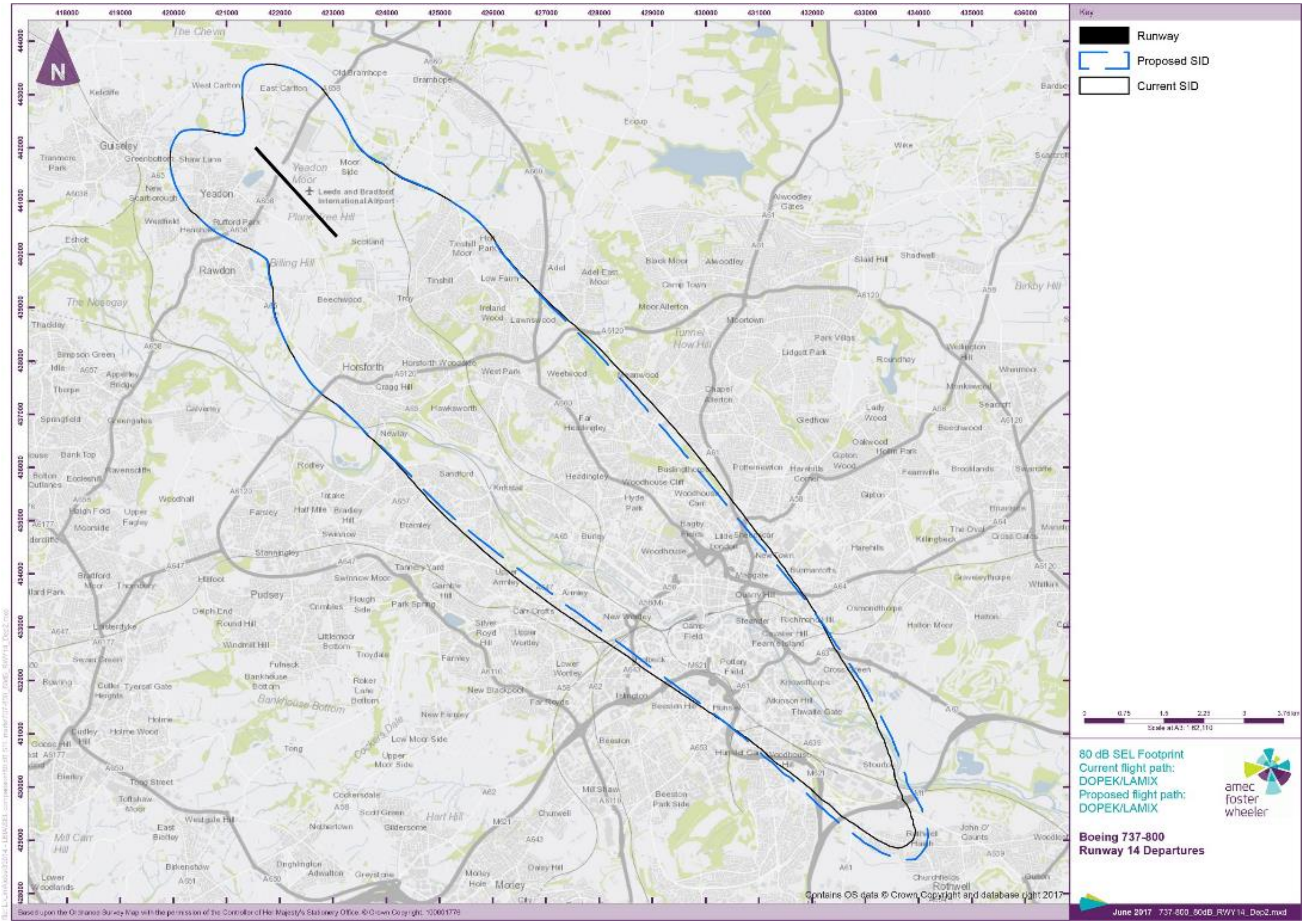
4.6 737-800 Rwy 32 DOPEK/LAMIX SID



4.7 737-800 Rwy 32 NELSA SID

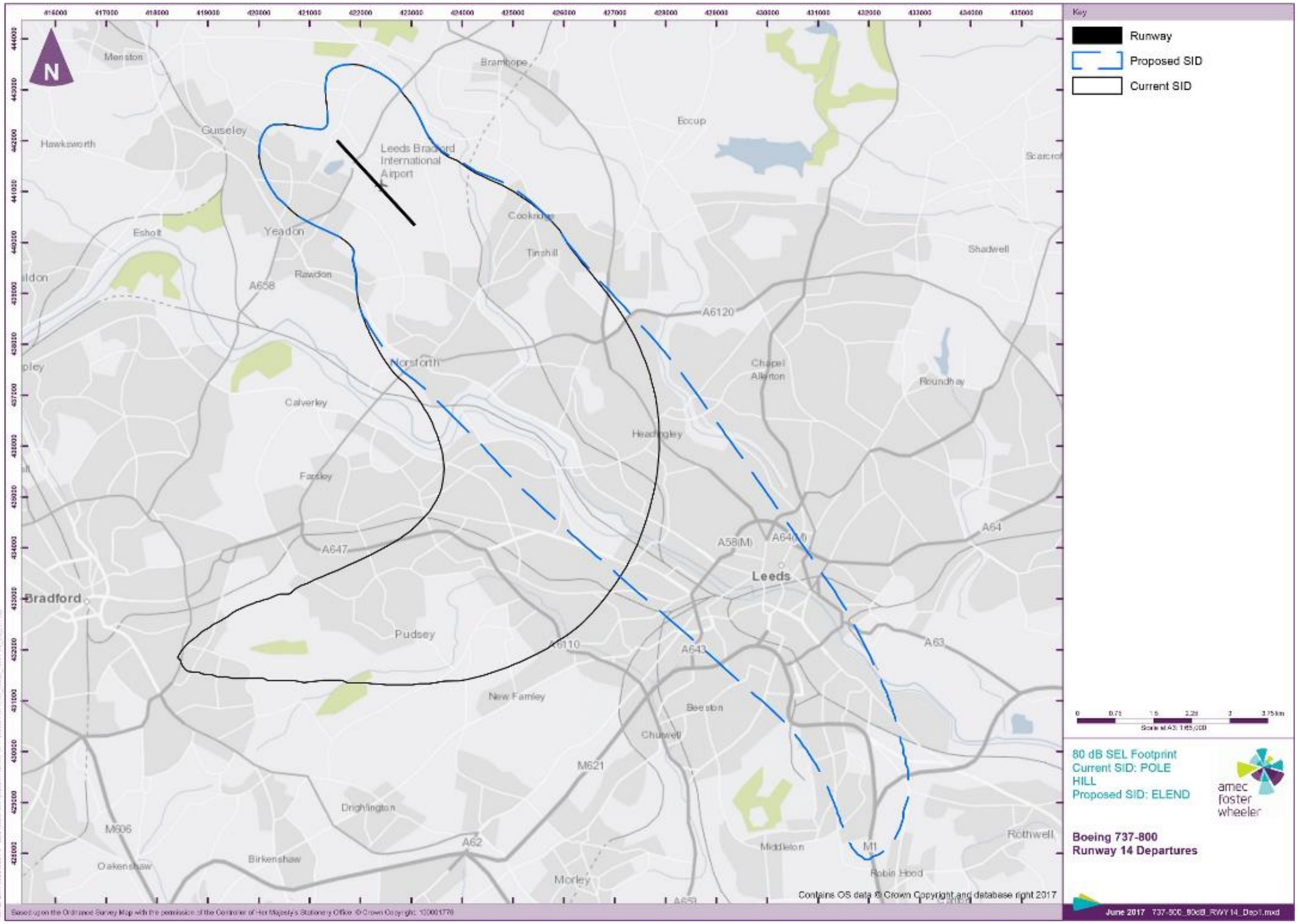


4.8 737-800 Rwy 14 DOPEK/ LAMIX SID



Leeds Bradford® Airport

4.9 737-800 Rwy 14 ELEND SID



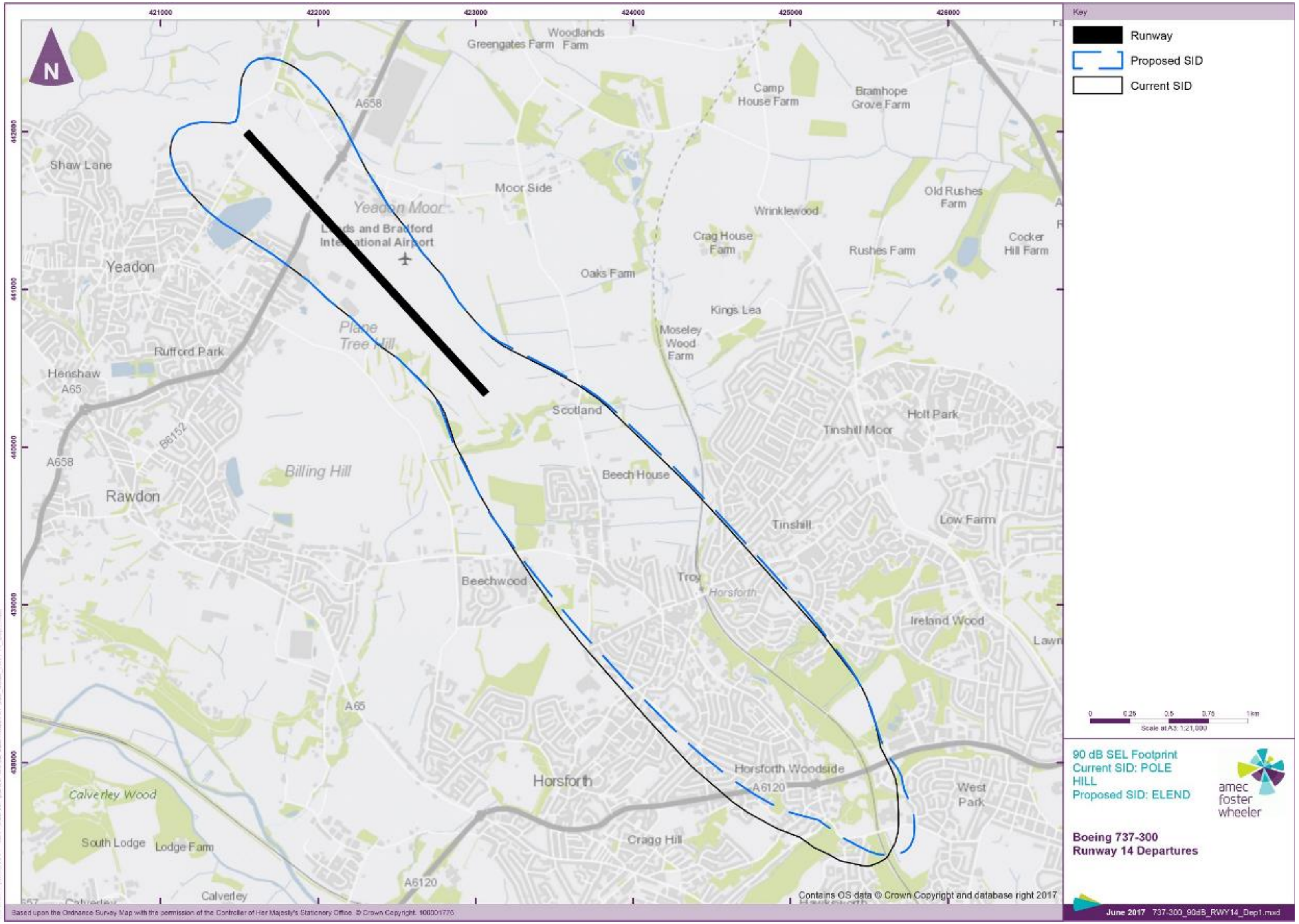
