Leeds Bradford Airport (LBA) Future Airspace

Step 2a – Design Option Update Brief – Nov 23

Part 1: Departures

Leeds Bradford®
Yorkshire's Airport

CYRRUS

IMPORTANT: This presentation is part of the LBA ACP Stage 2 Stakeholder Engagement on Design Options and Design Principle Evaluation, further information, background and context can be found in a document titled ‘CPJ-5692-DOC-034-LBA FASI(N) ACP Stakeholder Engagement Overview’ which has been sent out with this presentation (and another focused on ‘Arrivals’) and all of these will ultimately be available on the ACP portal.

Agreed Design Principles (DPs)

DP #	Design Principle
1	**Importance of Safety** – The airspace design and its operation must maintain or where possible, enhance current levels of safety.
2	**Noise** - The design should limit, and where practicable reduce, the number of people overflown, the impact of noise to stakeholders on the ground and where possible periods of built-in respite should be considered.
3	**Tranquillity** - Where practical, route designs should limit effects upon noise sensitive areas. These may include cultural or historic assets, tranquil or rural areas, sites of care or education and AONBs.
4	**Emissions and Air Quality** – The proposed design should minimise CO2 emissions per flight.
5	**Airspace Dimensions** – The volume and classification of controlled airspace required for LBA should be the minimum necessary to deliver an efficient airspace design, considering the needs of all airspace users.
6	**Airspace Complexity** – The airspace design should seek to reduce complexity and bottlenecks in controlled and uncontrolled airspace and contribute to a reduction in airspace infringements.
7	**Technical Requirements** – The design shall be fully compliant with PANS-OPS and UK CAA criteria to meet the technical capability requirements of aircraft using the airport.
8	**Systemisation** – The new procedures will integrate with the en-route network, as per the FASI(N) programme. If required, the arrival transitions shall integrate with the Instrument Approach Procedures (IAPs), deconflict with the departure procedures, reducing the requirement for tactical coordination.
9	**Operational Cost** – Provided it does not have an adverse impact of community disturbance, procedures should be designed to optimise fuel efficiency.
10	**AMS Realisation** – This ACP must serve to further, and not conflict with, the realisation of the AMS.
11	**PBN** – The new procedures should capitalise on as many of the potential benefits of PBN implementation as are practicable.

Design Principles Evaluation (DPE) Criteria

DP #	Design Principle		
DP1	**Importance of Safety** – The airspace design and its operation must maintain or where possible, enhance current levels of safety.		
Criteria	**Meets:** No safety issues identified that could not be overcome with similar levels of safety assurance to today's operation.	**Partially Meets:** Issues identified that would require a significantly more robust safety argument than today's operation to overcome.	**Does Not Meet:** Issues identified that could not be overcome without prohibitively restrictive safety mitigation.
DP2	**Noise** - The design should limit, and where practicable reduce, the number of people overflown, the impact of noise to stakeholders on the ground and where possible periods of built-in respite should be considered.		
Criteria	**Meets:** Limits or has the potential to reduce overall impacts of aircraft noise.	**Partially Meets:** Impacts of aircraft noise likely to be broadly similar in terms of the number of people affected. Some communities (possibly previously unaffected ones) may be affected more than others.	**Does Not Meet:** Has the potential to increase the overall impacts of aircraft noise on local communities.
DP3	**Tranquillity** - Where practical, route designs should limit effects upon noise sensitive areas. These may include cultural or historic assets, tranquil or rural areas, sites of care or education and AONBs.		
Criteria	**Meets:** Limits effects on Noise Sensitive Areas and does not result in any overflight of an AONB or a NP below 7000ft.	**Partially Meets:** Does not result in overflight of a significant portion of an AONB or a NP but may result in overflight of other sensitive areas.	**Does Not Meet:** Results in direct and significant overflight of AONBs, NPs and/or various tranquil areas important to local communities.
4	**Emissions and Air Quality** – The proposed design should minimise CO_2 emissions per flight.		
Criteria	**Meets:** Has potential to burn less fuel and emit less CO_2 than other DOs.	**Partially Meets:** Is not the most fuel-efficient DO but is not significantly worse than other DOs.	**Does Not Meet:** Clearly an inefficient DO resulting in unnecessary and excessive fuel burn and therefore CO_2 emissions.

Design Principles Evaluation (DPE) Criteria

DP #	Design Principle		
5	**Airspace Dimensions** – The volume and classification of controlled airspace required for LBA should be the minimum necessary to deliver an efficient airspace design, considering the needs of all airspace users.		
Criteria	**Meets:** Allows for either a reduction in the volume of CAS required or does not require any additional CAS.	**Partially Meets:** May result in a need for small amounts of additional CAS but there may be potential to revert some CAS to Class G.	**Does Not Meet:** Large additional volumes of CAS are required to contain the proposed DO without the potential to revert some to Class G.
6	**Airspace Complexity** – The airspace design should seek to reduce complexity and bottlenecks in controlled and uncontrolled airspace and contribute to a reduction in airspace infringements.		
Criteria	**Meets:** Does not result in a complex CTA/CTR configuration.	**Partially Meets:** Results in changes to the CAS configuration that may cause other aviators some minor challenges.	**Does Not Meet:** Results in a highly complex CAS configuration.
7	**Technical Requirements** – The design shall be fully compliant with PANS-OPS and UK CAA criteria to meet the technical capability requirements of aircraft using the airport.		
Criteria	**Meets:** Is fully compliant and meets the technical capabilities of almost all airport operators.	**Partially Meets:** Is largely compliant but with reasonable justification for any non-compliance and meets the technical capabilities of most airport operators.	**Does Not Meet:** Has several non-compliances without reasonable justification and does not meet the technical capabilities of several airport operators.
8	**Systemisation** – The new procedures will integrate with the en-route network, as per the FASI(N) programme. If required, the arrival transitions shall integrate with the Instrument Approach Procedures (IAPs), deconflict with the departure procedures, reducing the requirement for tactical coordination.		

Design Principles Evaluation (DPE) Criteria

DP #	Design Principle		
Criteria	**Meets:** Integrates seamlessly with the en-route network and is likely to reduce the need for tactical coordination and vectoring within the CTA/CTR.	**Partially Meets:** Integrates seamlessly with the en-route network but may not reduce the need for tactical coordination and vectoring within the CTA/CTR.	**Does Not Meet:** Does not integrate seamlessly with the en-route network and will increase the need for tactical coordination and vectoring within the CTA/CTR.
9	**Operational Cost** – Provided it does not have an adverse impact of community disturbance, procedures should be designed to optimise fuel efficiency.		
Criteria	**Meets:** Fuel efficiency is optimal without an adverse impact on local communities.	**Partially Meets:** Fuel efficiency is marginally sub-optimal due to consideration to the impact on local communities.	**Does Not Meet:** Fuel efficiency is clearly not optimised, or it has been optimised at the expense of local communities.
10	**AMS Realisation** – This ACP must serve to further, and not conflict with, the realisation of the AMS.		
Criteria	**Meets:** Generally aligned with the AMS.	**Partially Meets:** Partially aligned with the AMS.	**Does Not Meet:** Not aligned with the AMS.
11	**PBN** – The new procedures should capitalise on as many of the potential benefits of PBN implementation as are practicable.		
Criteria	**Meets:** Designed to the latest navigation standards that do not require aircraft fleet upgrades.	**Partially Meets:** Designed to the latest navigation standards that may require aircraft fleet upgrades.	**Does Not Meet:** Fails to utilise the latest navigation standards.

What's New?

What has changed? Seven new Departure DOs have been developed, five for RW32 and two for RW14. These DOs share the same initial climb-out but then split in the required departure directions.

The requirement for SIDs towards the NW and NE has been reviewed and it was concluded there was insufficient demand. Accordingly, the NW and NE SID options have been removed from evaluation.

We have looked to recently improved procedure design and navigation techniques to try and avoid some of the communities closer to the Airport.

Many of these new DOs have been developed specifically to provide communities with respite or night-time noise relief

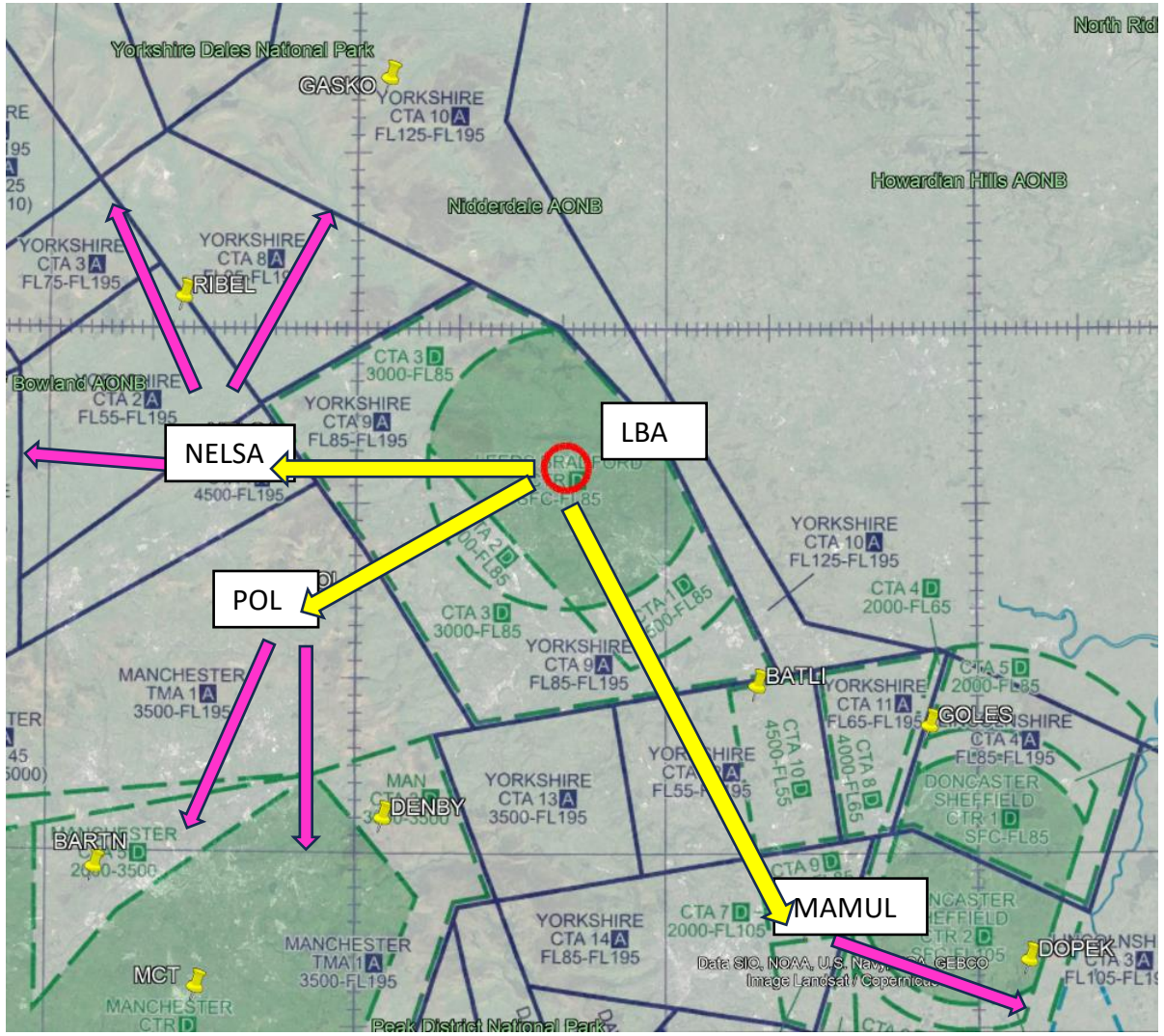
The DPE for all the Departure DOs has been revised post-CAA review. It was considered that the DPs had not been applied consistently to each DO and therefore a revised DPE is presented for comment.

Departures

Departure Directions and the Route Network Flow

NERL have expressed a preference to see departures from LBA to route via three gateways into the Route Network:

- W, NW and NE via NELSA
- S and SW via POL
- ESE via MAMUL

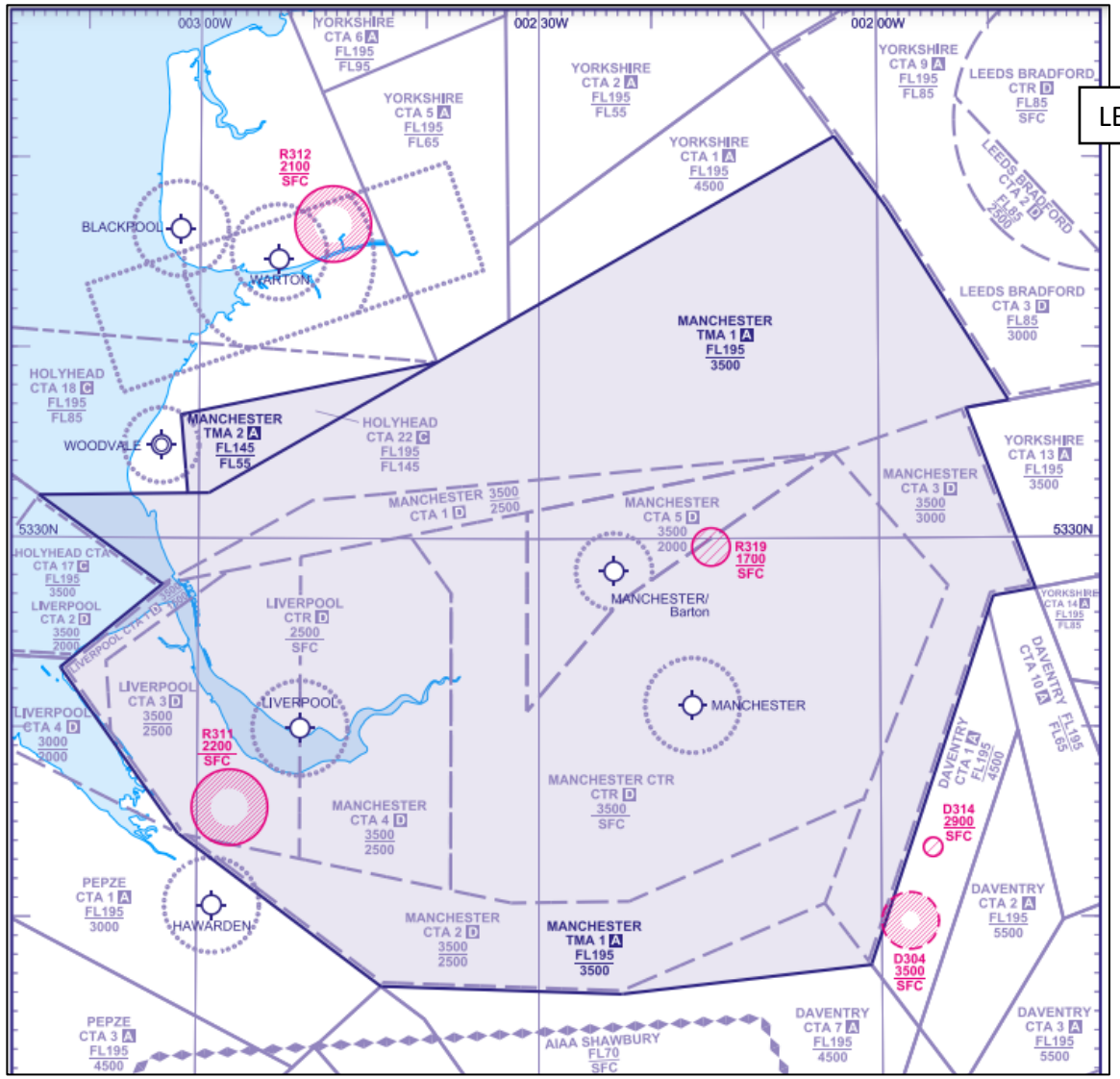


Important: Note that the arrows on this slide do not show flight paths, they show direction of travel from LBA. Flight paths off the two runways would look very different.

MTMA

The points on the previous slides are chosen as they best fit the overall flow of the Manchester Terminal Manoeuvring Area (MTMA) within which aircraft are climbing in and out of various airports, principally:

- Manchester;
- Liverpool;
- East Midlands; and
- Leeds Bradford.

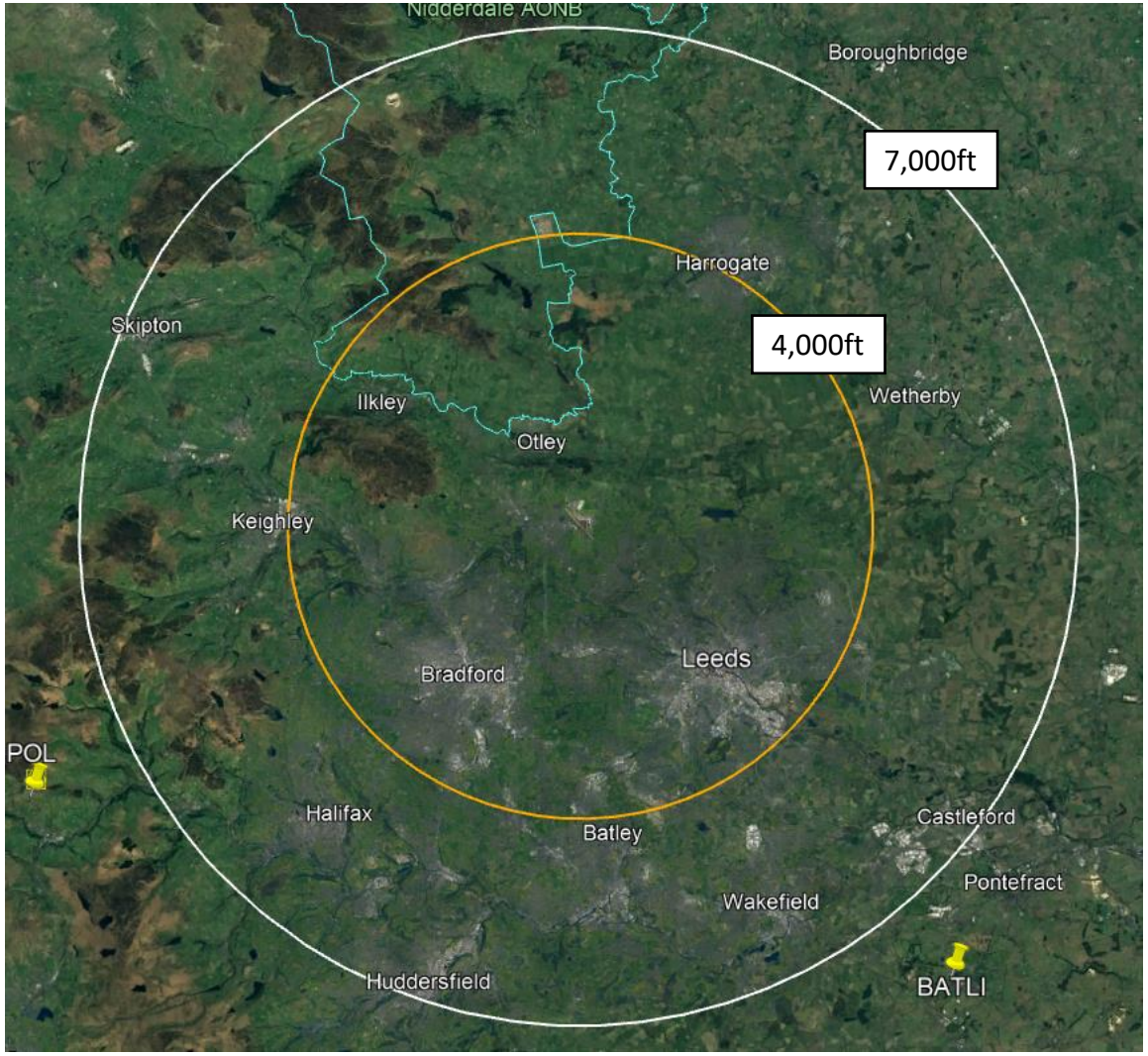


Climb Gradient Range Rings

This graphic shows two ranges from LBA where aircraft can realistically expect to achieve 4,000ft and 7,000ft on an 8% climb gradient.

This gradient has been routinely achieved and exceeded, even on the hottest days of the summer months.