5 Night Time Sound Exposure Level (SEL) Contours 90 dB Contours

5.1 Overview

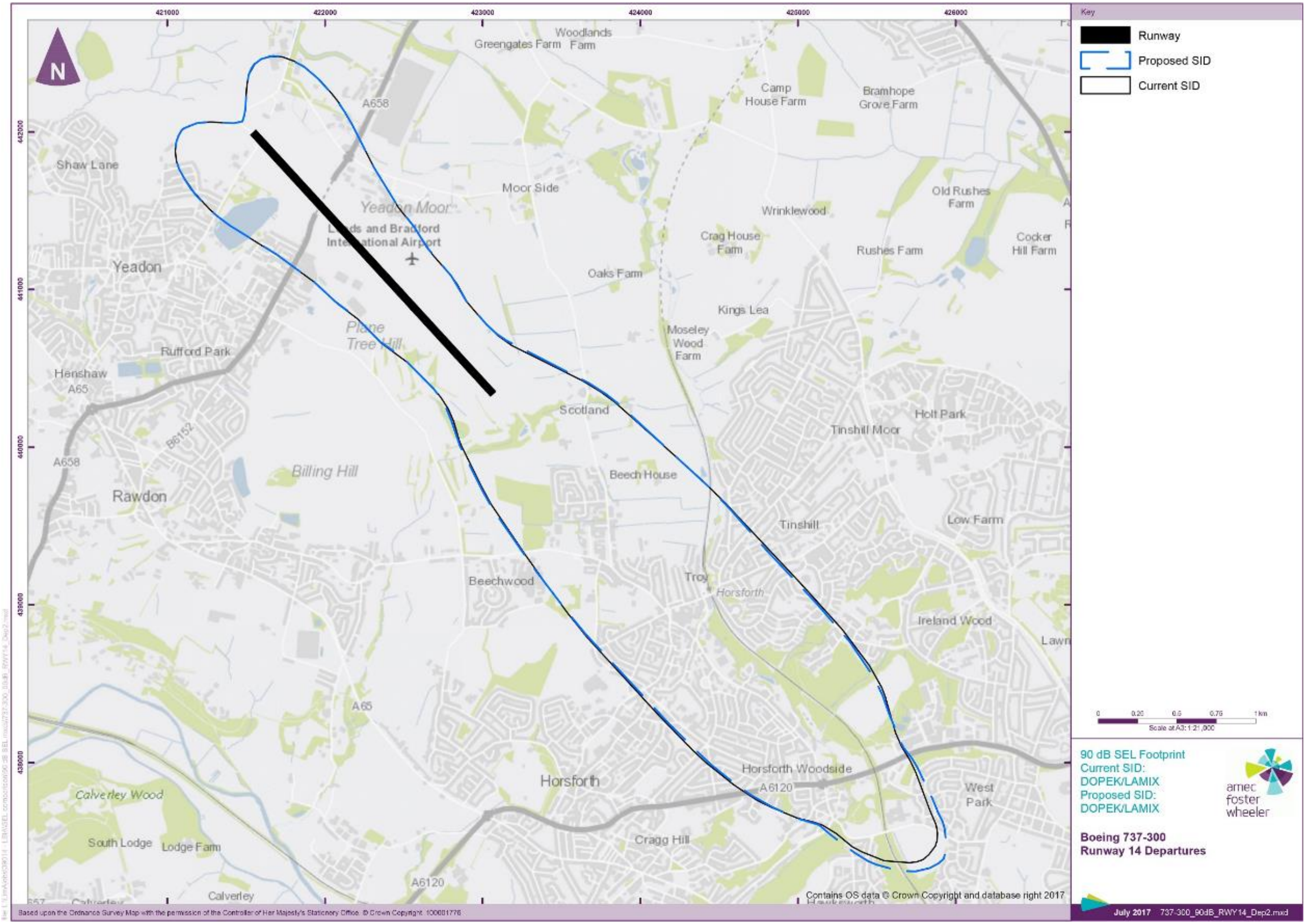
This section contains a series of contour charts showing the **90 dB contours** for each aircraft type, from each rwy, on each departure direction.

Leeds Bradford Airport

5.2 737-300 Rwy 14 POLE HILL SID

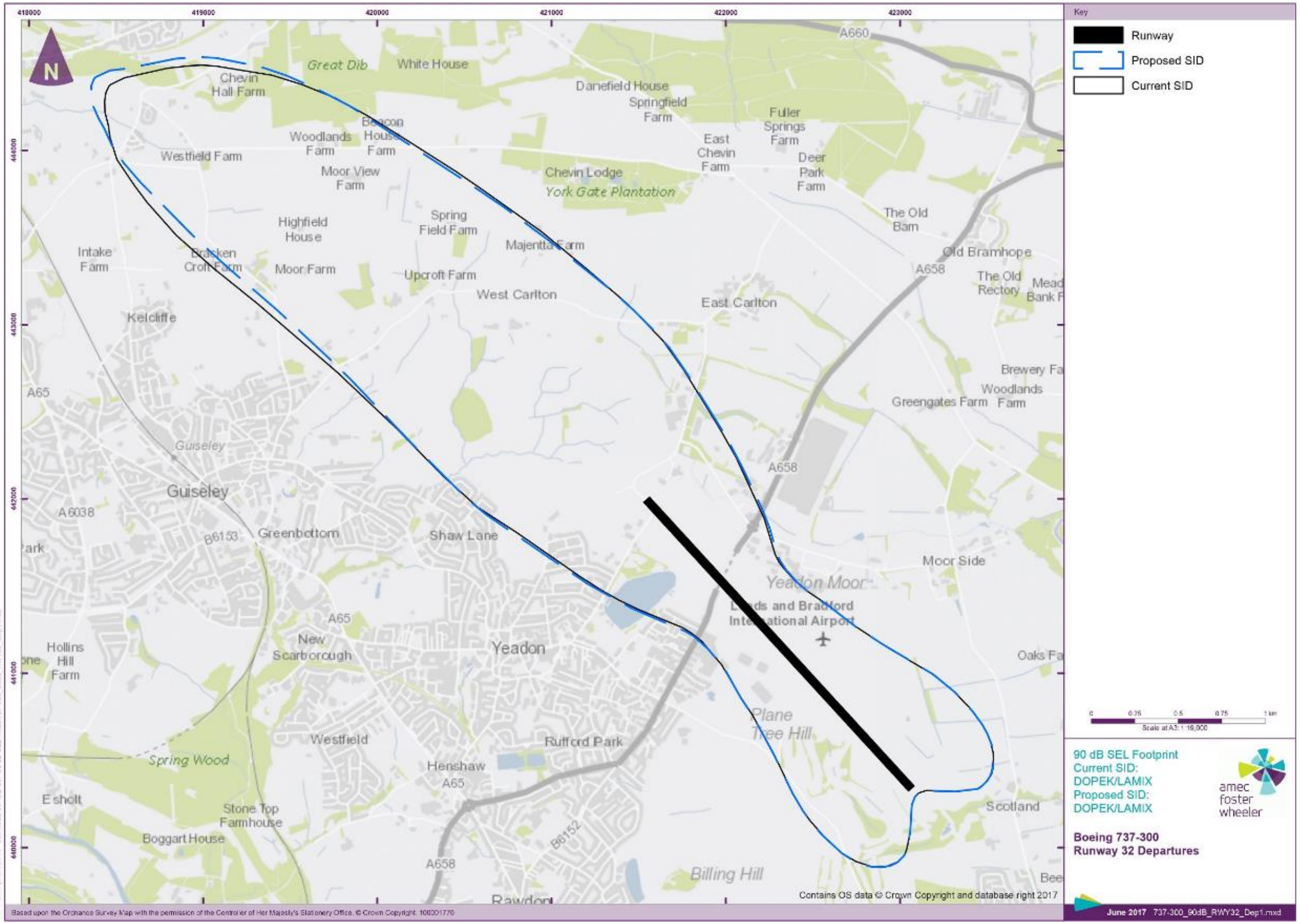


5.3 737-300 Rwy 14 DOPEK/LAMIX SID

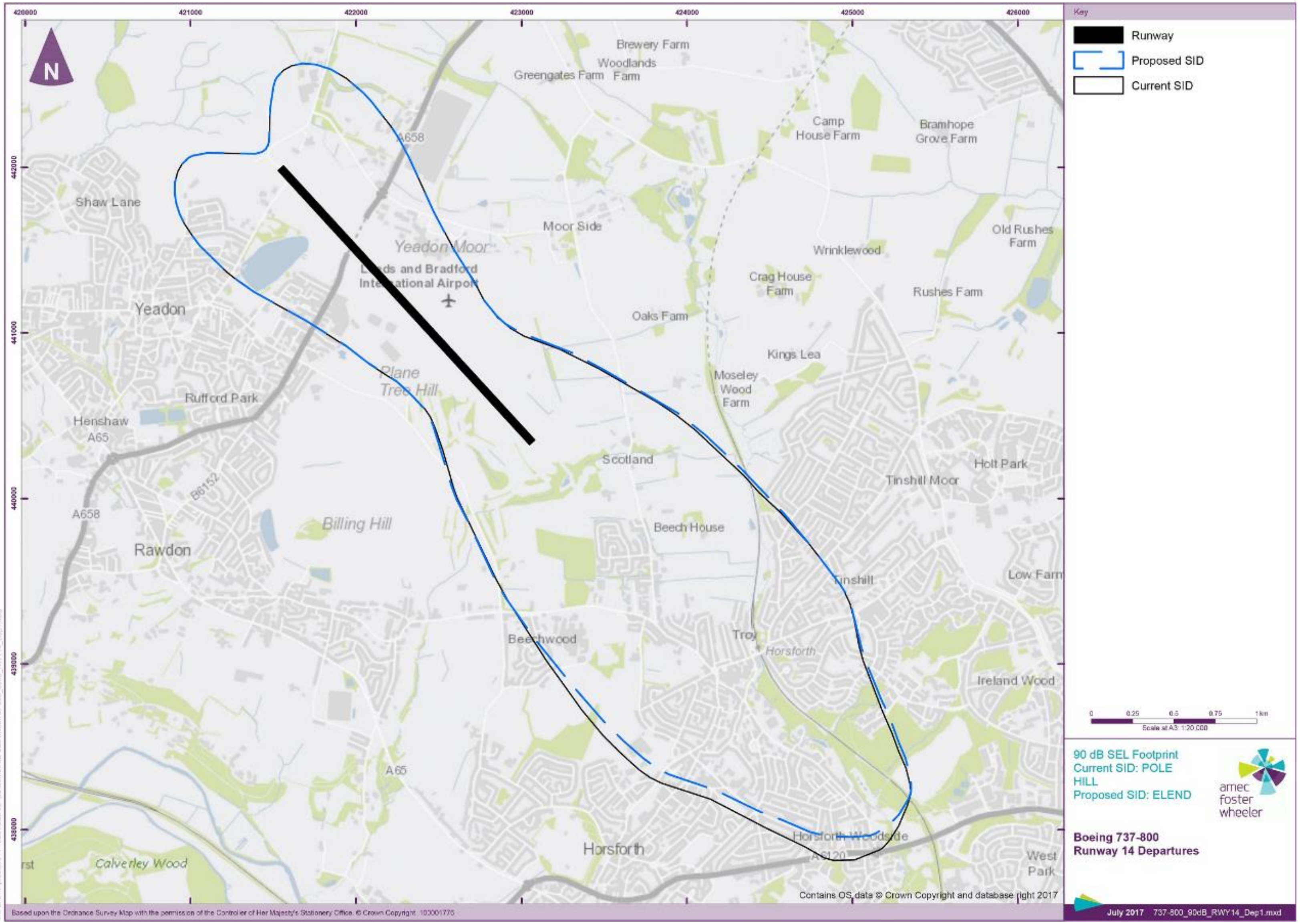