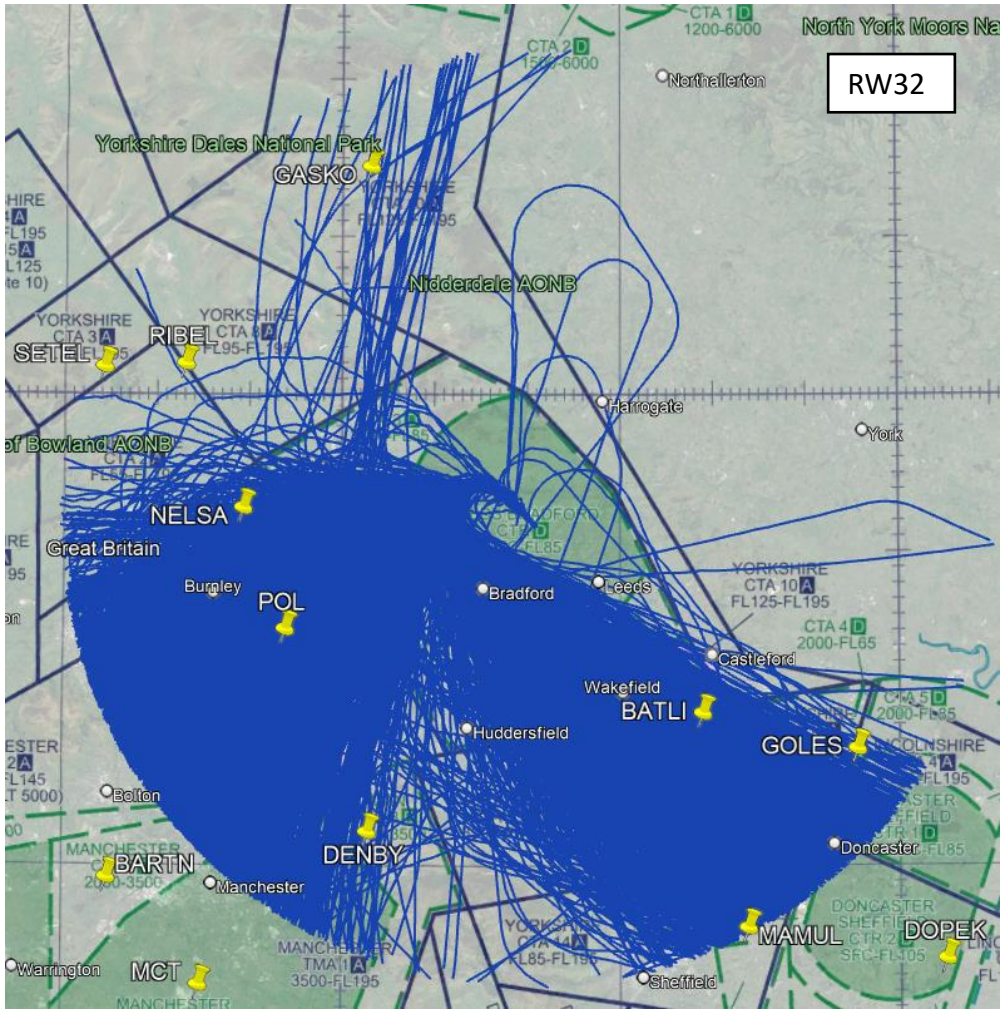
These range rings are presented on the departure option slides for perspective.

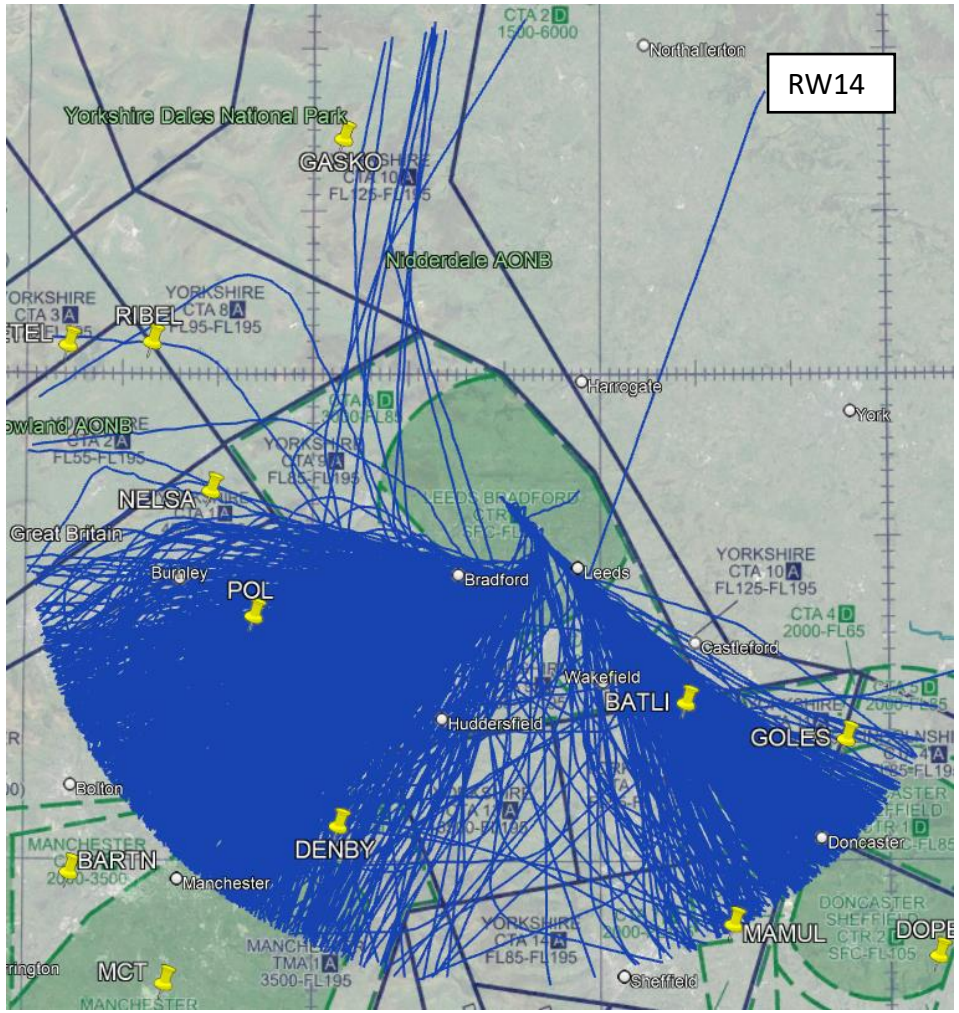


Baseline Swathe Development

LBA RW32 Baseline Departure Swathe Creation:

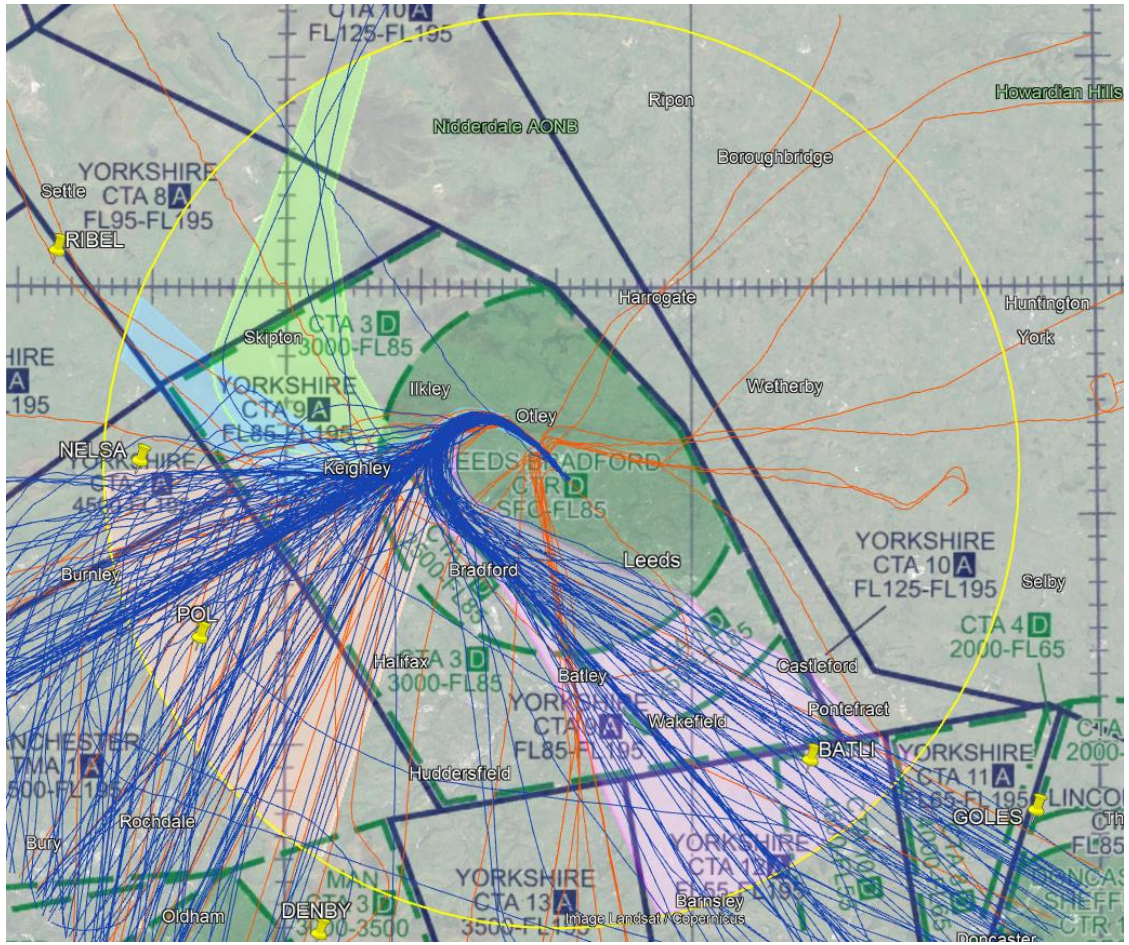
Too cluttered to make any sense over 92 days