Leeds Bradford® Airport

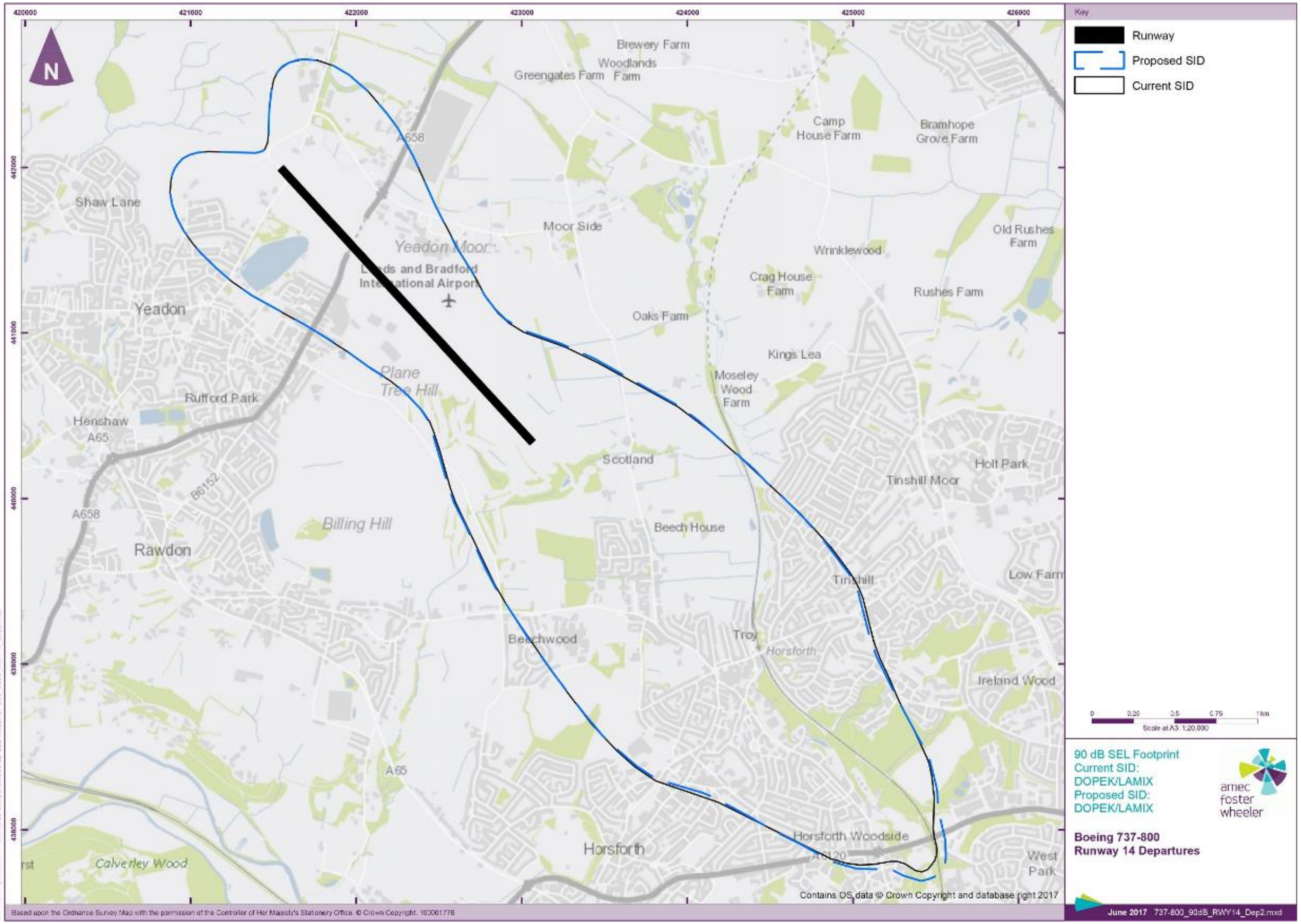
5.4 737-300 Rwy 32 DOPEK/LAMIX SID



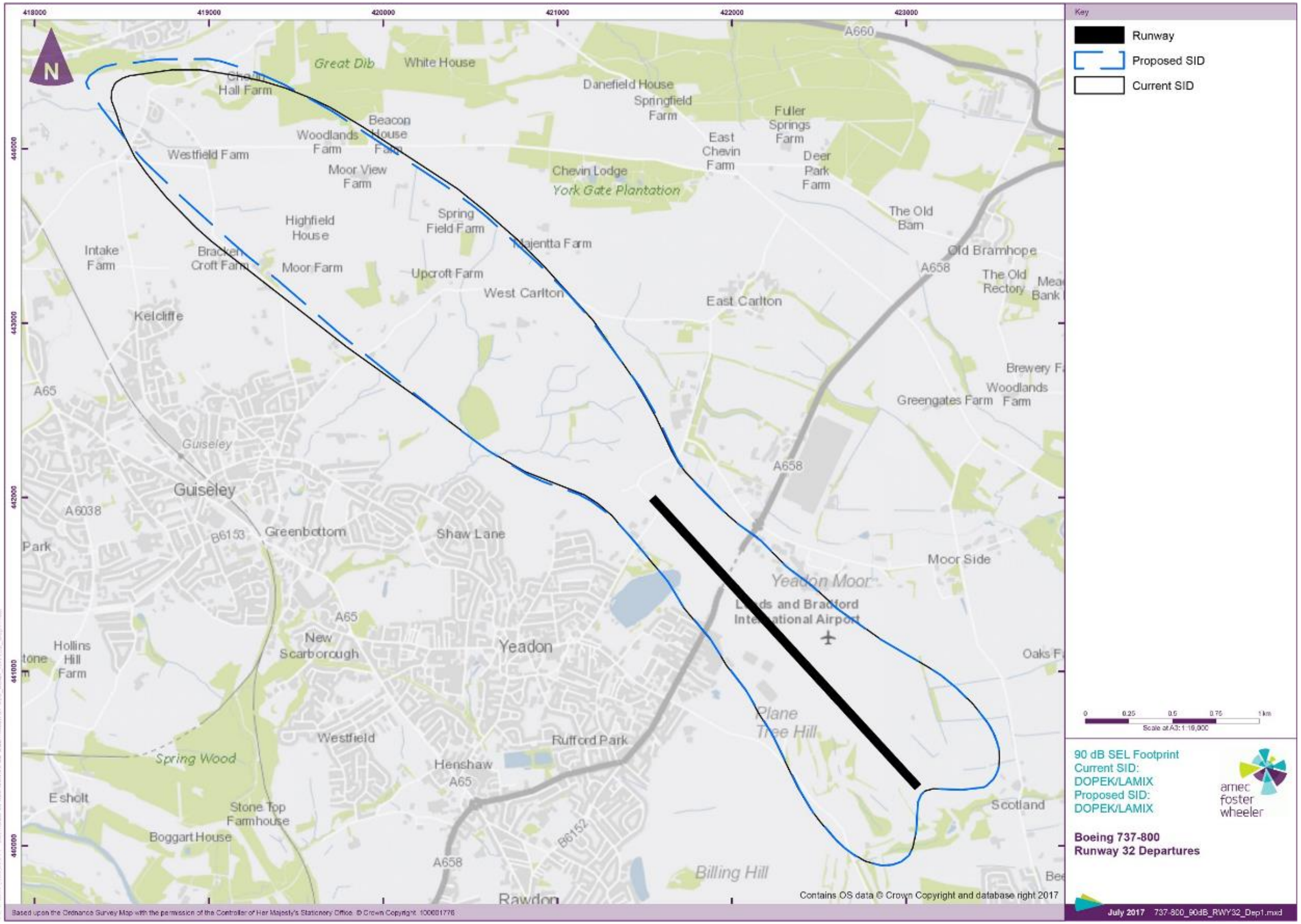
5.5 737-800 Rwy 14 ELEND SID



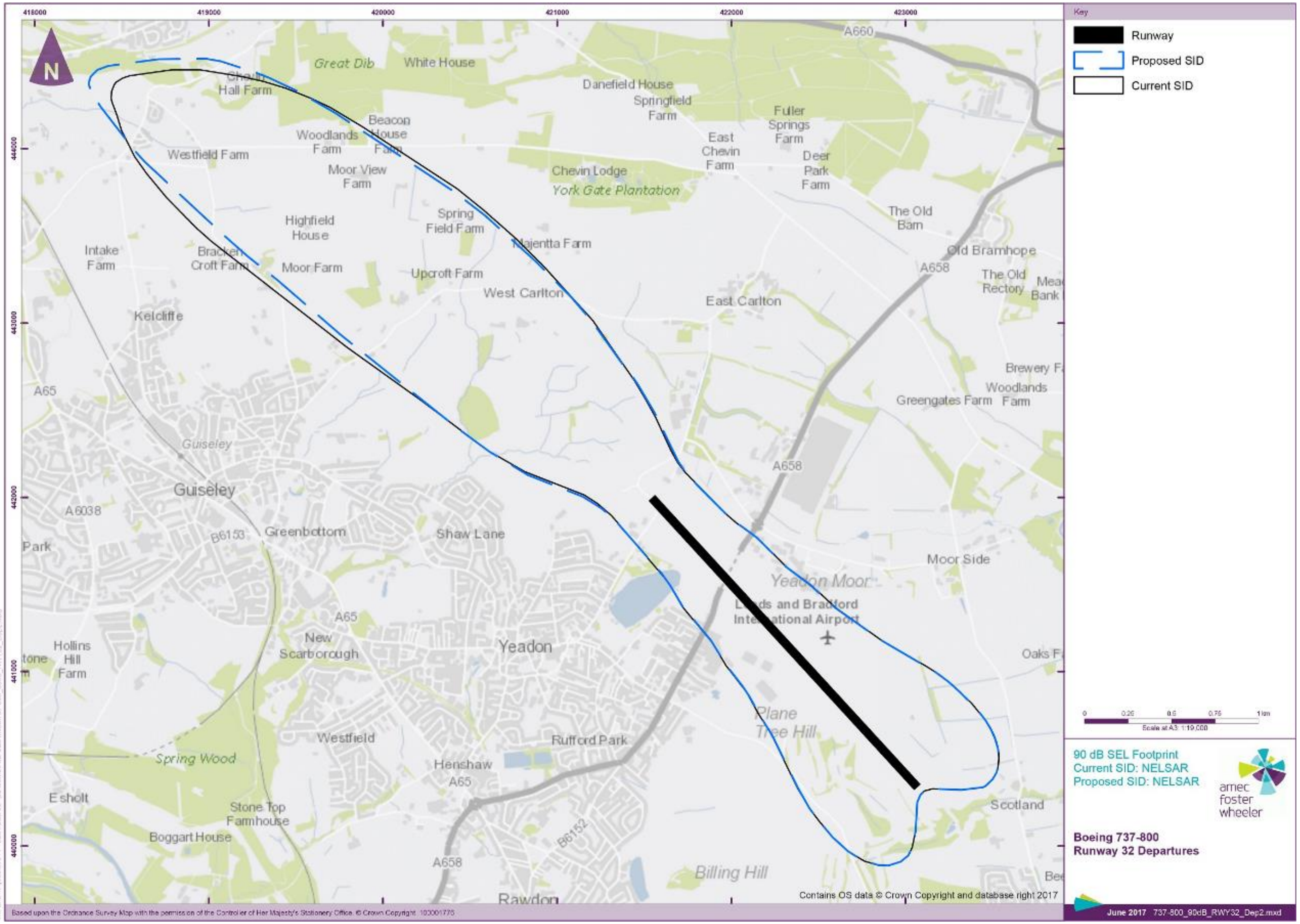
5.6 737-800 Rwy 14 DOPEK / LAMIX SID



5.7 737-800 Rwy 32 DOPEK/LAMIX SID



5.8 737-800 Rwy 32 NELSA SID

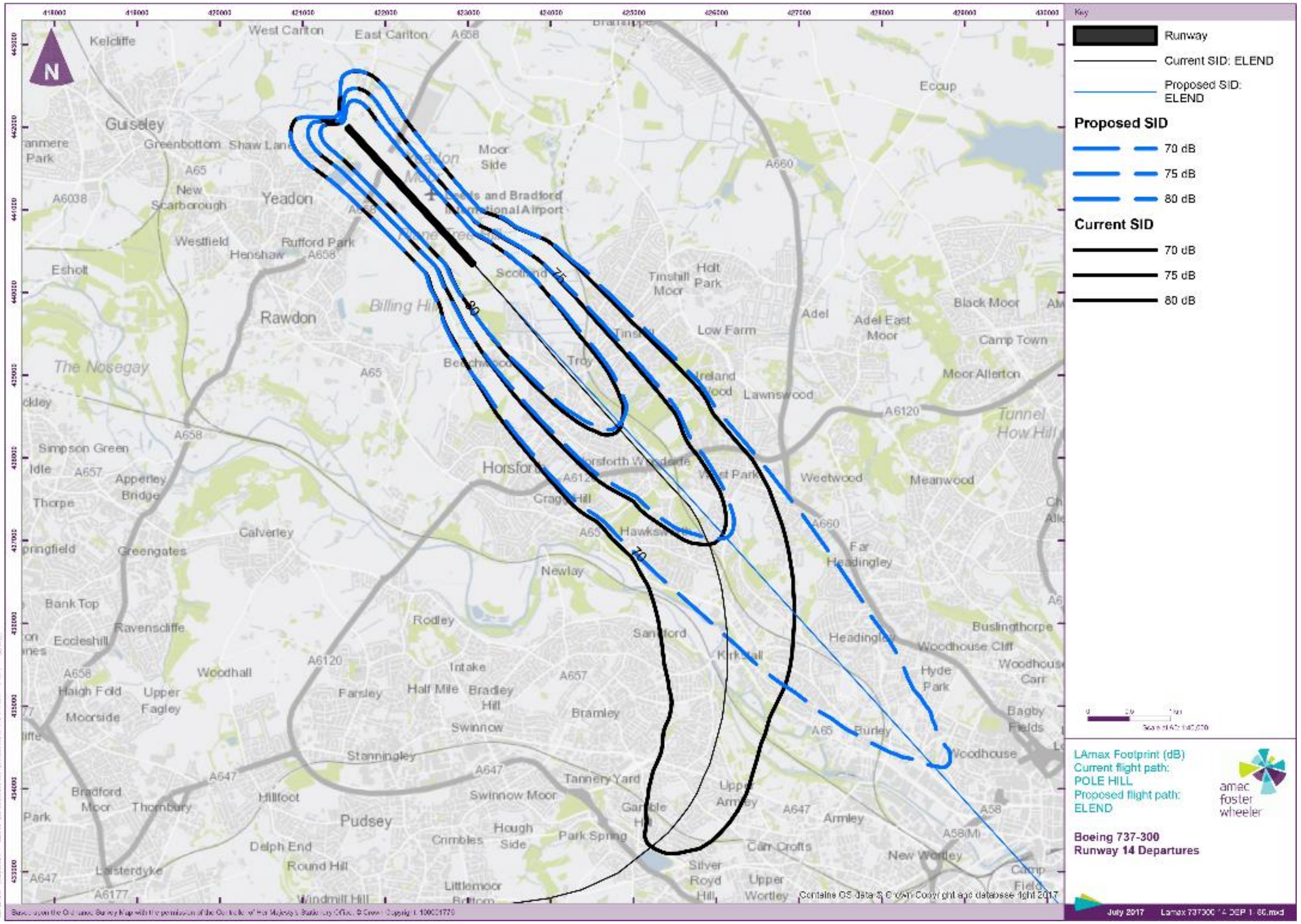