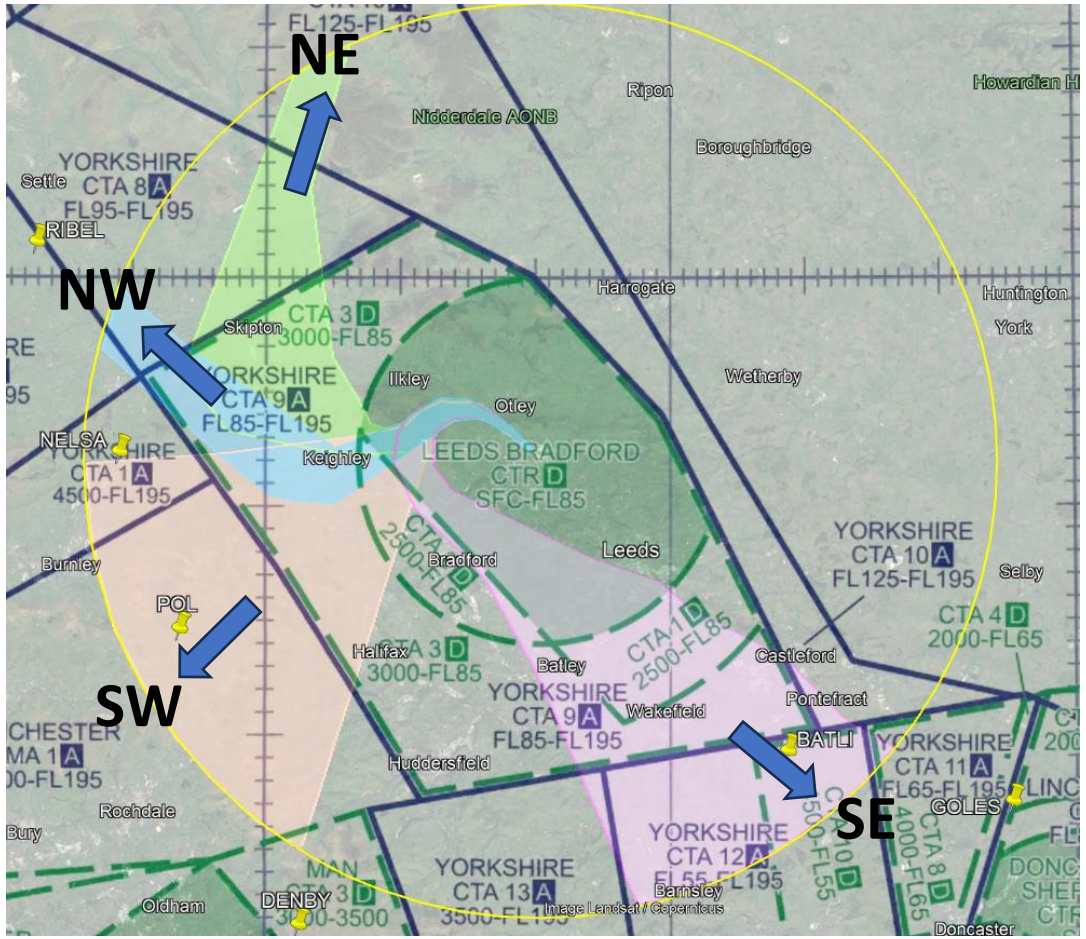




NTMS RW32 & RW14 Departures 92-day Summer 2022

LBA RW32 Baseline Departure Swathe Creation



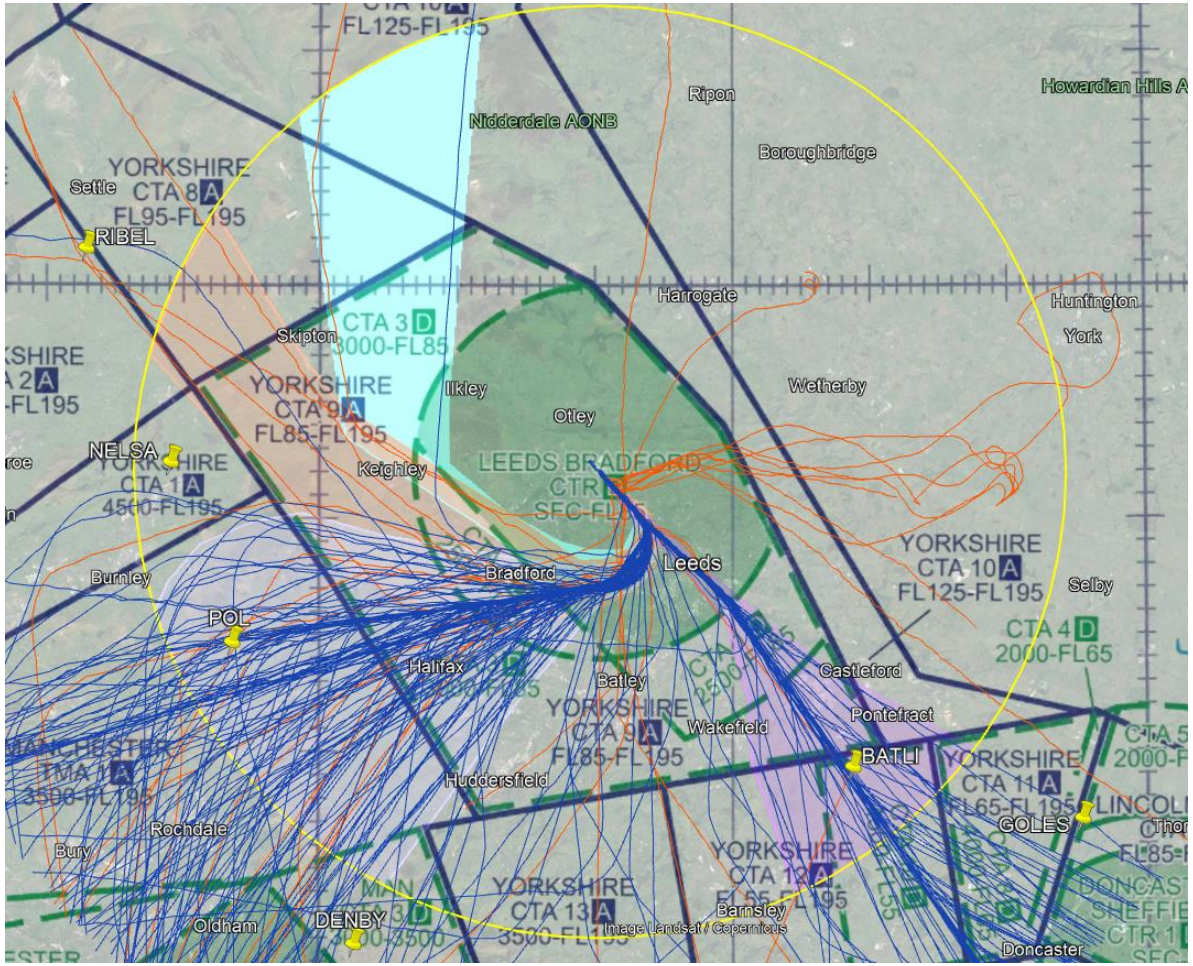


Blue = Commercial Traffic

Orange = Non-Commercial Traffic

NTMS RW32 Departure Data 3rd to 10th July 2022

LBA RW14 Baseline Departure Swathe Creation



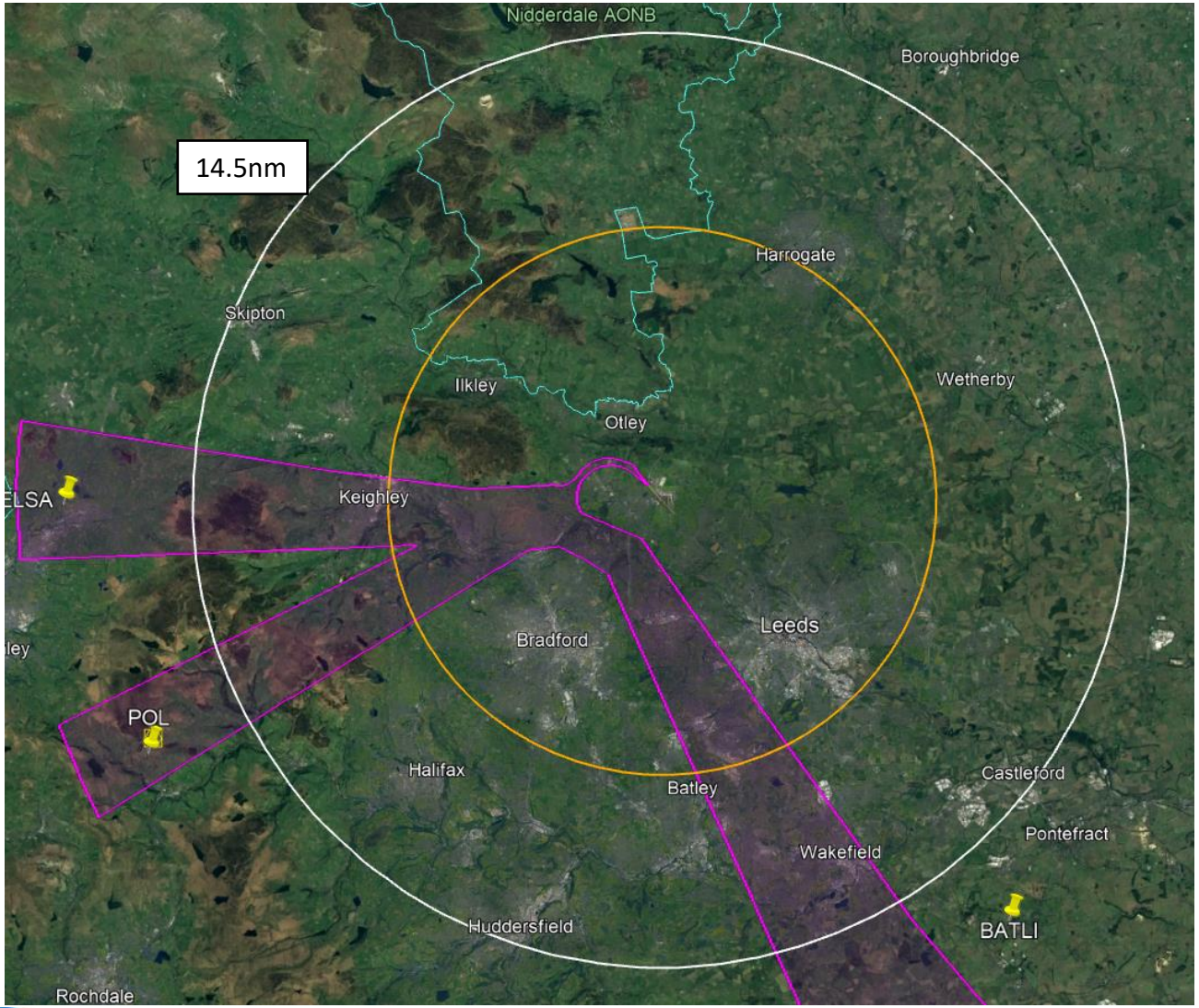
Blue = Commercial Traffic

Orange = Non-Commercial Traffic

NTMS RW14 Departure Data 3rd to 10th July 2022

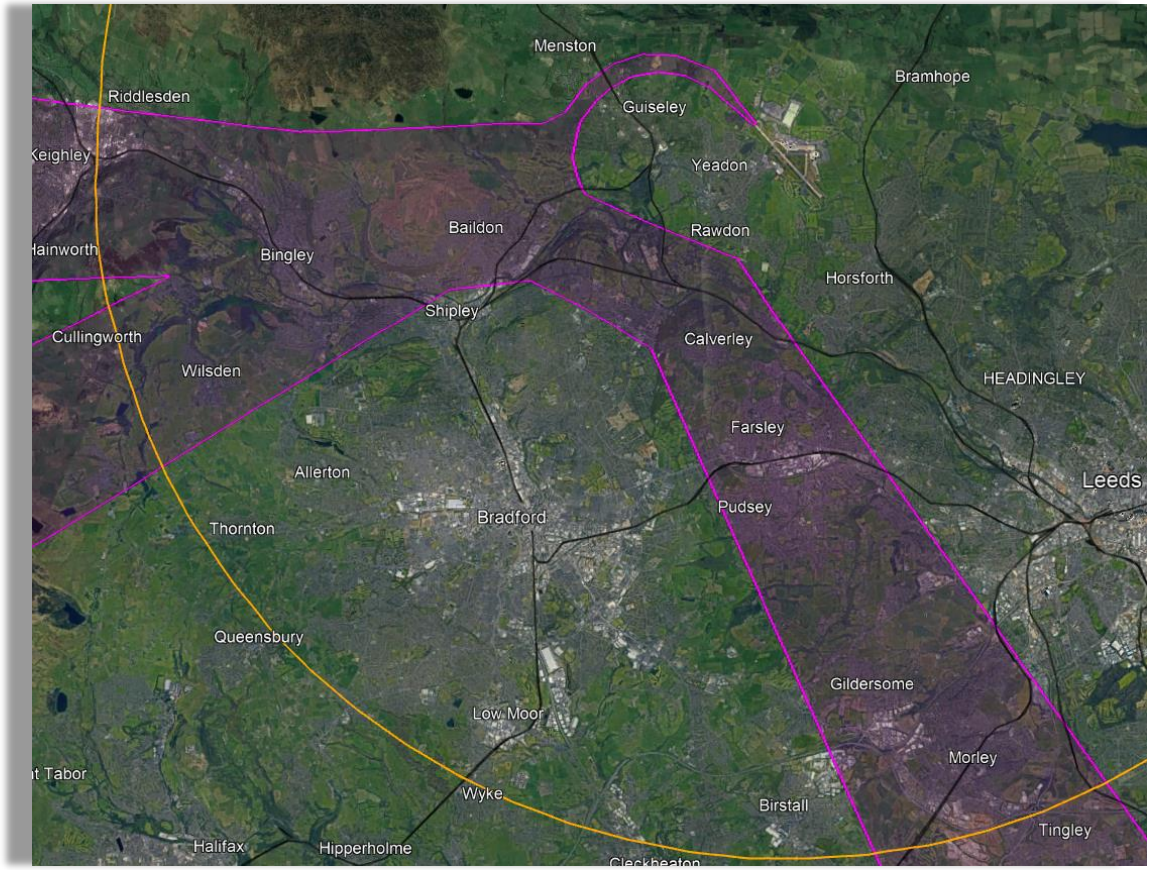
New Departure Options

RW32 – New Option A – Potential Respite Route

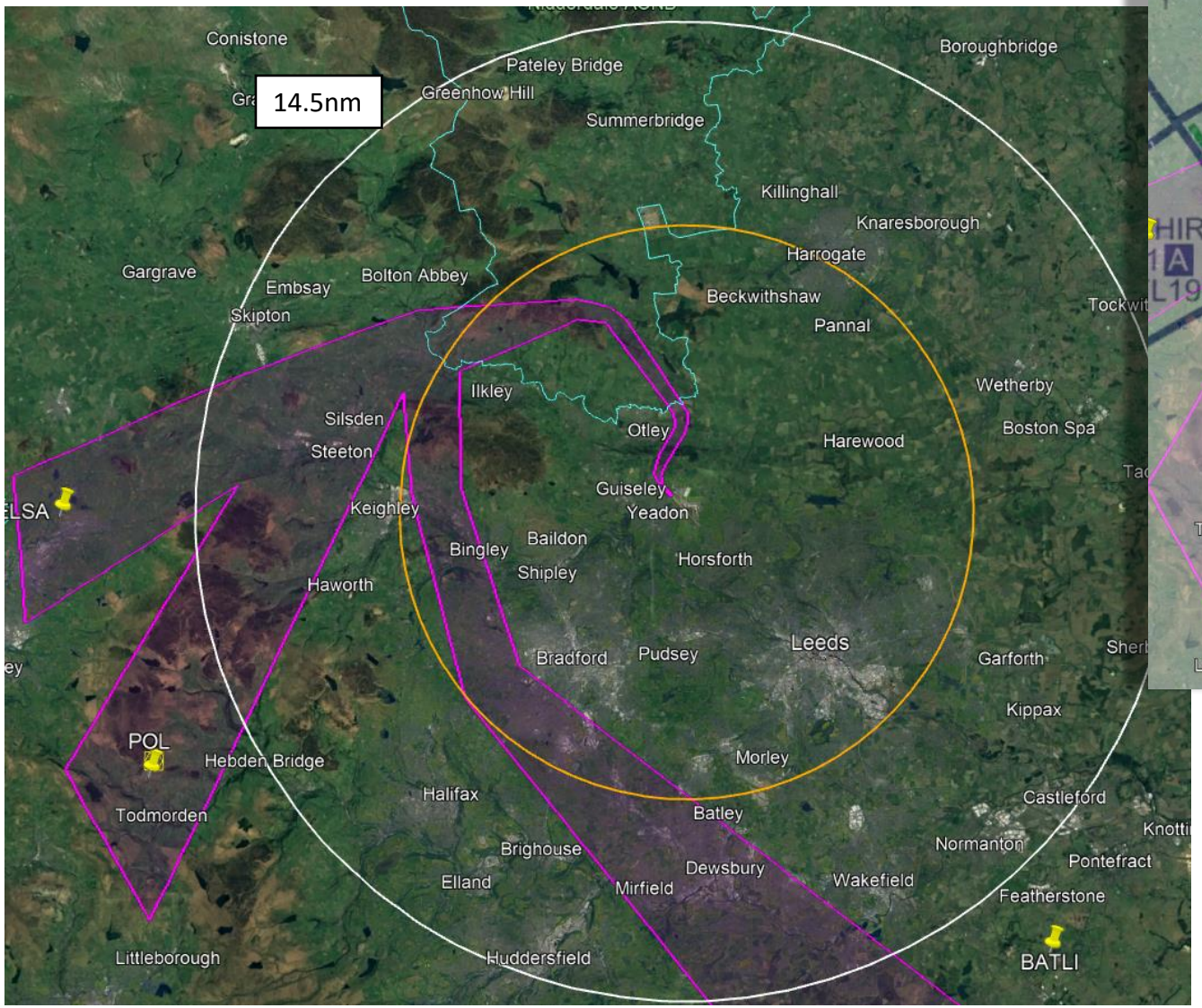


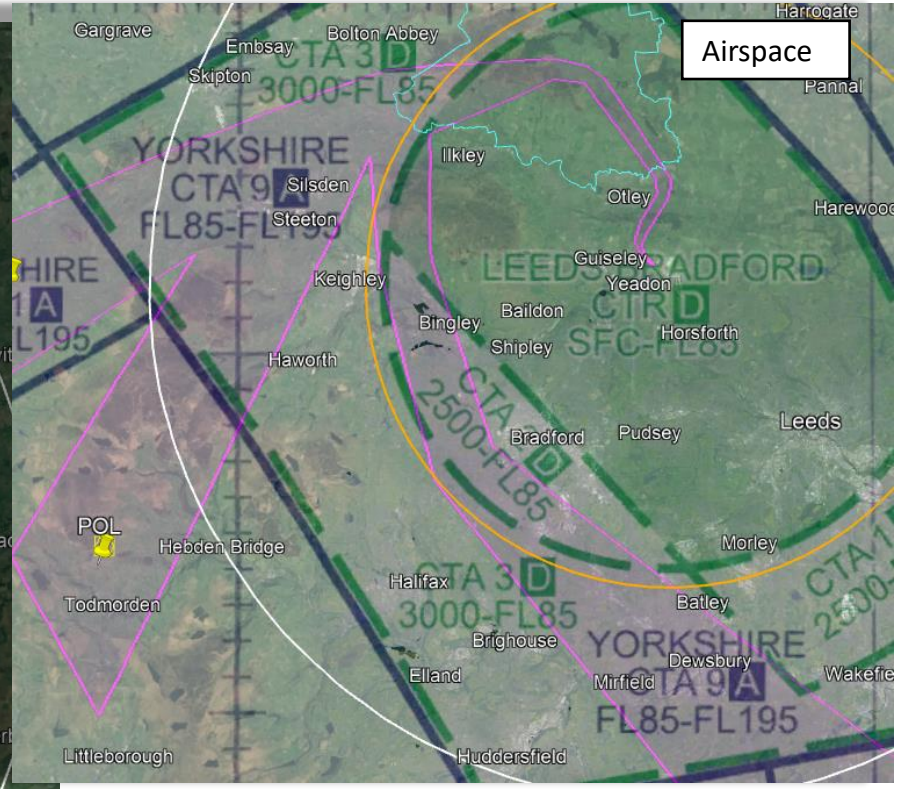
This option uses modern navigational techniques (Radius-to-Fix turns) to navigate over the fields between North Guiseley (Wetherby Whaler Restaurant area) and South Menston. The objective is to reduce the noise nuisance from the existing route over North Menston/South Burley by sharing the load between the two routes. Flight paths could be altered on a daily basis to share the noise between the two areas. As satellite navigational techniques are used, the flight tracks over the area will be accurate.

RW32 – New Option A – Zoomed in views



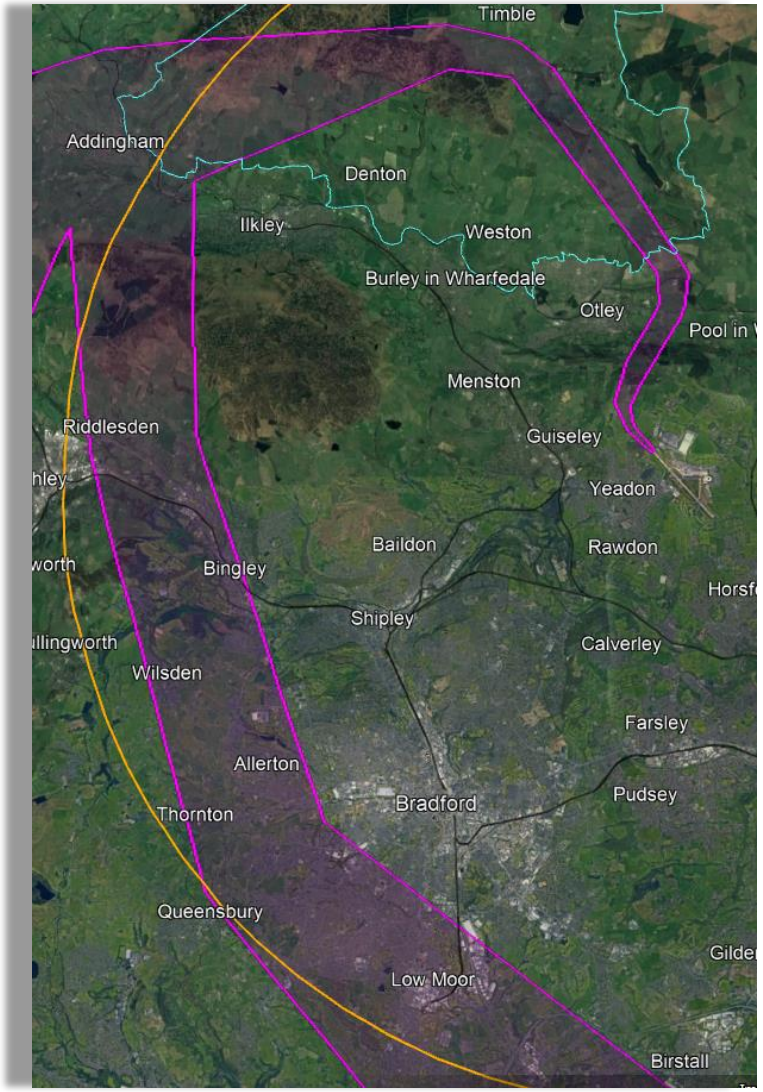
RW32 – New Option B – Potential Night Route

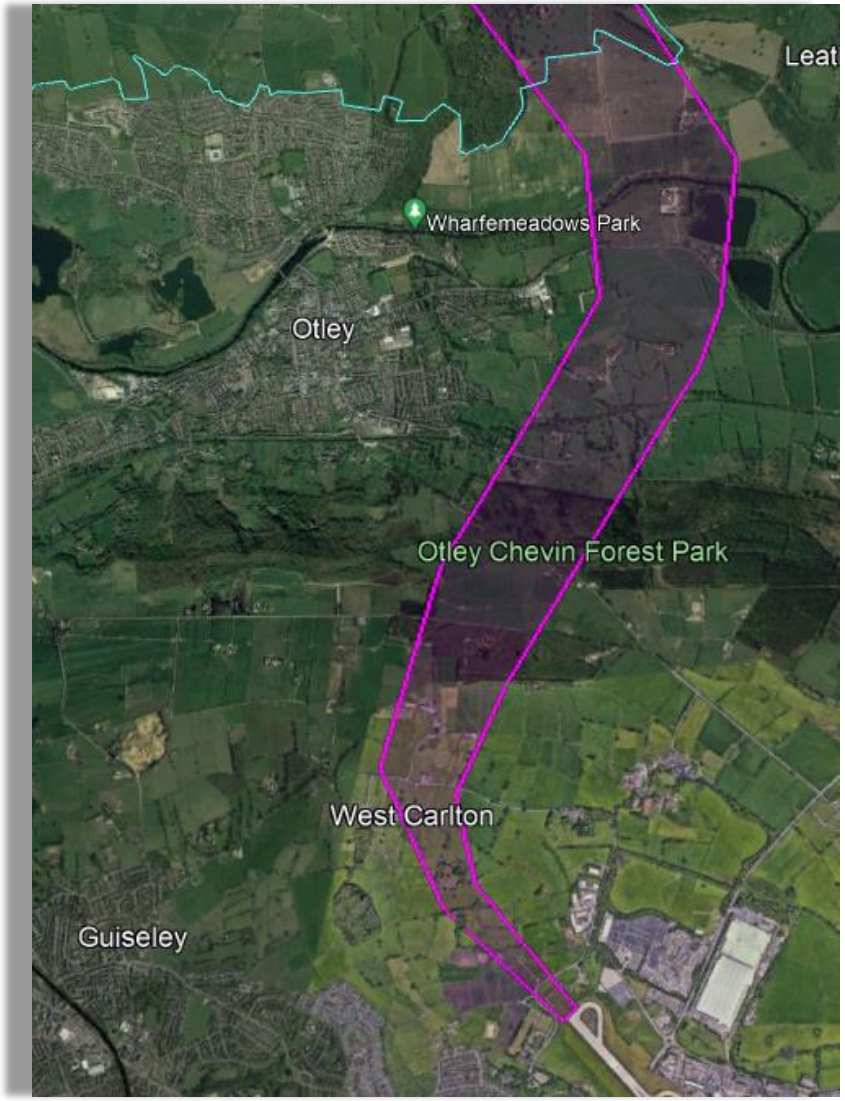




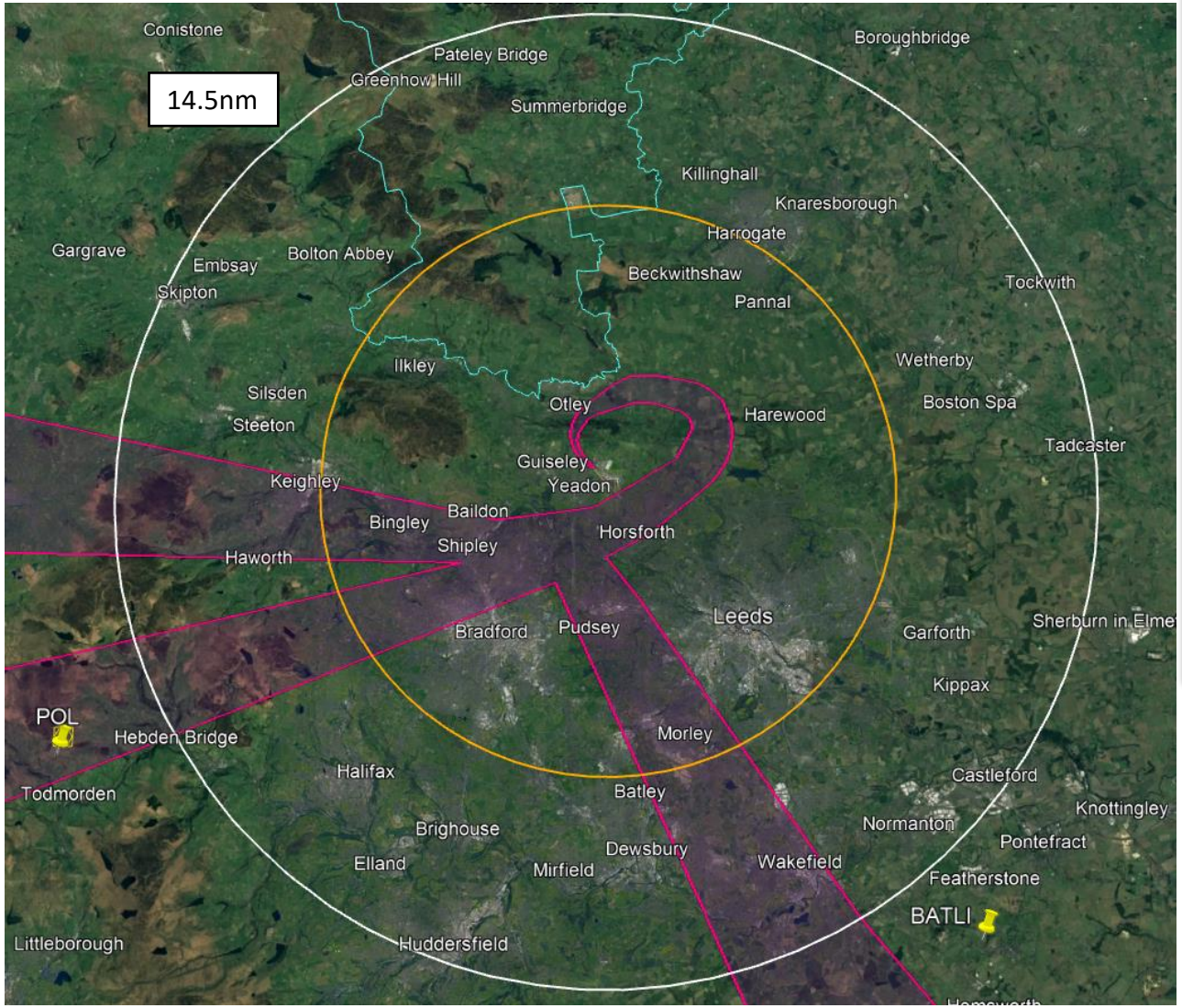
This option involves an early right turn over the Chevin followed by a left turn intended to route around the back of Otley and in so doing, reduce the populated areas overflown. The initial climb-out is then split in the three most in demand departure directions. The extra track distance makes less likely for regular use but instead as a night-time noise abatement route.