6 L_{AMAX} Contours

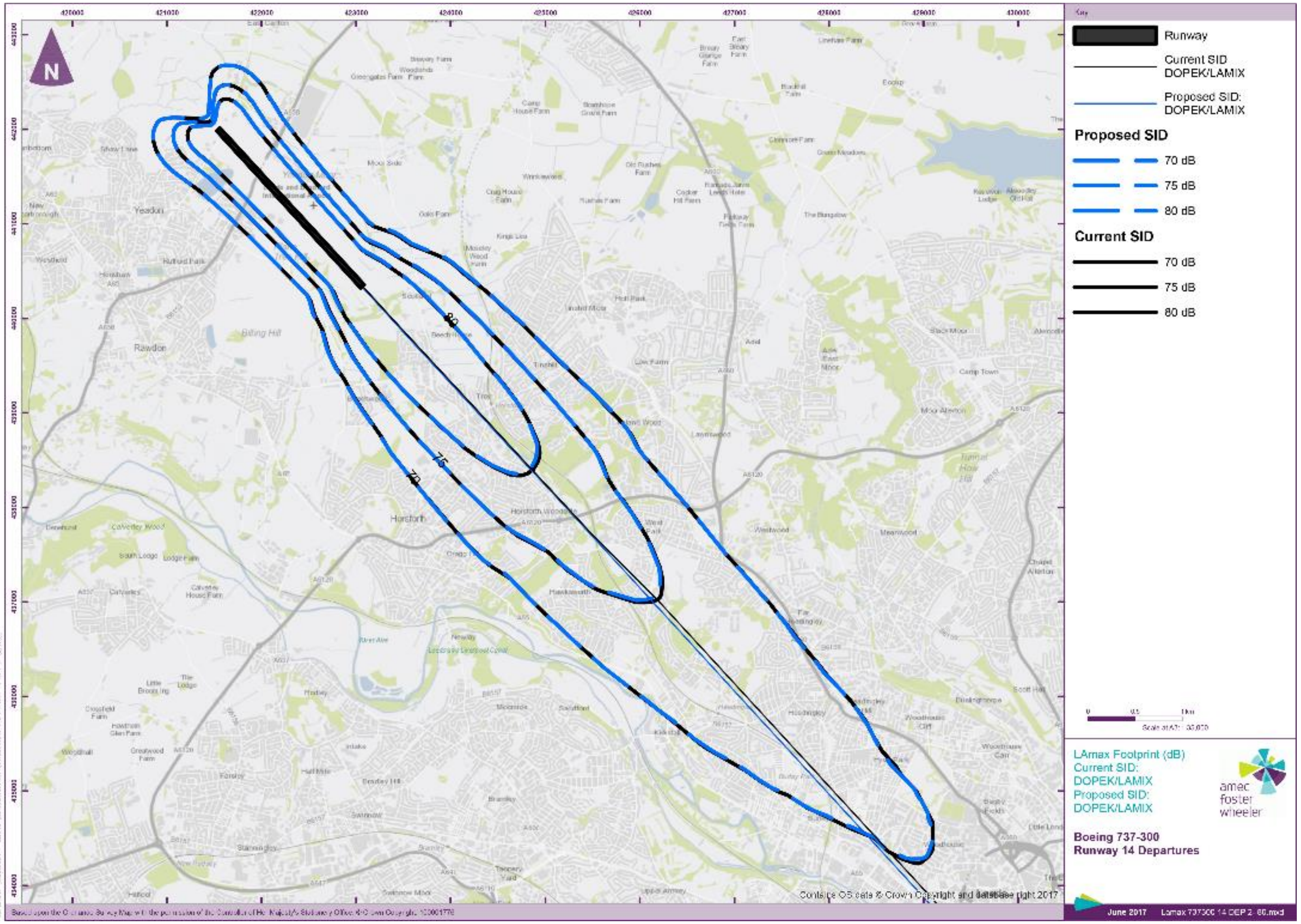
6.1 Overview

This section contains L_{AMAX} contours for each aircraft type, each rwy and each departure profile.