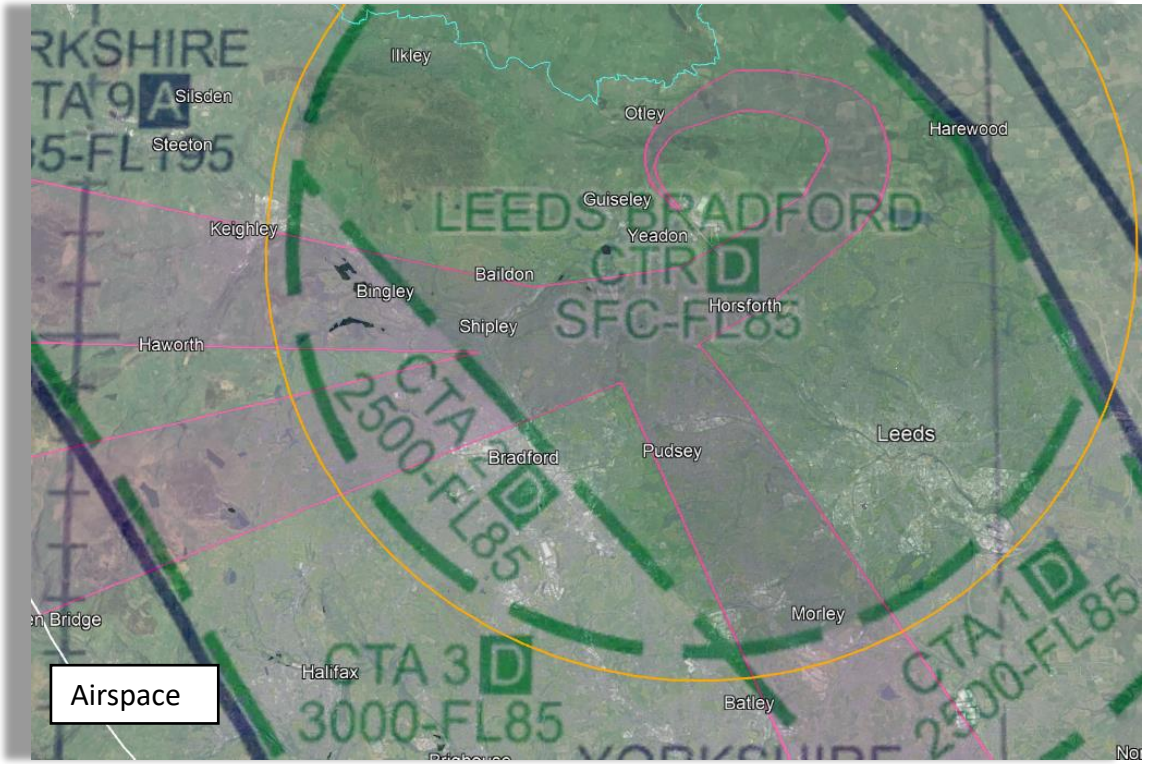
RW32 – New Option B – Zoomed in views





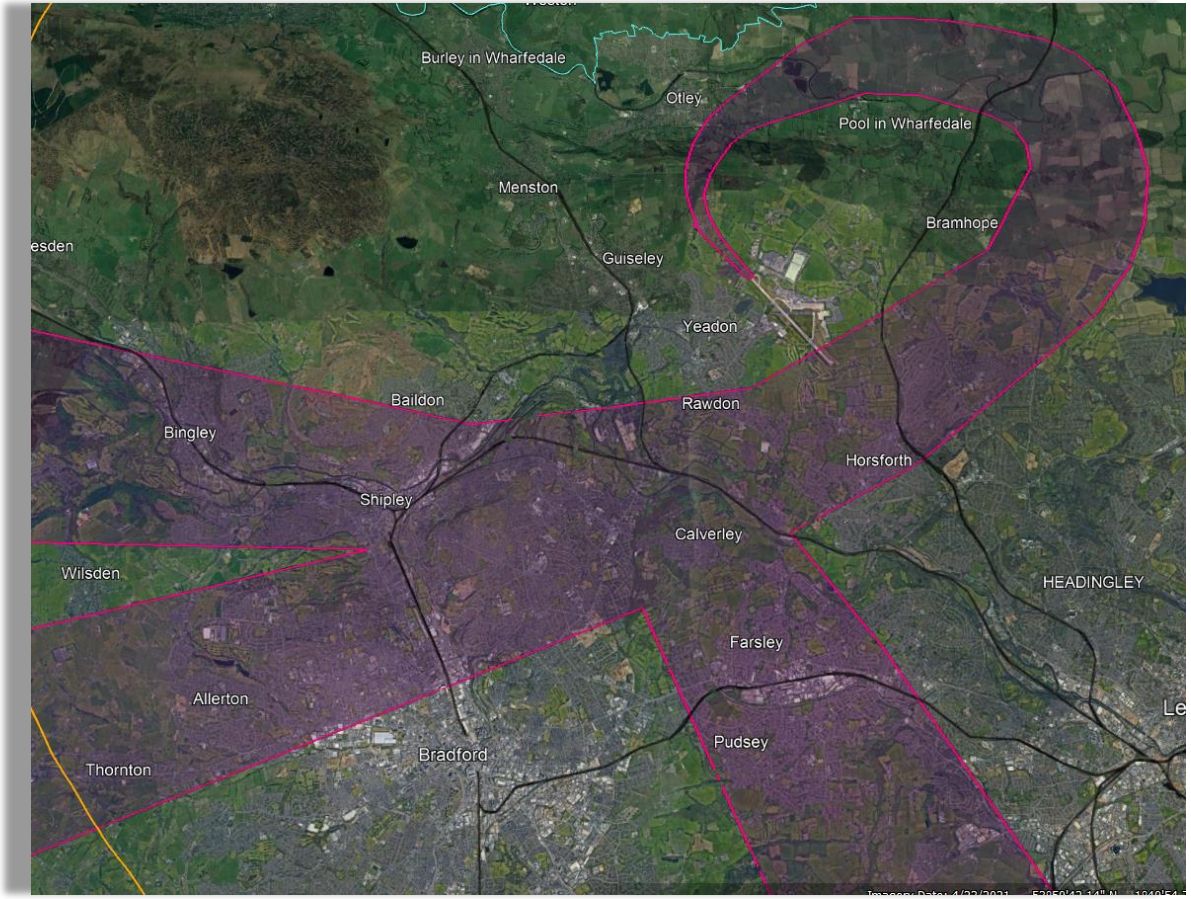
RW32 – New Option C - Potential Respite or Night Route

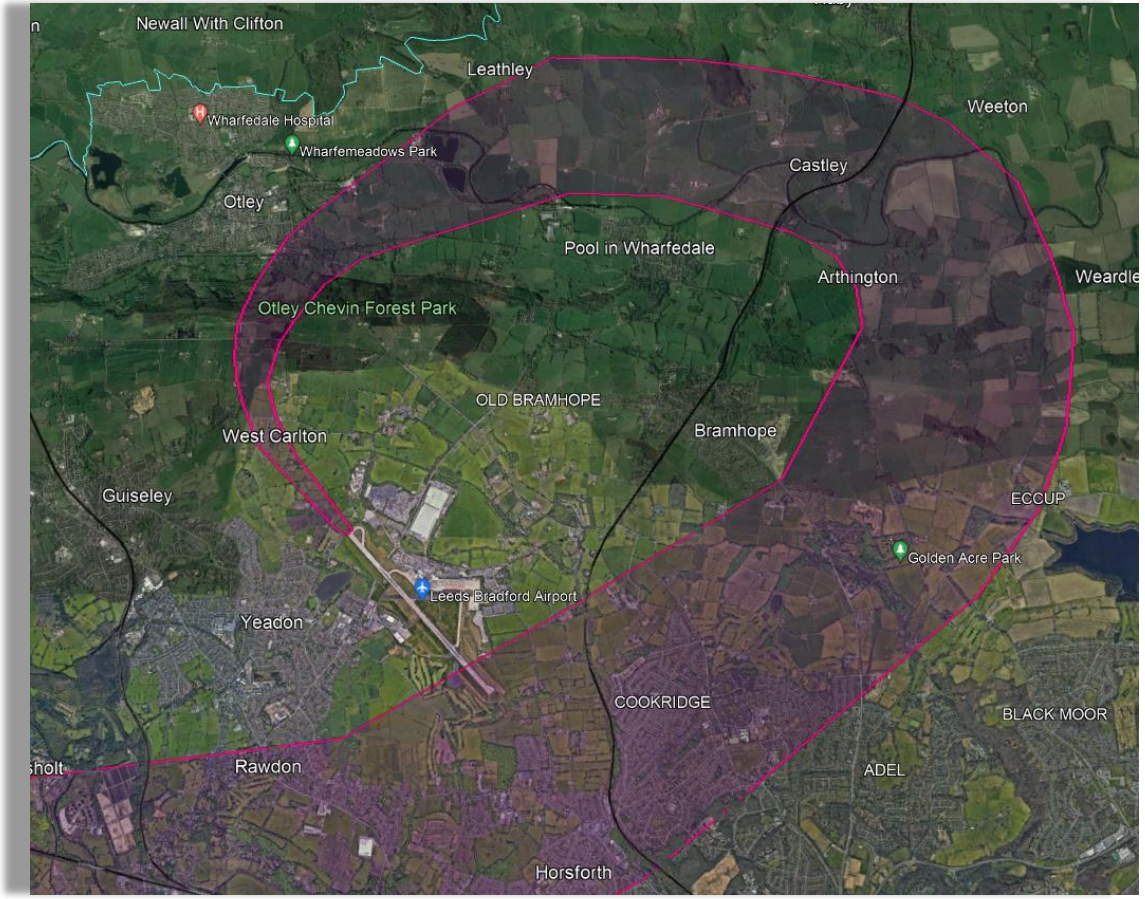




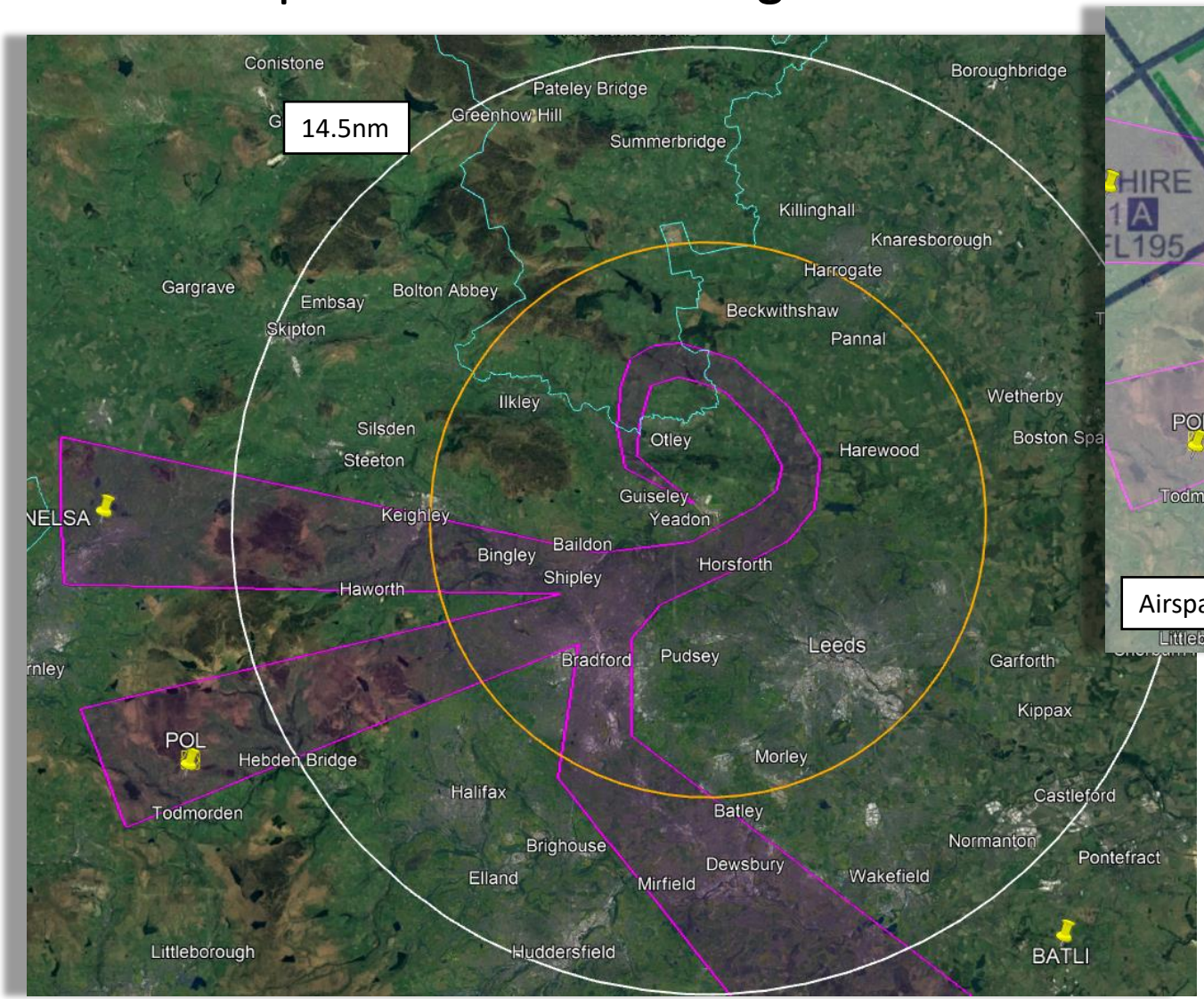
This option uses advanced navigational techniques to fly an early right turn after departure to avoid Otley. It is intended as a respite option to share the noise loading with the traditional route over Menston and Burley In Wharfedale. The aircraft would climb out looping mainly over countryside to then cross Cookridge at realistically 5000 feet or above.

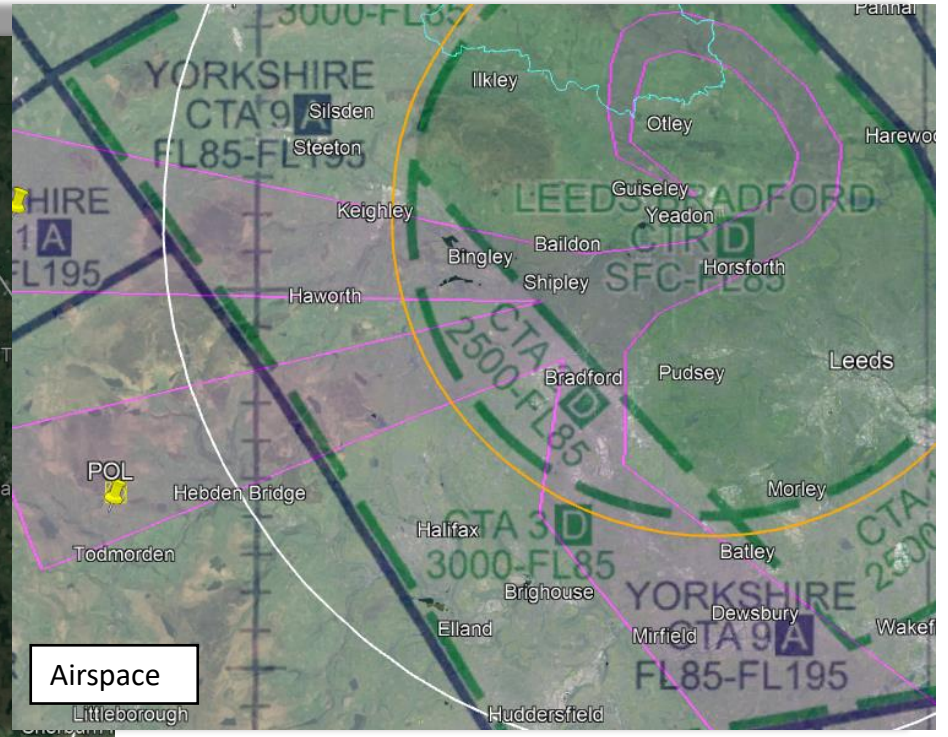
RW32 – New Option C – Zoomed in views





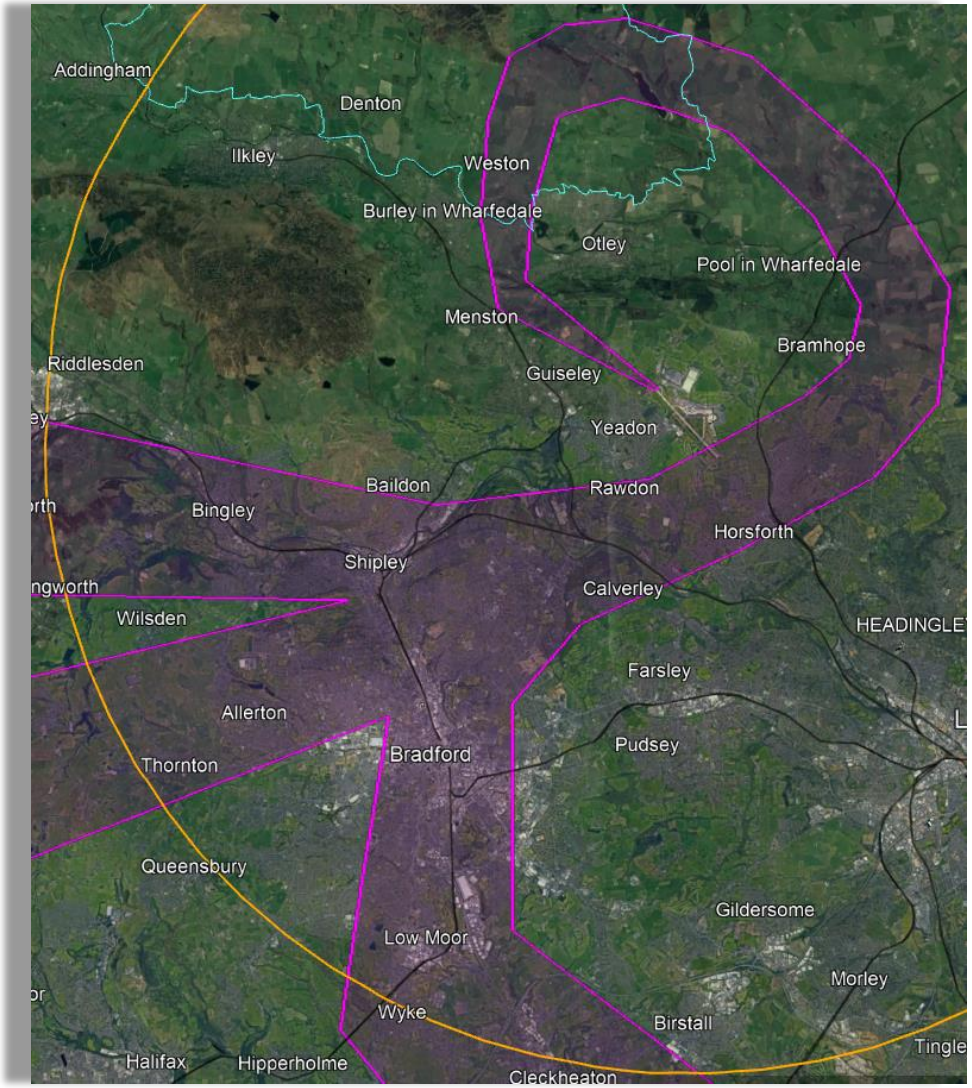
RW32 – New Option D – Potential Night Route

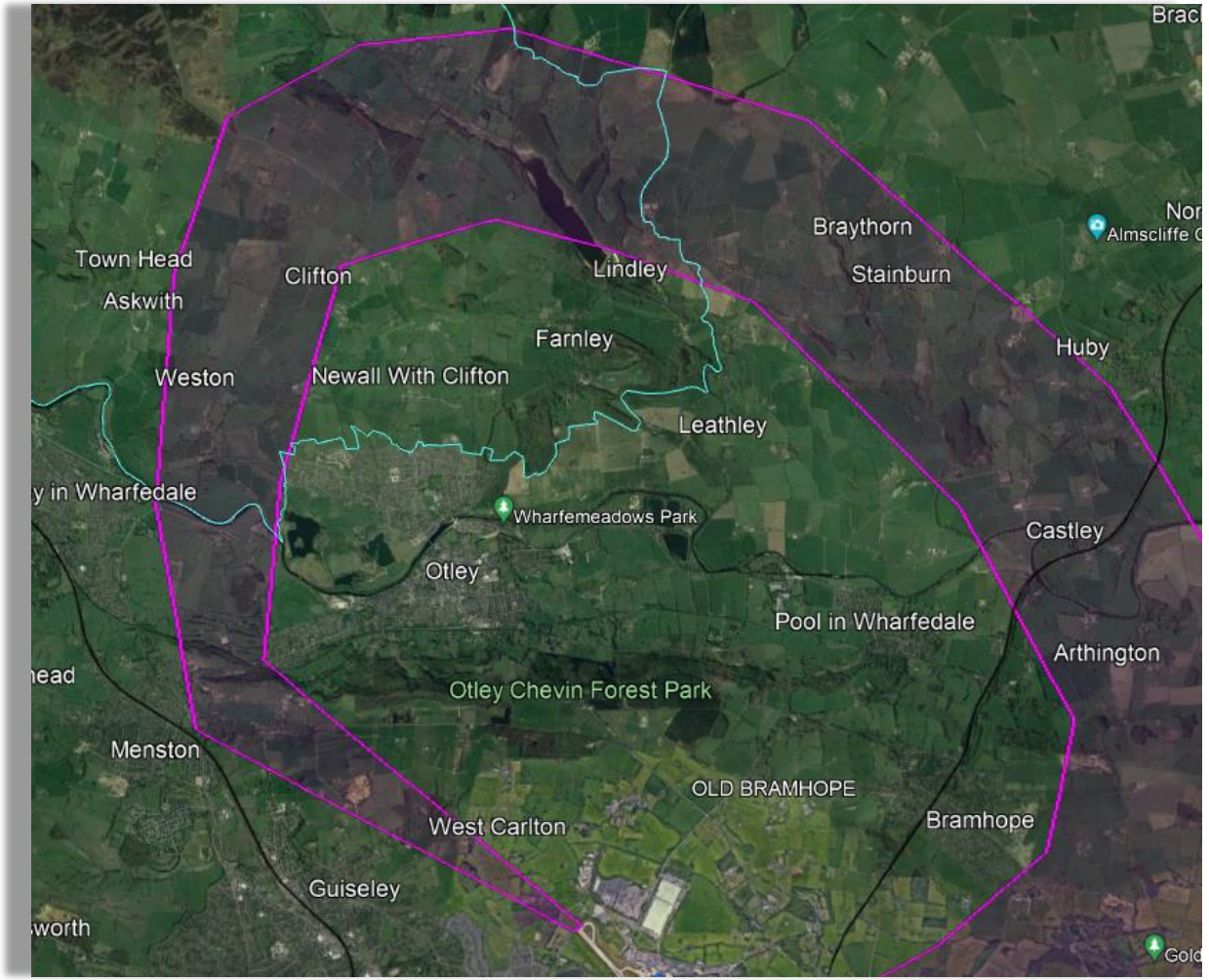




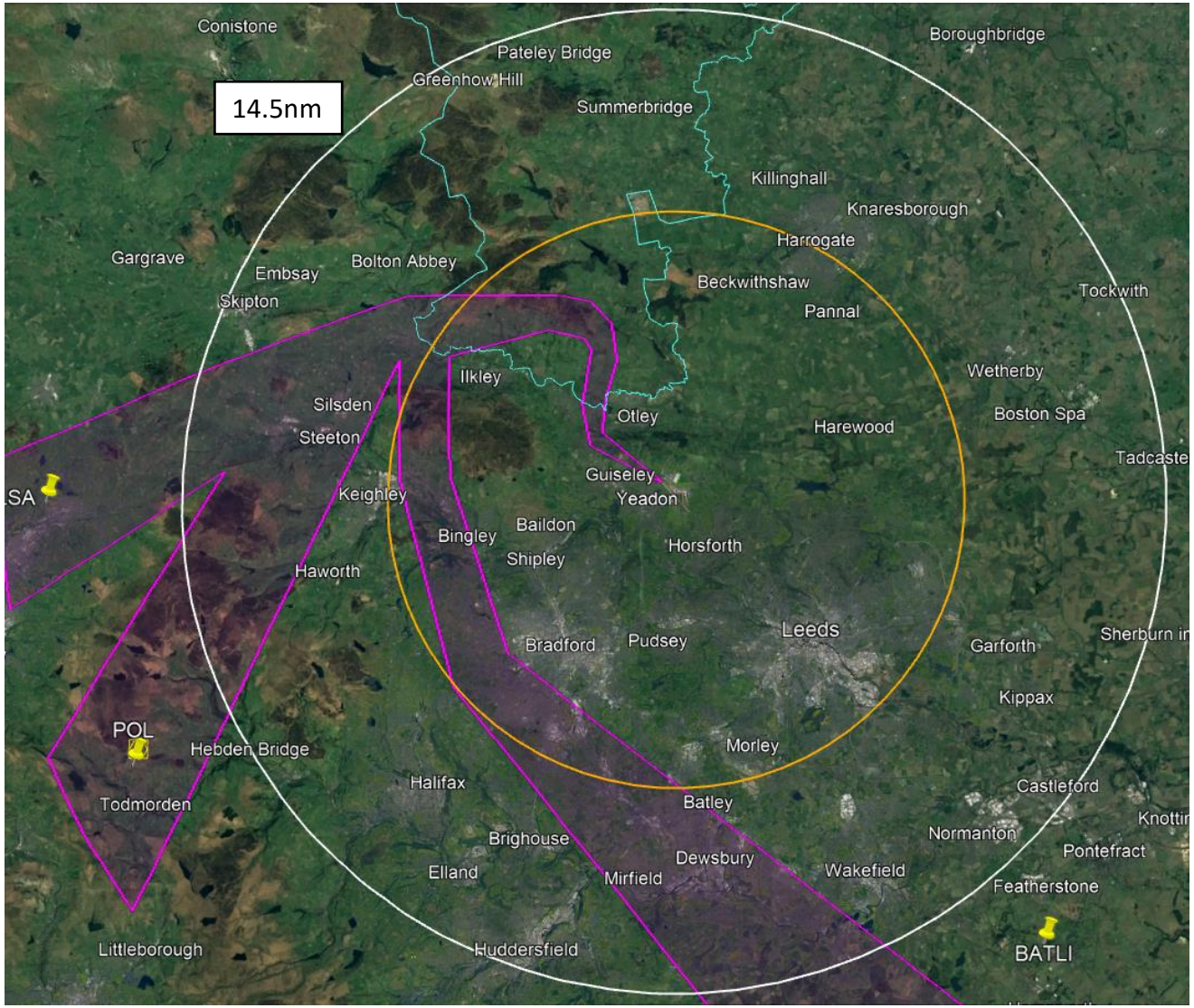
This route generally follows the initial track of the existing flightpath for 2 miles to deviate West of Otley. Rather than turning west over Menston, the flightpath makes a wide right turn to the north of Otley to gain height over open countryside prior to turning back westbound. The route is designed to minimise noise to local communities during the night. Due to the excessive miles flown and excess CO_2 produced, this route is not considered viable for continuous operations and is more suited for use at night for purposes of noise nuisance reduction.

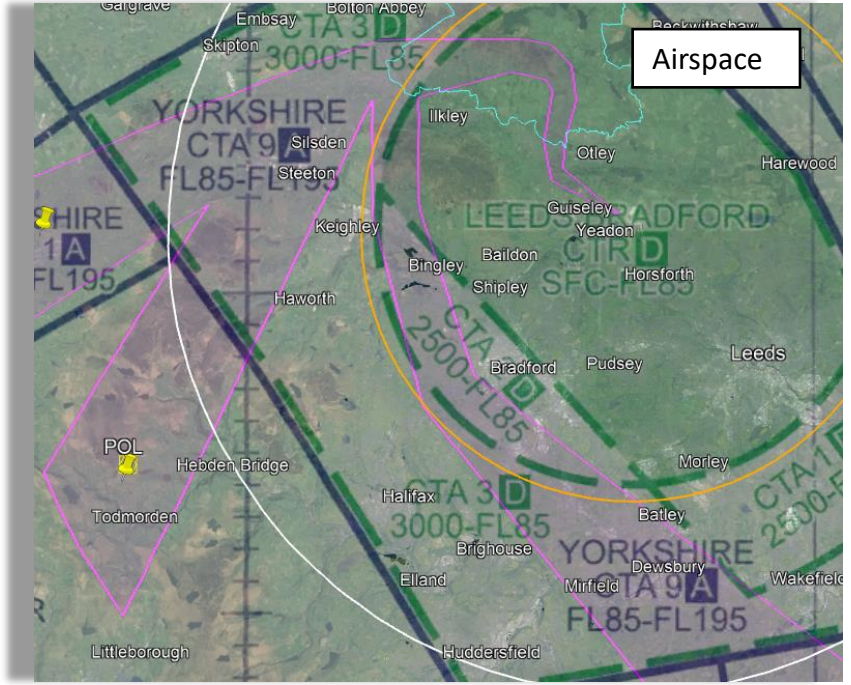
RW32 – New Option D – Zoomed in views





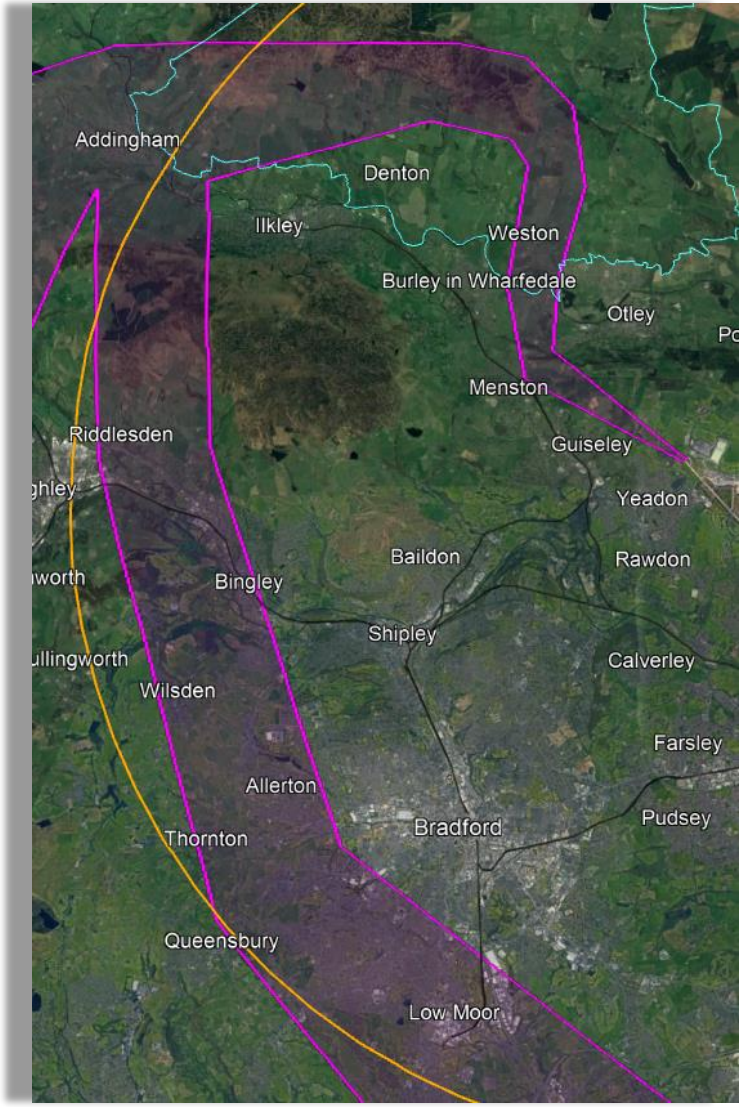
RW32 – New Option E – Potential Night Route

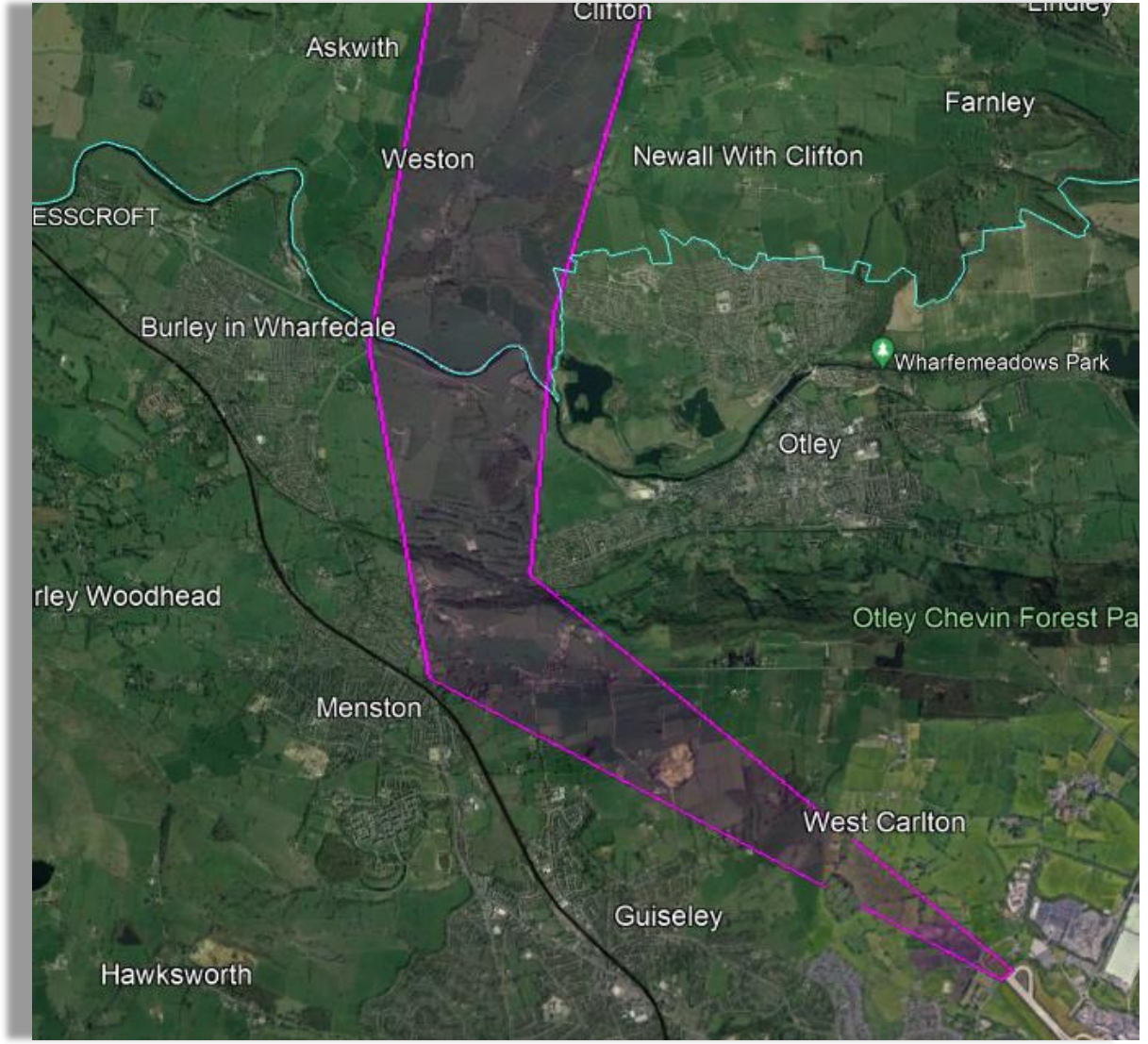




This route generally follows the initial track of the existing flightpath for 2 miles to deviate West of Otley. After this point, the route flies north and then westbound to avoid all major settlements whilst gaining height over open countryside. The route is designed to minimise noise to local communities during the night. Due to the excessive number of additional miles flown and excess CO_2 produced, this route is not considered viable for continuous operations and is more suited for use at night for purposes of noise nuisance reduction.

RW32 – New Option E – Zoomed in views

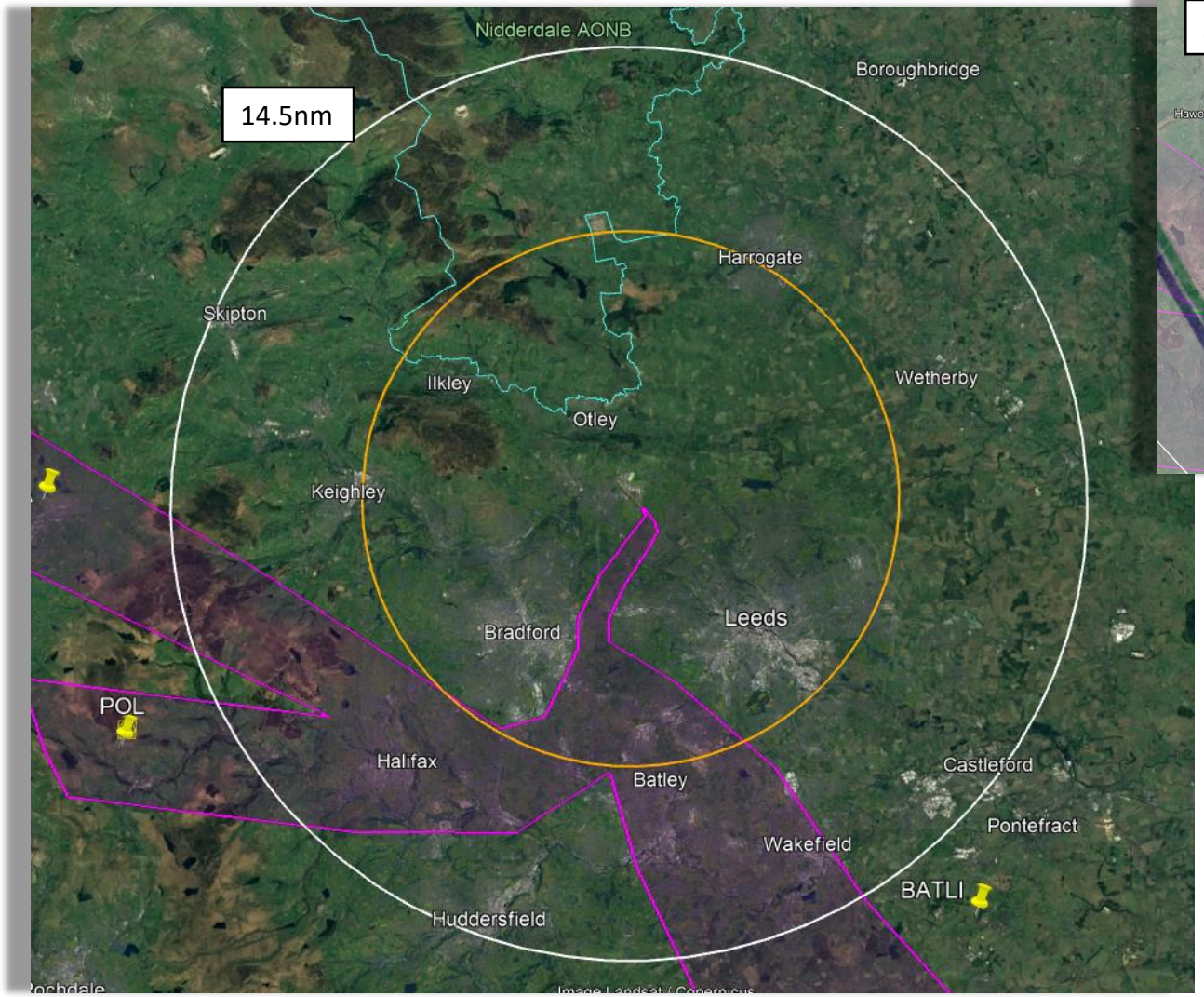


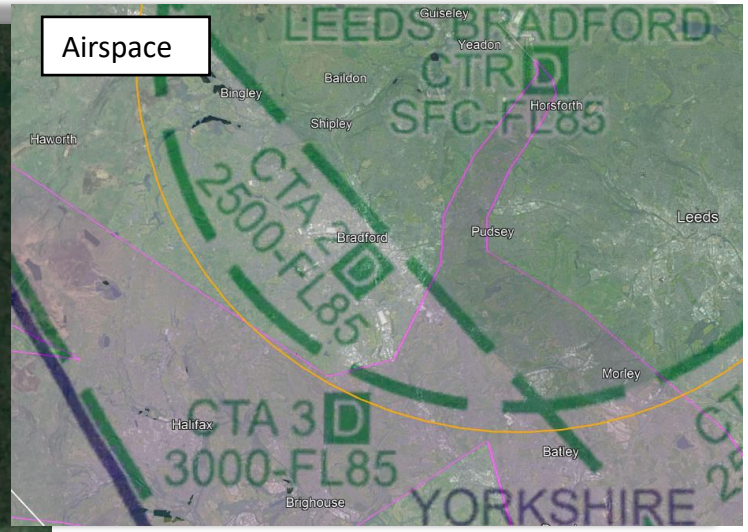


RW32 – New Options A-E - DPE

Option	DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Airspace Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN
A		Potential to affect less people at lower level but newly affected North Guisley and Baildon	Baildon Moor				Early turn will need some justification				May require fleet upgrades
B			AONB and Chevin	More track miles but facilitates continuous climb			Early turn will need some justification		Done to avoid communities		
C		Affects less people at lower level but newly affected east end Otley	Chevin	Continuous Climb offsets additional miles	Uncertain as to airspace containment in right turn		Early turn will need some justification		Continuous Climb offsets additional miles		May require fleet upgrades
D			AONB	More track miles but facilitates continuous climb	Uncertain as to airspace containment in right turn				Done to avoid communities		
E			AONB	More track miles but facilitates continuous climb					Done to avoid communities		