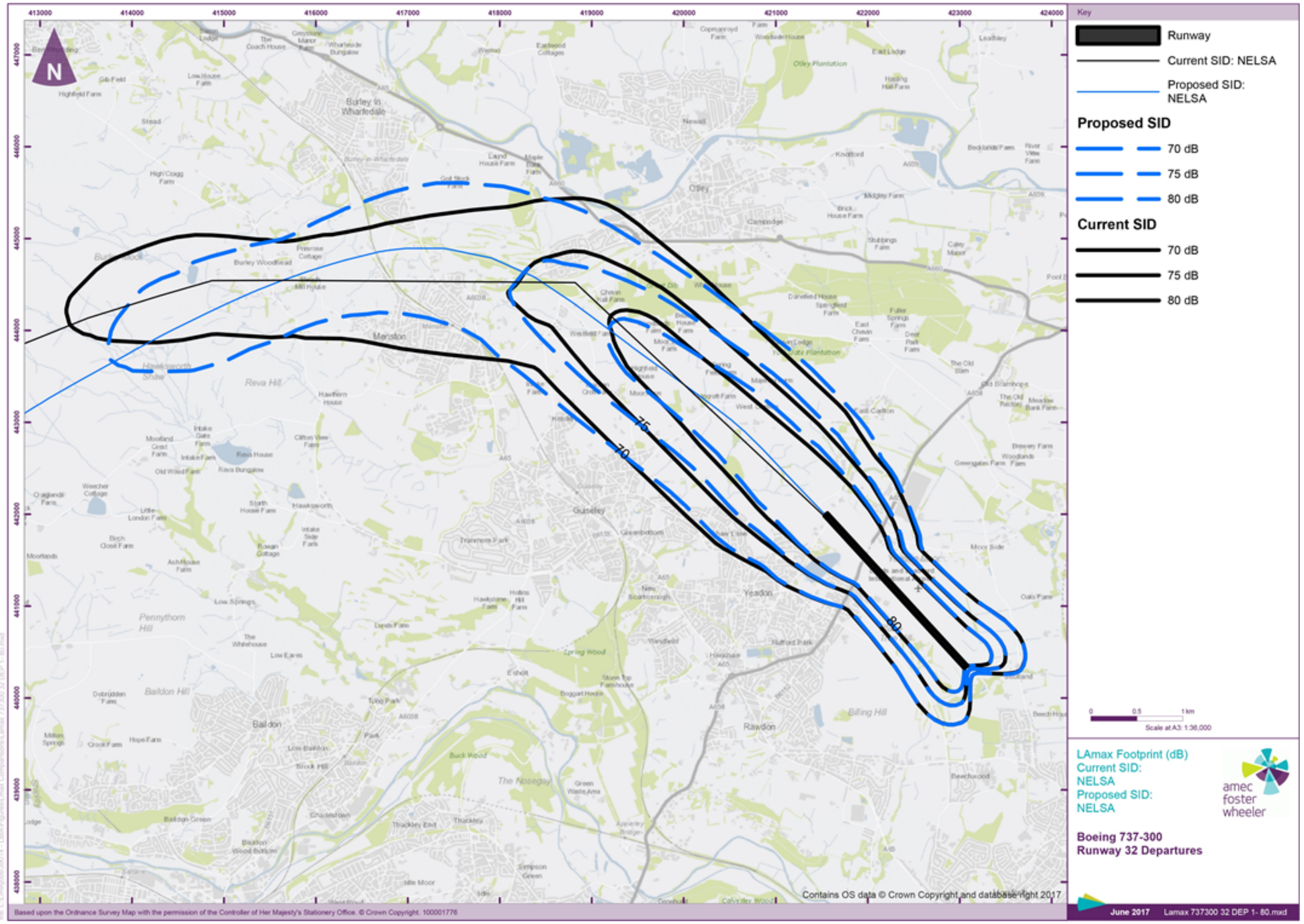
6.2 737-300 Rwy 14 POLE HILL / ELEND SID



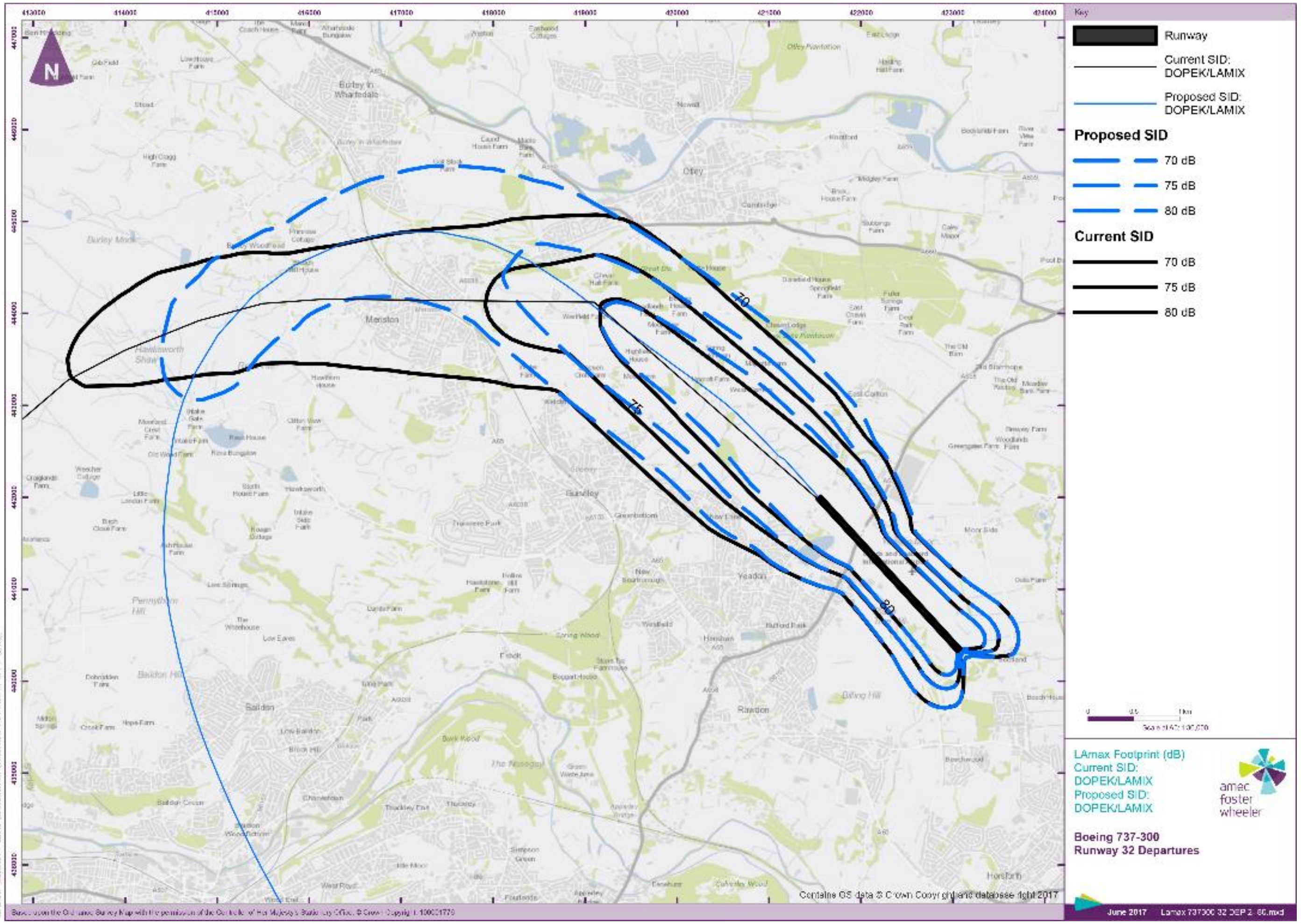
6.3 737-300 Rwy 14 DOPEK / LAMIX SID



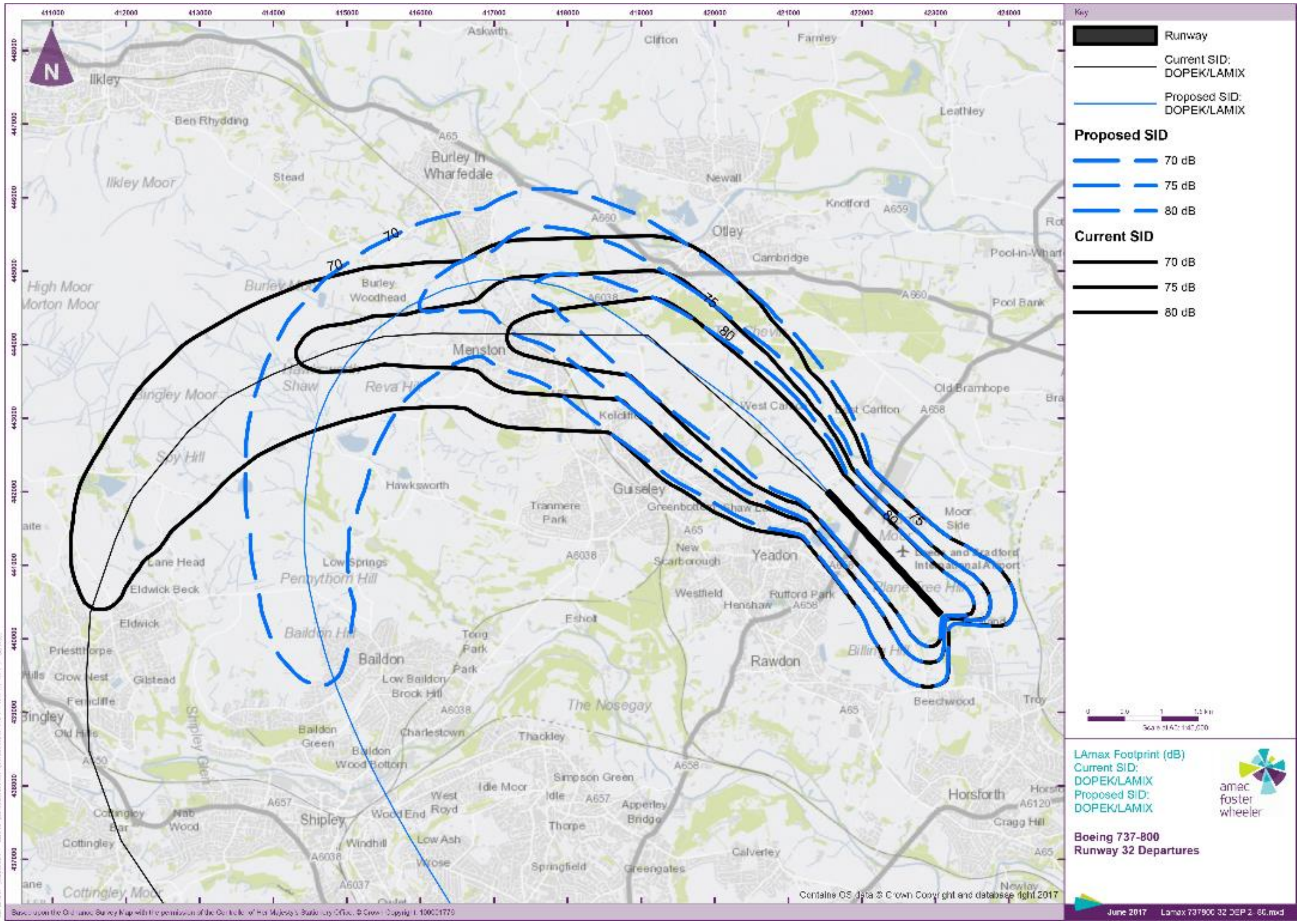
6.4 737-300 Rwy 32 NELSA SID



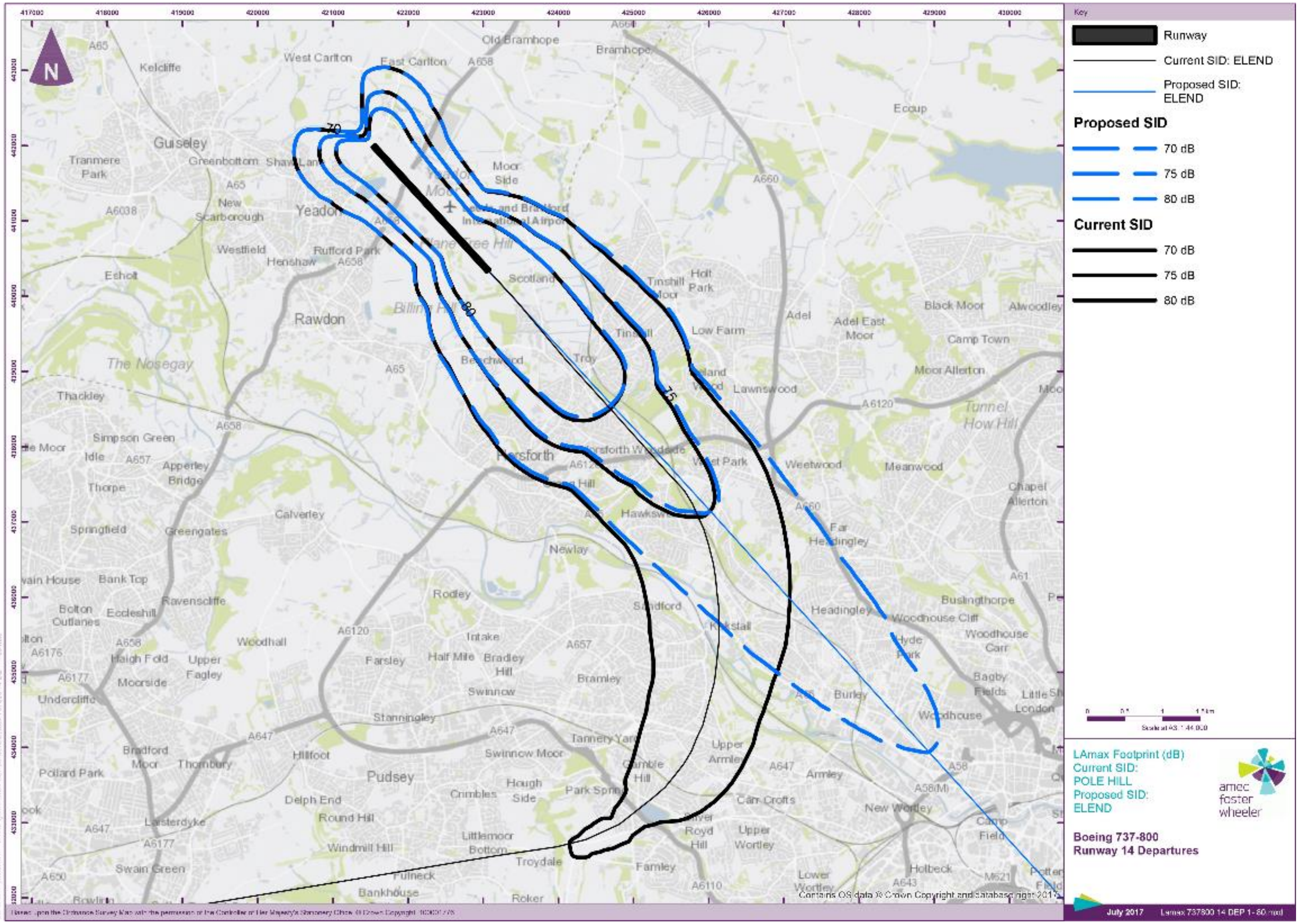
6.5 737-300 Rwy 32 DOPEK / LAMIX SID



6.6 737-800 Rwy 32 DOPEK / LAMIX SID



6.7 737-800 Rwy 14 POLE HILL / ELEND SID



6.8 737-800 Rwy 14 DOPEK / LAMIX SID