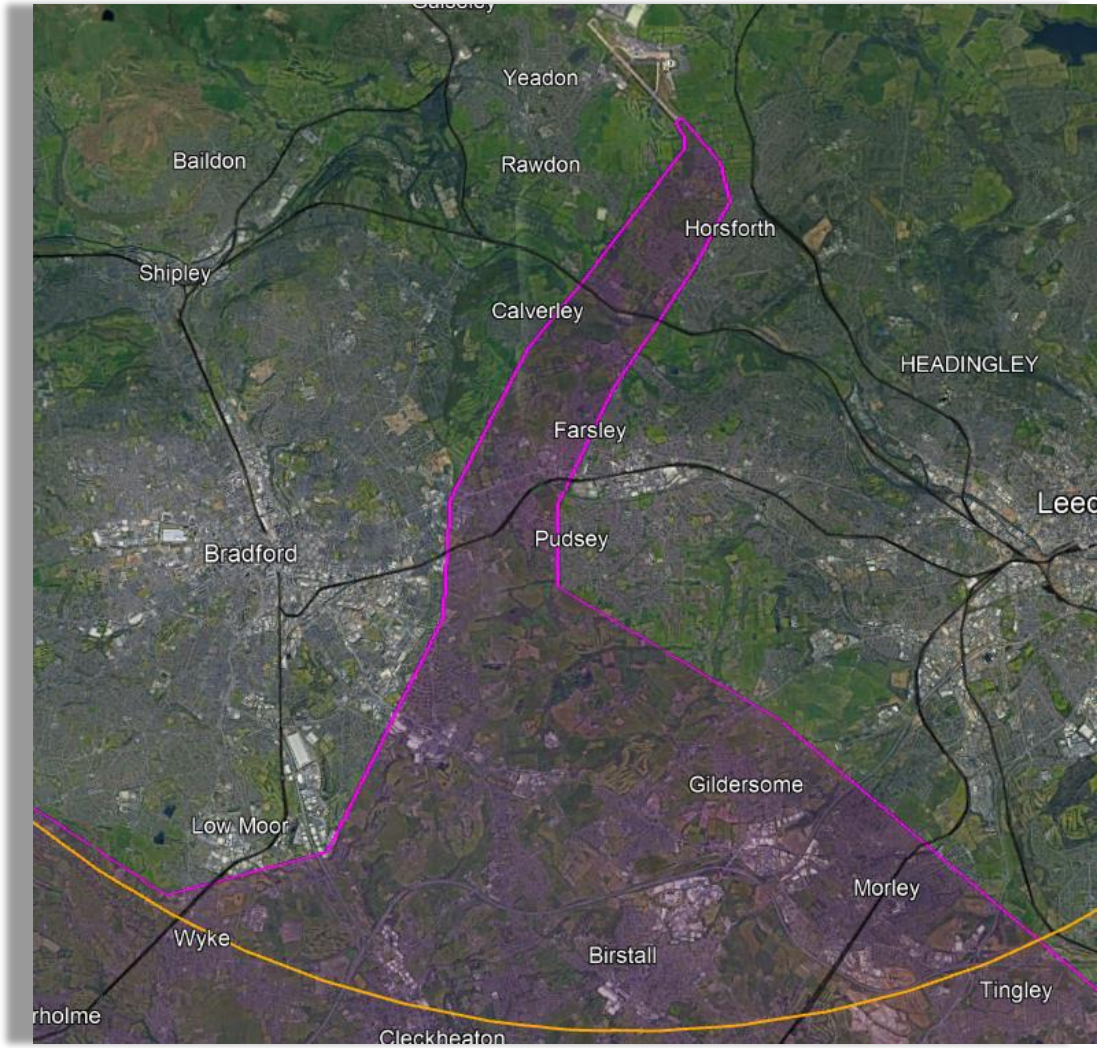
RW14 – New Option A - Potential Respite or Permanent Route

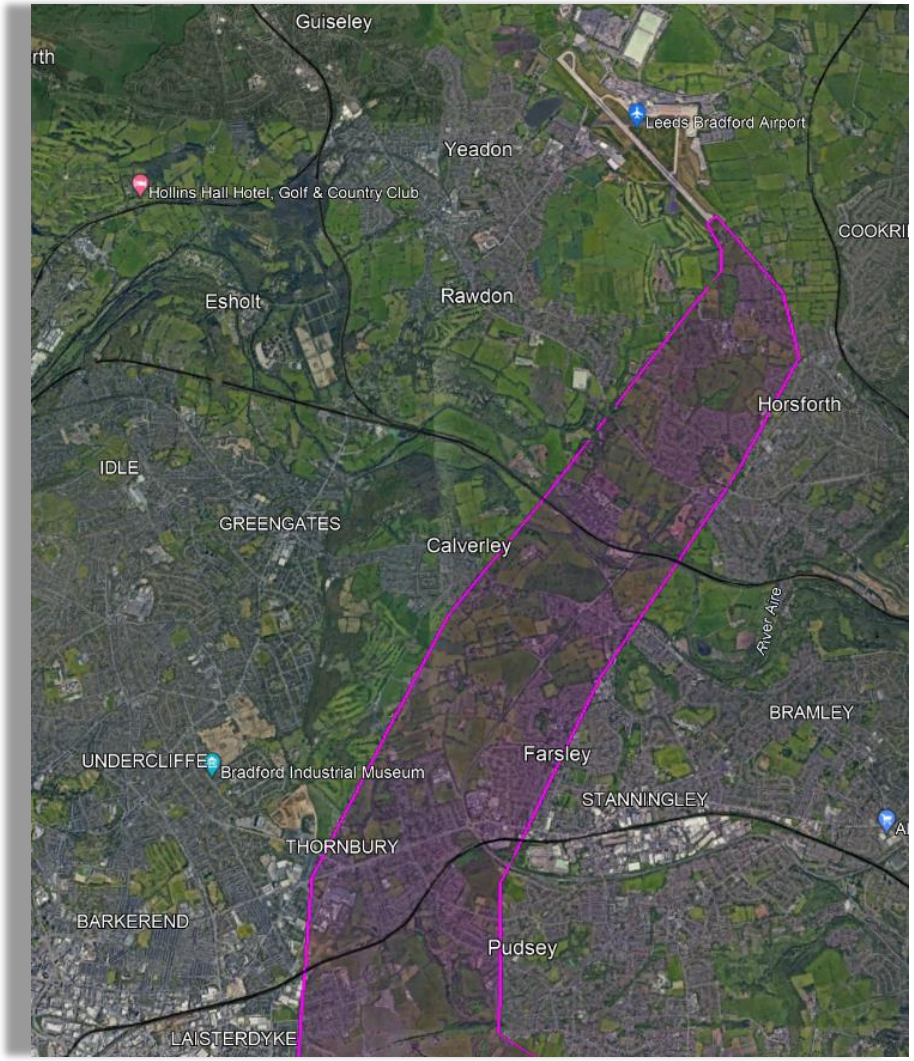




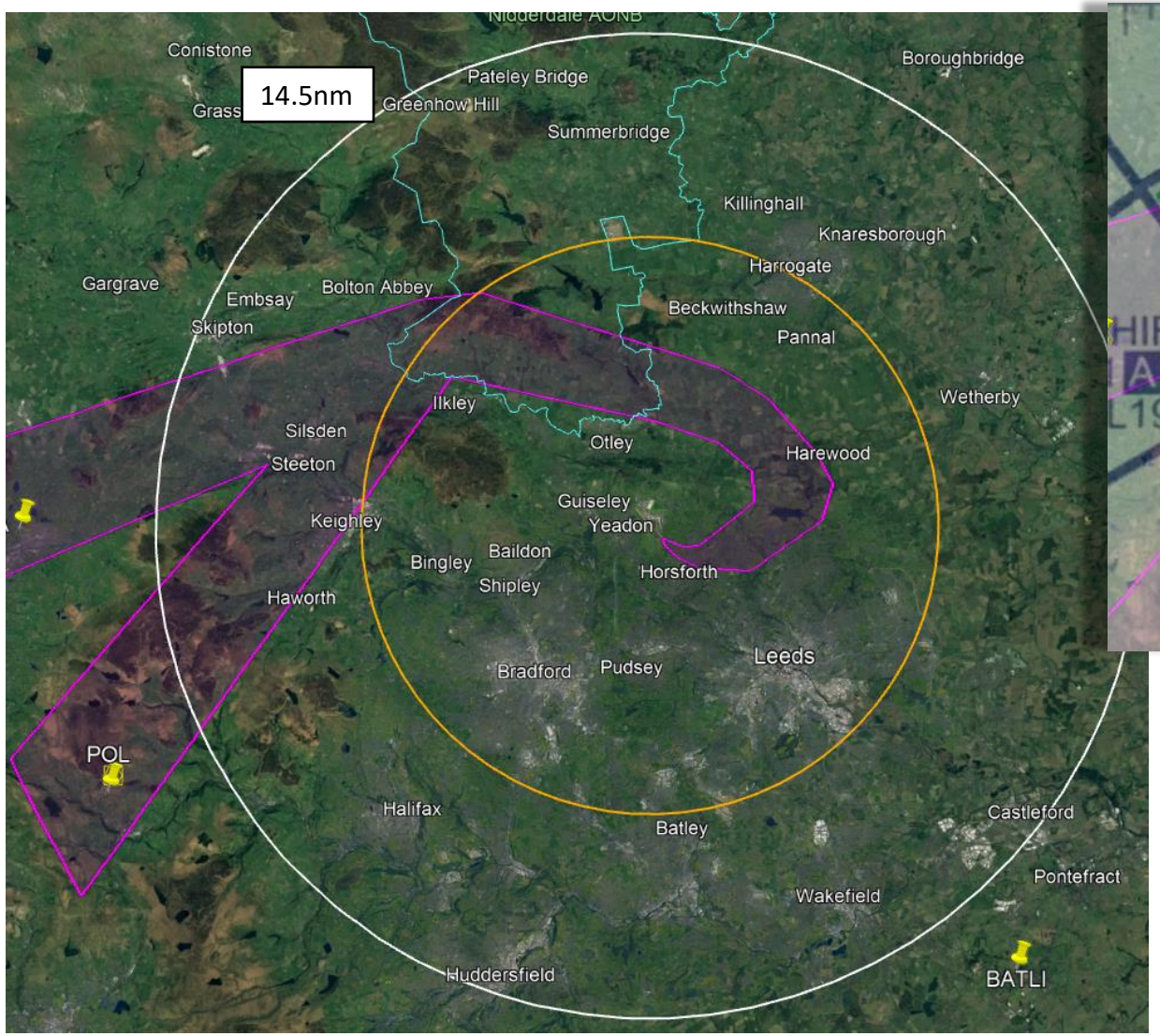
This option turns right on passing 500 feet to avoid overflying the suburbs North-West of Leeds. The route seeks to weave through an area of countryside dividing Leeds and Bradford prior to turning on a direct track. It intends to offer some respite to the North-West Leeds area whilst accepting that new areas such as Eastern Calverley and Farsley may be overflown. This route also offers an element of dispersion; as aircraft climbs rates differ, the point at which the turn is made (500 feet) will vary on each departure, resulting in varied tracks. Currently, due to its proximity to the Airport, the area of North-Western Leeds is regularly directly overflown regardless of the runway in use; departures over this area when on RW14 and arrivals when on RW32. This option may provide an opportunity to remove some noise nuisance from this area when RW14 is in use.

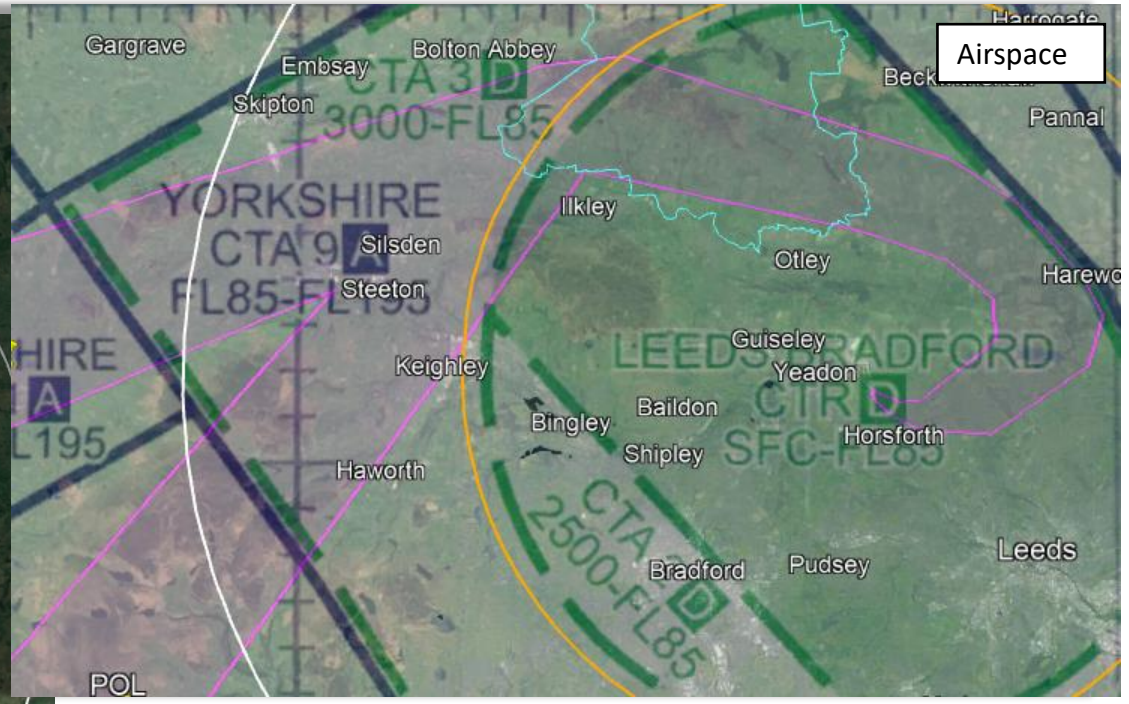
RW14 – New Option A – Zoomed in views





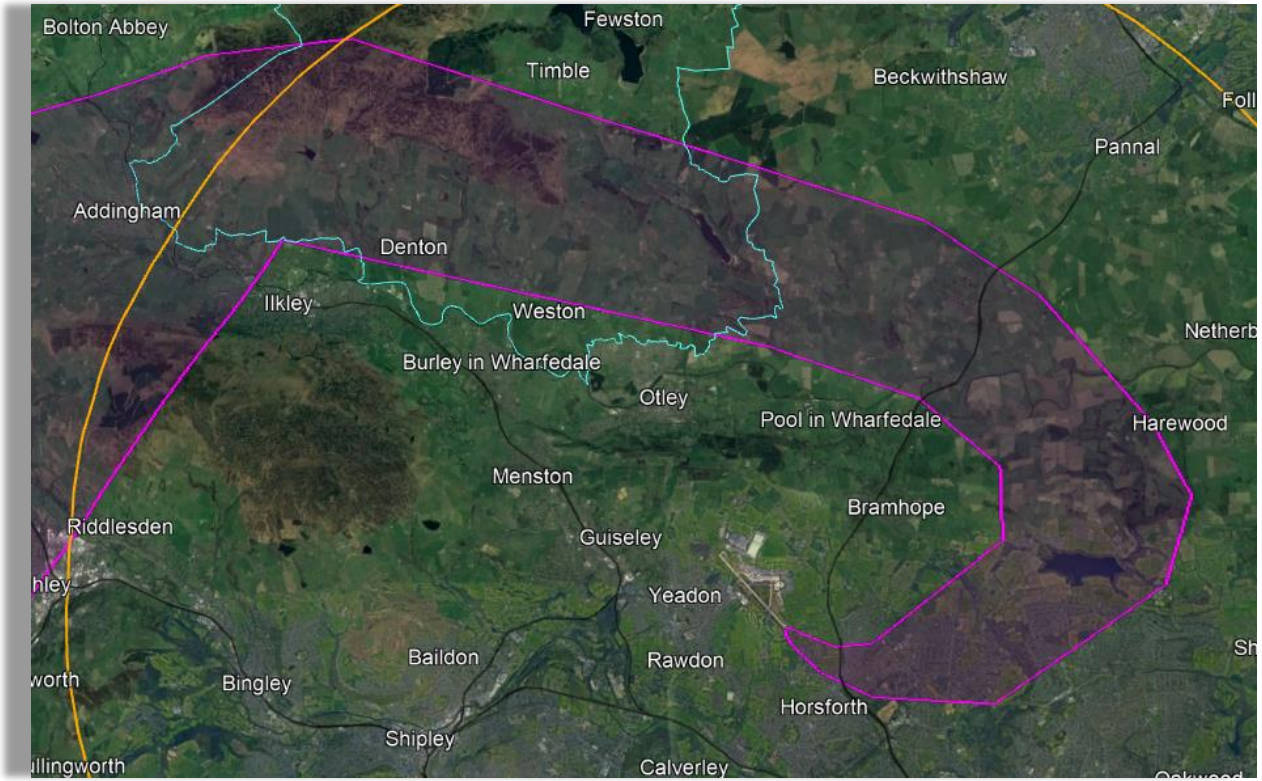
RW14 – New Option B – Potential Night Route

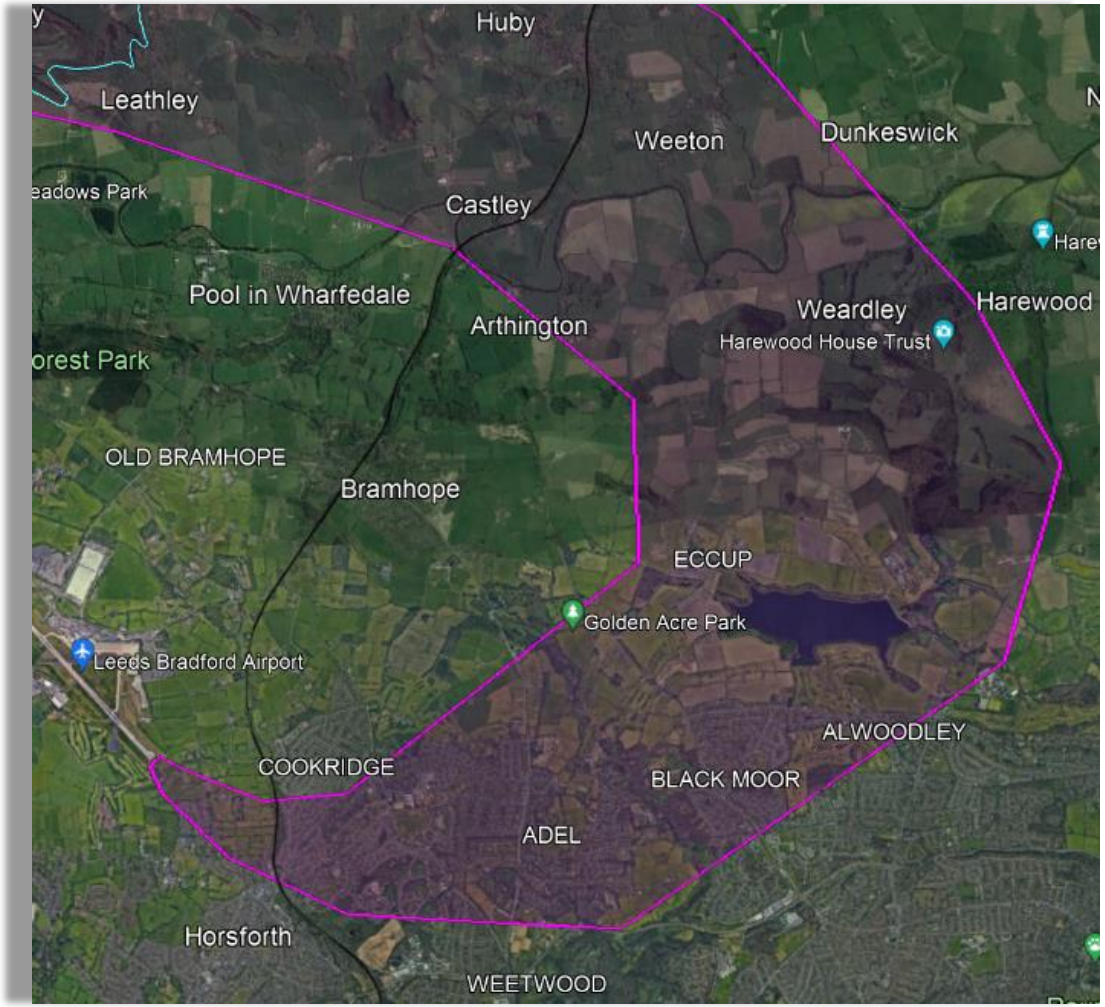




This option utilises an early left turn off RW14 to offer respite to both the suburbs of North-Eastern Leeds and the towns of Pudsey and Bramley. It does however overfly new communities in North-East Leeds such as Weetwood and Adel before continuing to climb out over the countryside. Due to the length of route flown, this route would only be viable as a night noise mitigation route in a combined respite rotation with other noise routes. It would not be viable for departures routing out towards LAMIX (to the South-East).

RW14 – New Option B – Zoomed in views



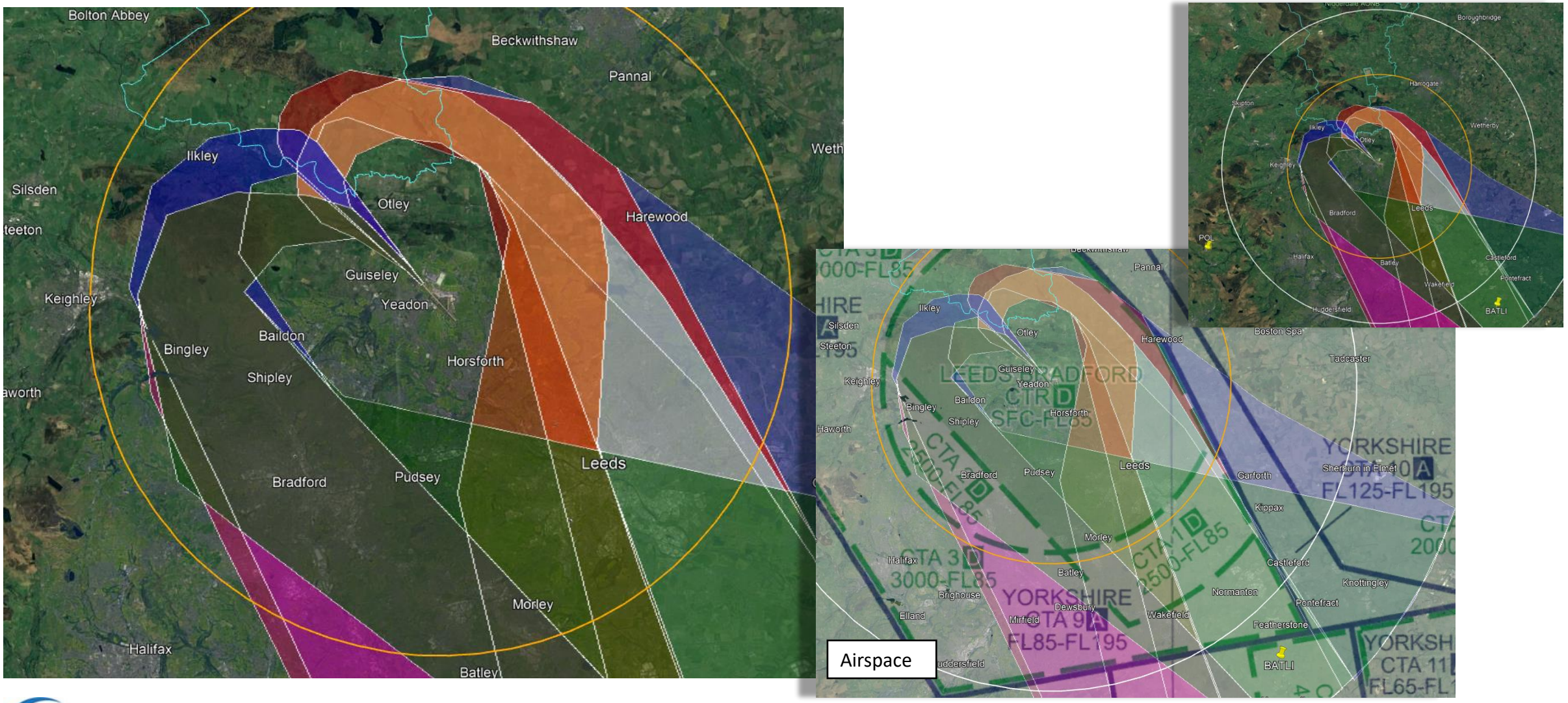


RW14 – New Options A & B - DPE

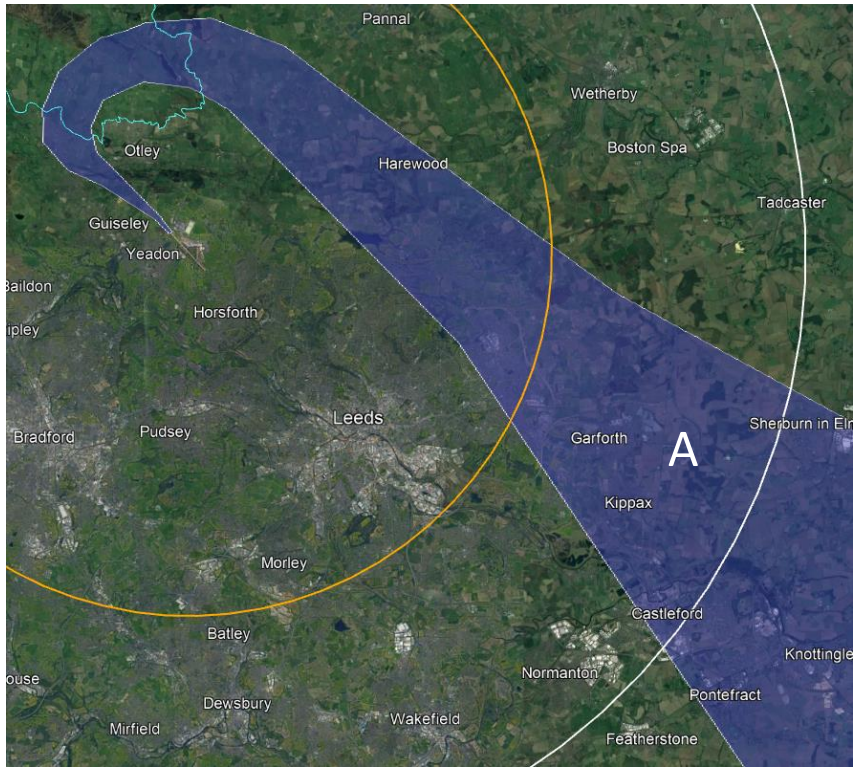
Option	DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Airspace Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN
A		New communities impacted including Calverley and Farsley									
B	Potential conflict with inbounds	New communities impacted including Adel and Blackmoor	Eccup Reservoir and AONB	Additional track mileage largely for noise purposes	Uncertain about airspace containment	Potential conflict with inbounds		Potential conflict with inbounds	Additional track mileage largely for noise purposes		

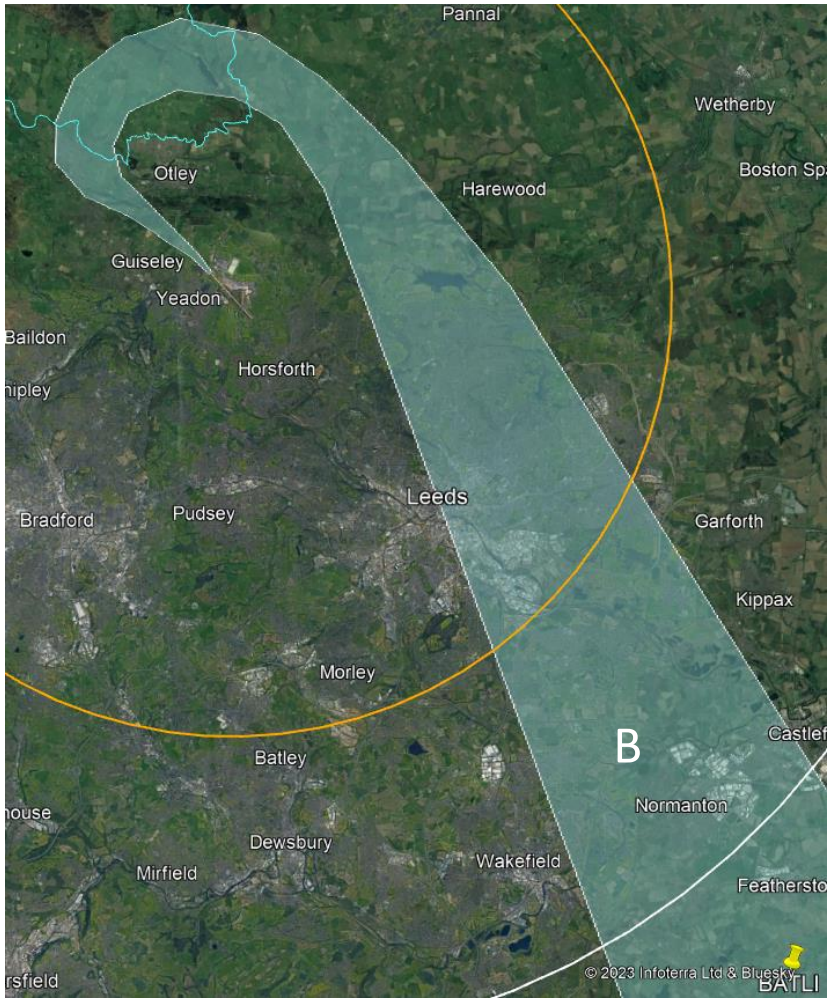
Existing Departure Options

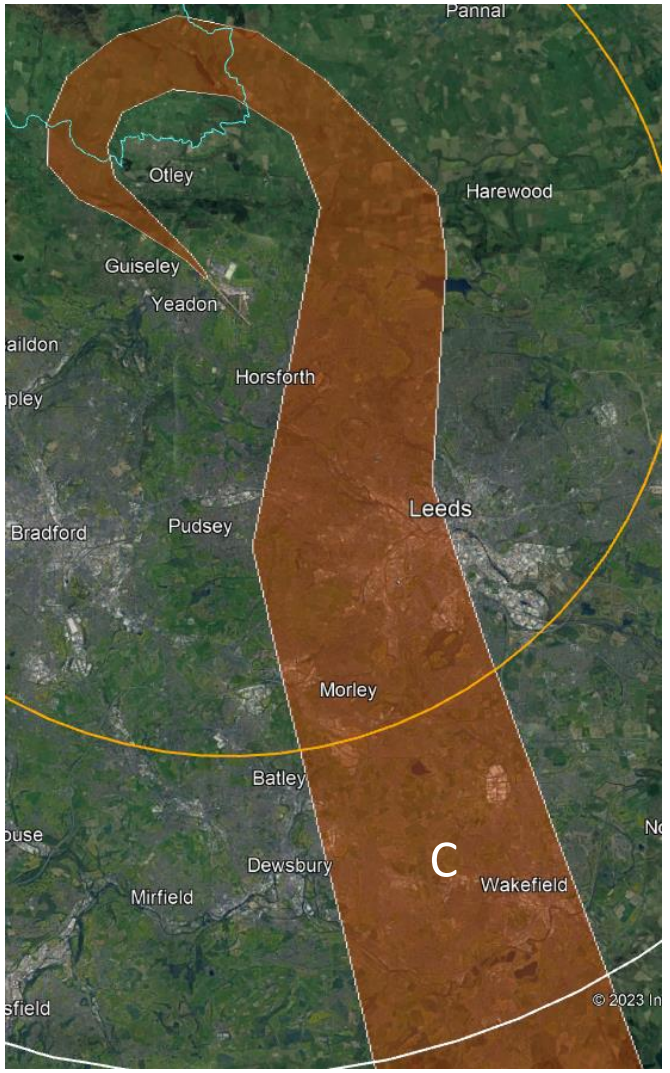
RW32 - South-Easterly Departures - MAMUL



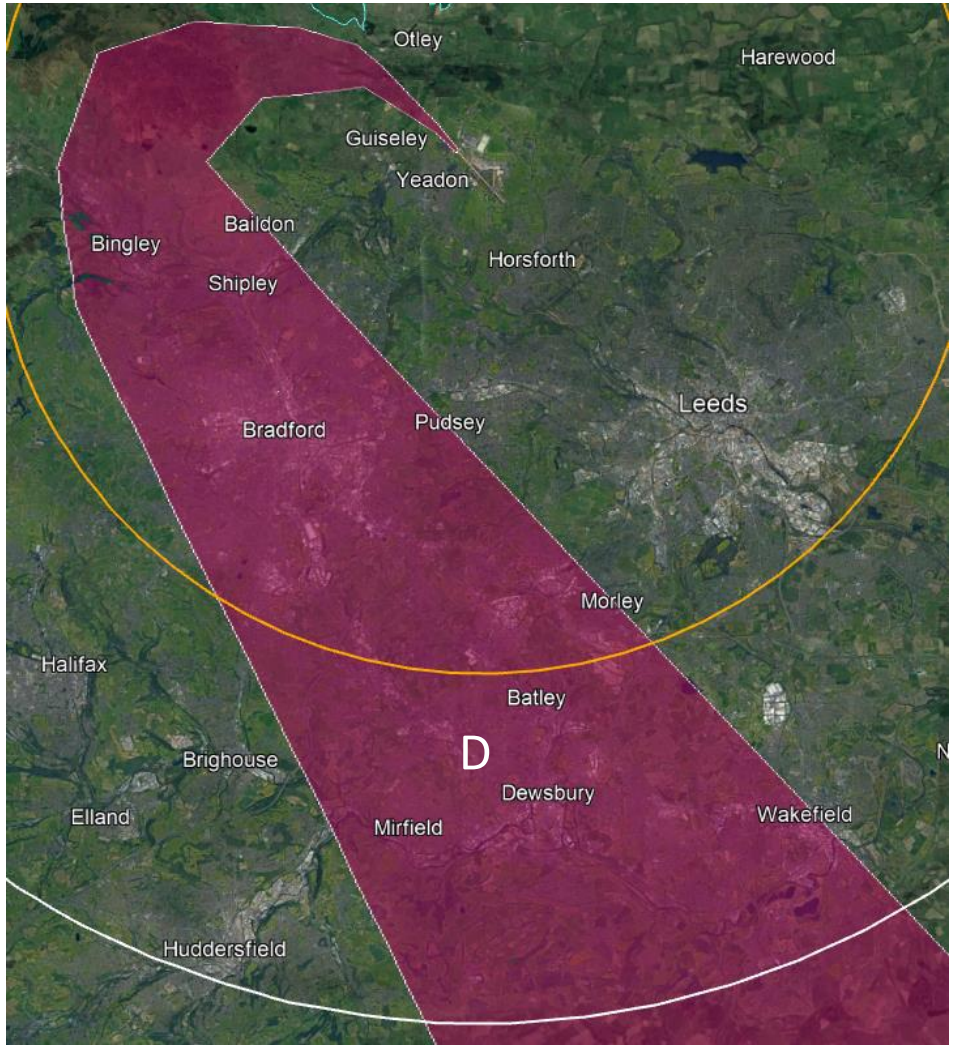
RW32 - South-Easterly Departures - MAMUL

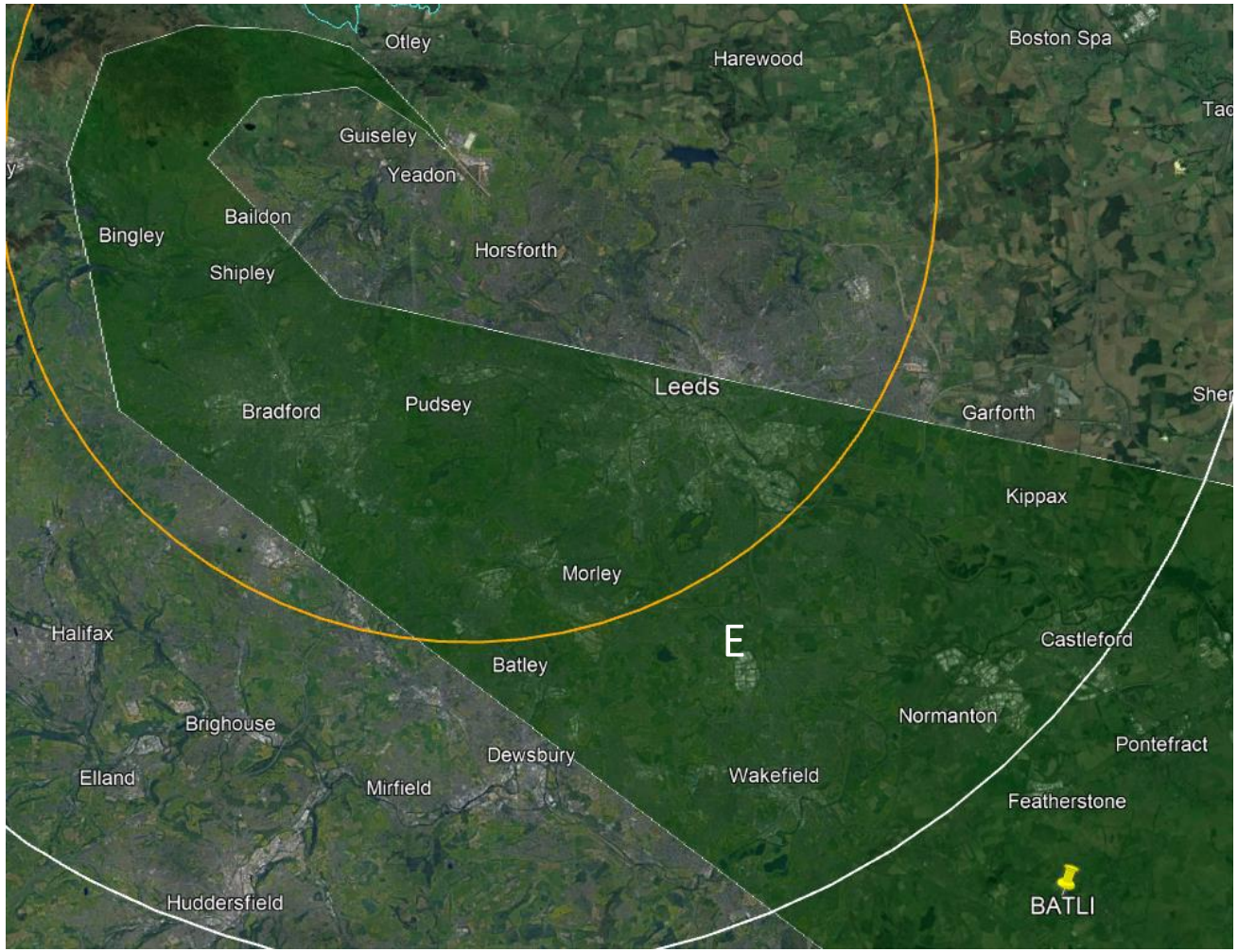




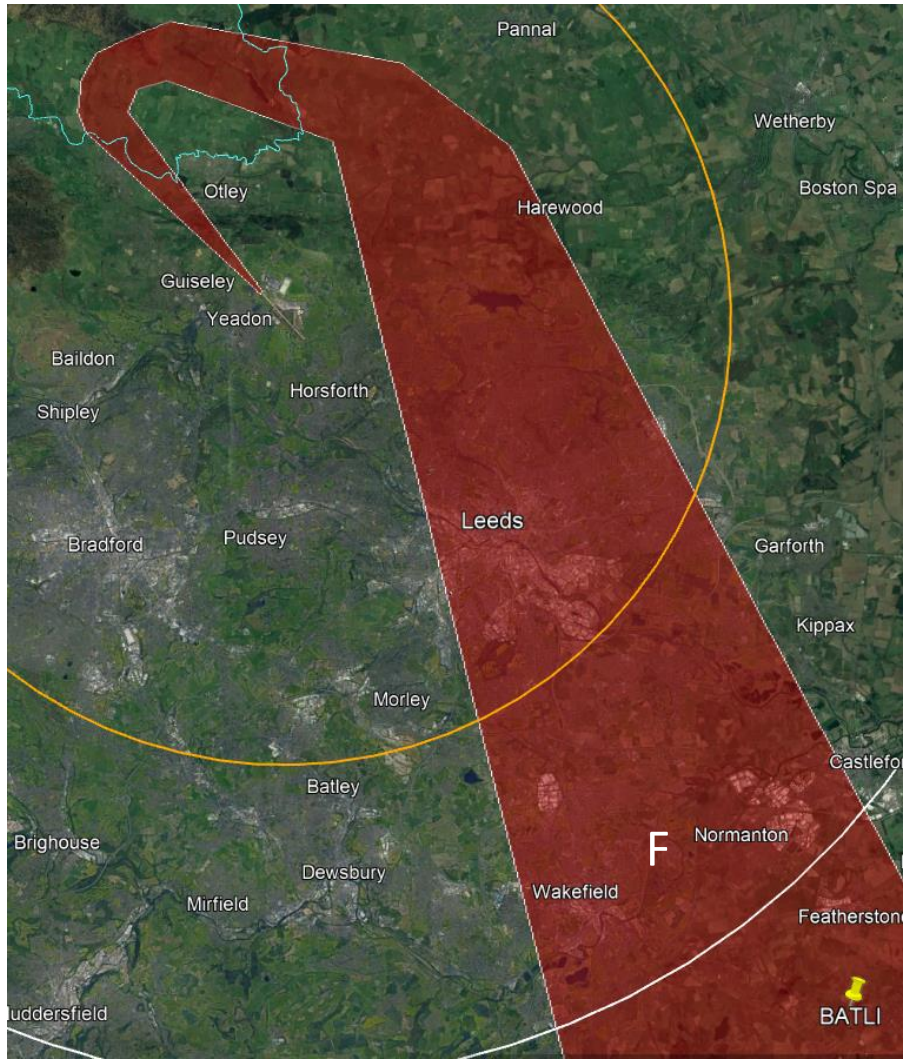


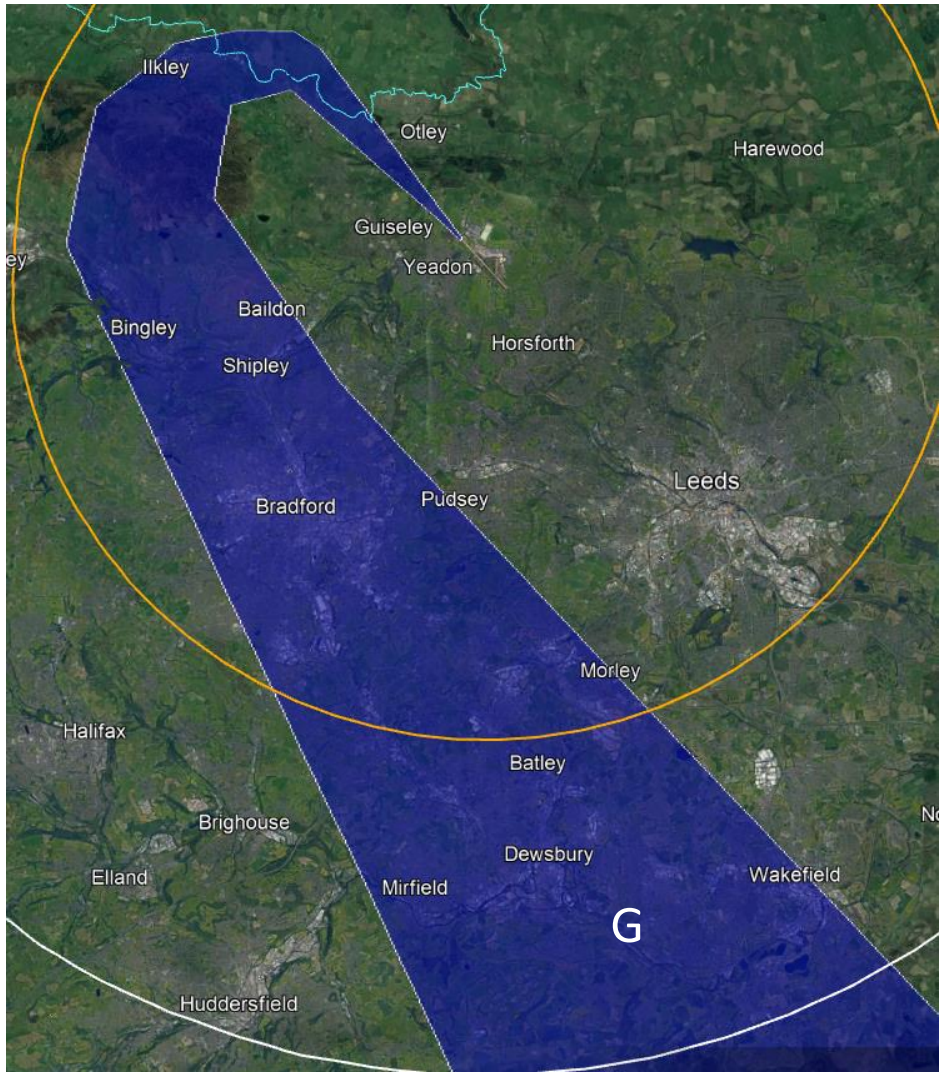
RW32 - South-Easterly Departures - MAMUL





RW32 - South-Easterly Departures - MAMUL





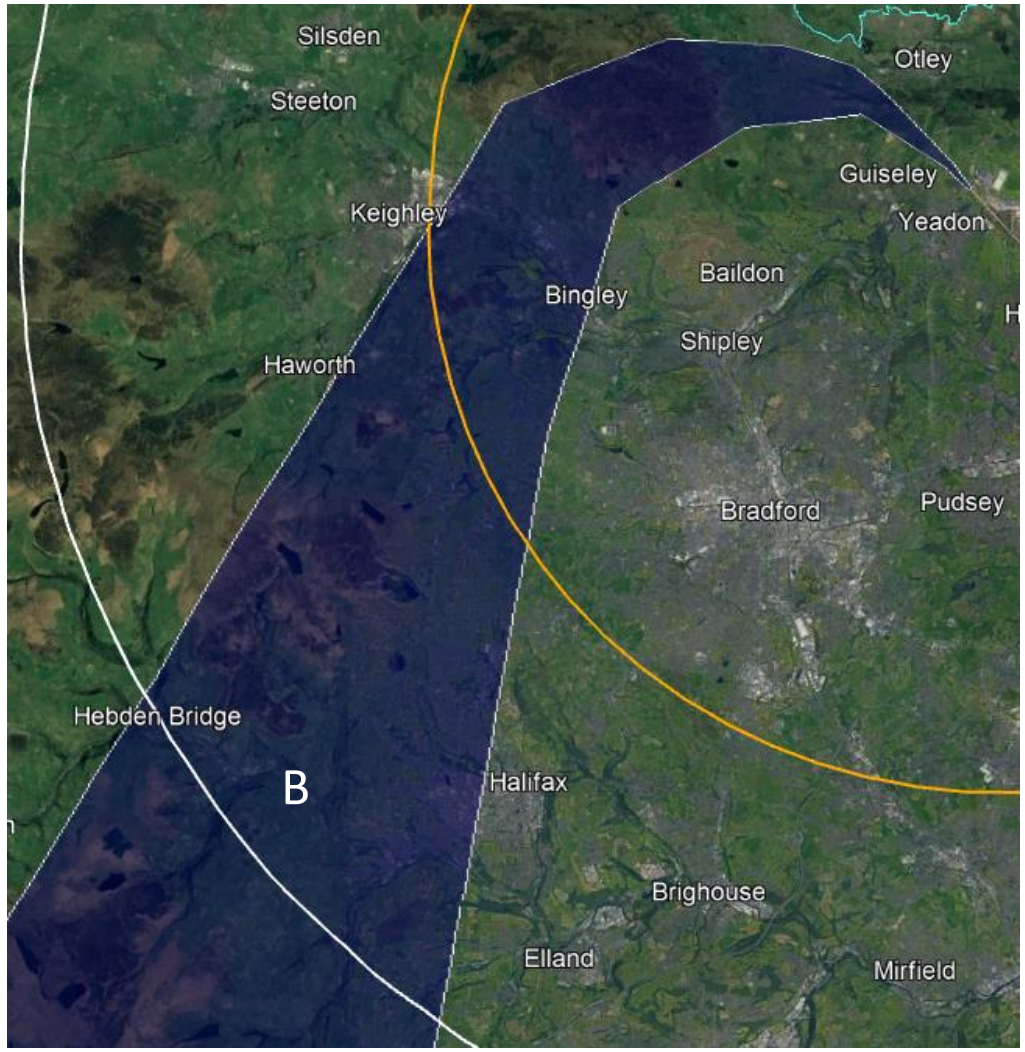
RW32 - South-Easterly Departures – MAMUL - DPE

Leeds Bradford®
Yorkshire's Airport

Option	DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Airspace Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN
32SEA	Considered no longer a viable option and discounted from assessment. Routes outside CAS and does not point in the direction of the Route Network joining points of MAMUL/LAMIX.										
32SEB	Potential conflict with inbounds via GOLES/BATLI	Burley-in-Wharfedale more greatly affected	AONB and Lindley Reservoir		Potential for additional CAS requirement	Potential complexity in GOLES area vs inbounds		Potential complexity in GOLES area vs inbounds			
32SEC		Burley-in-Wharfedale more greatly affected	AONB and Lindley Reservoir		Potential for additional CAS requirement						
32SED		Broadens area of affected communities	Ilkley Moor								
32SEE	Potential conflict with inbounds via GOLES/BATLI	Broadens area of affected communities	Ilkley Moor		Potential for additional CAS requirement	Potential complexity in GOLES area with additional CAS requirement		GOLES area conflictions and L975 flow issues		Unlikely to be systemised	
32SEF	Potential conflict with inbounds via GOLES/BATLI	Otley affected instead of Burley-in-Wharfedale	AONB and Lindley Reservoir		Potential for additional CAS requirement	Potential complexity in GOLES area vs inbounds		Potential complexity in GOLES area vs inbounds			
32SEG		Ilkley	AONB and Ilkley Moor								

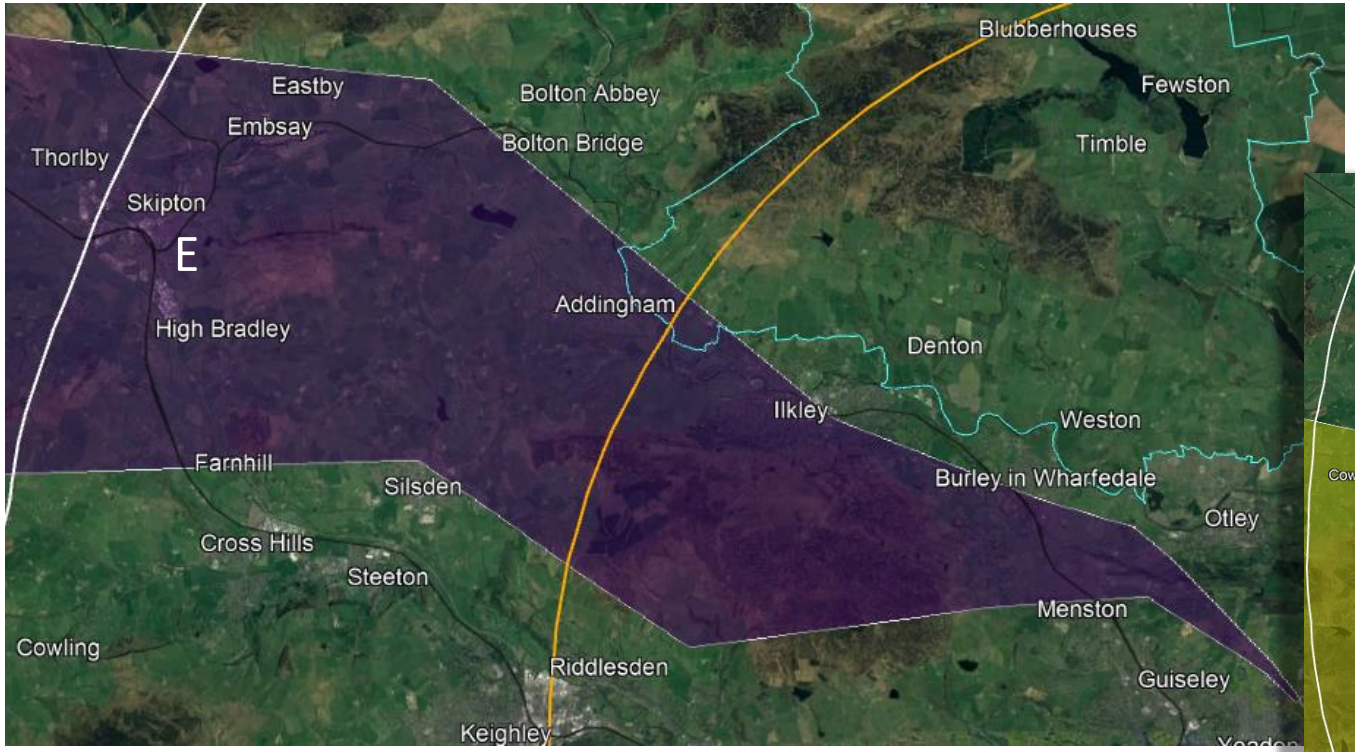
RW32 – South & West Departures – POL/NELSA

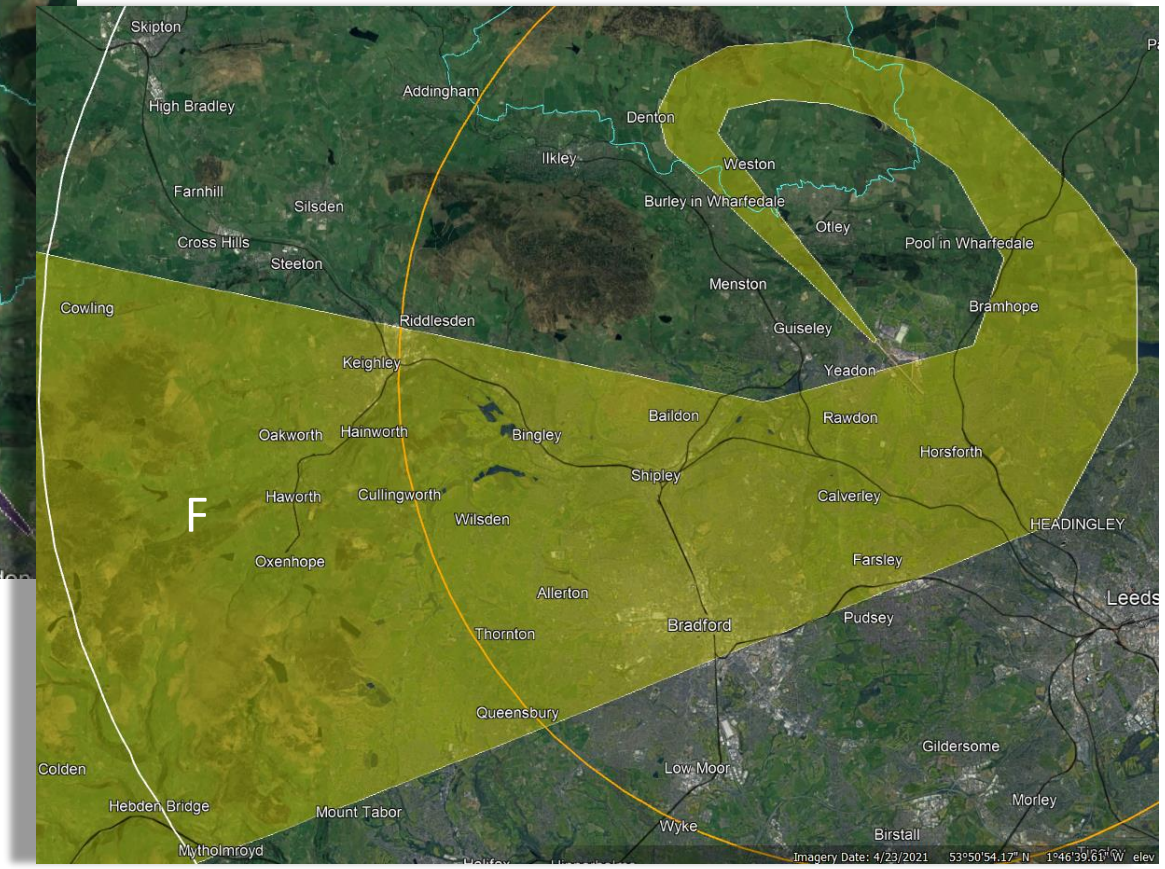
RW32 – South & West Departures – POL/NELSA



RW32 – South & West Departures – POL/NELSA

RW32 – South & West Departures – POL/NELSA





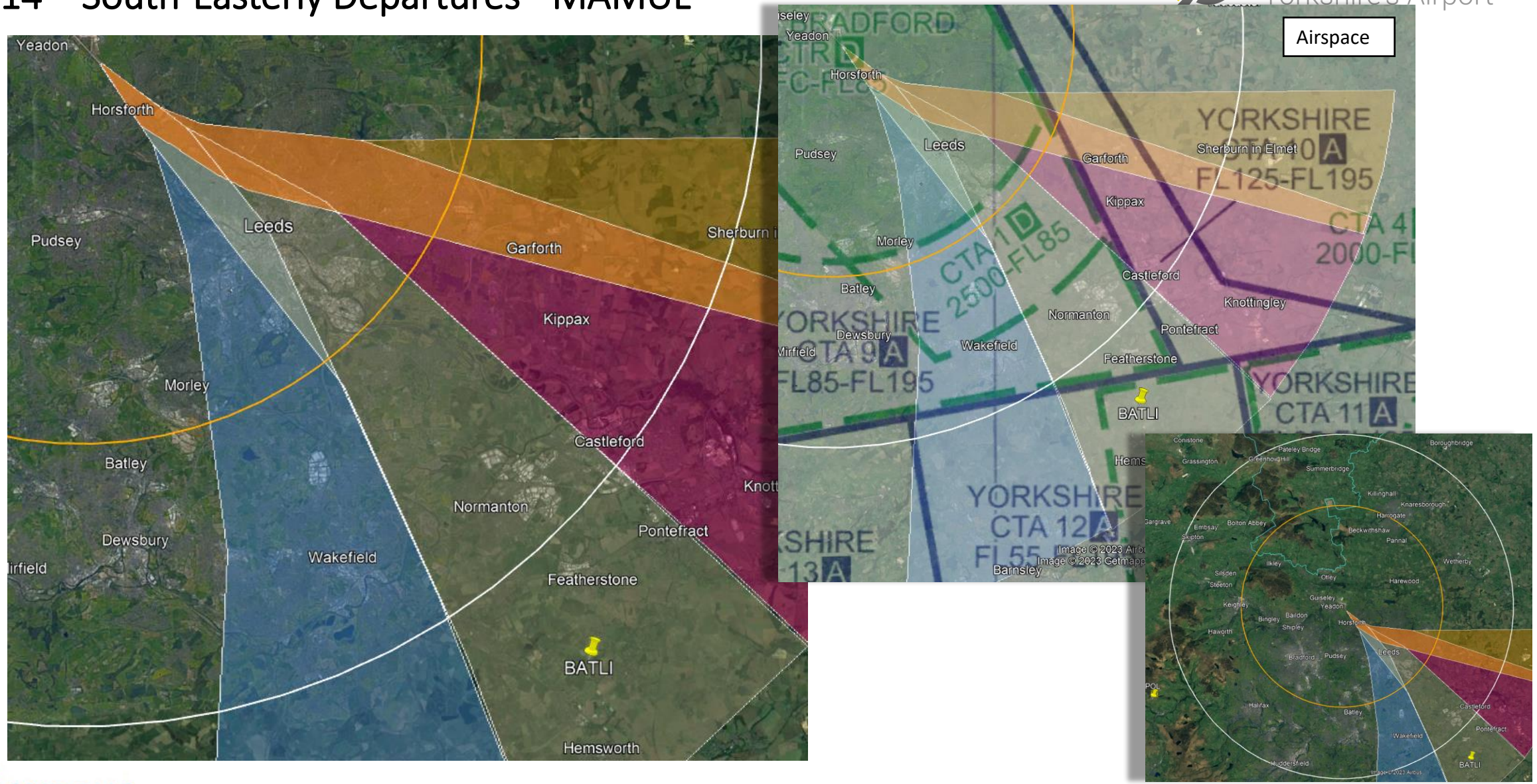
RW32 – South & West Departures – POL/NELSA

RW32 – South & West Departures – POL/NELSA - DPE

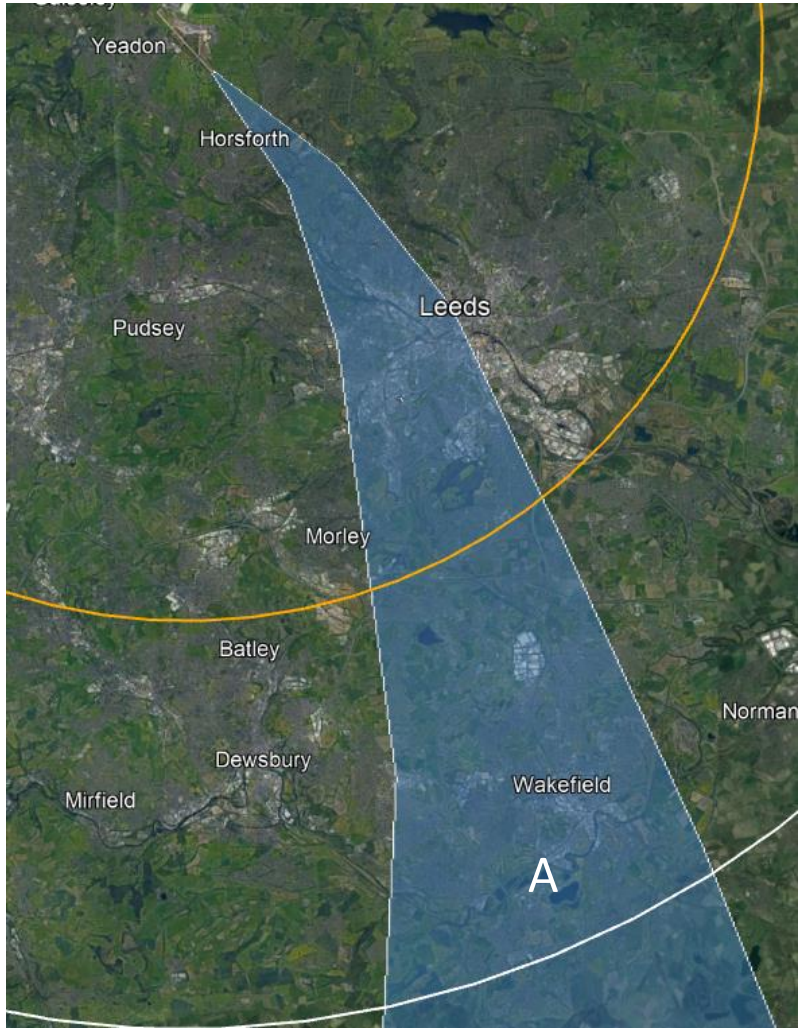
Leeds Bradford®
Yorkshire's Airport

Option	DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Airspace Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN
32S&WA		Burley-in-Wharfedale more greatly affected	AONB	Continuous Climb offsets additional track miles	Uncertainty about requirement for additional CAS				Continuous Climb offsets additional track miles		
32S&WB	Rejected after review as this does not fit with the Route Network as it does not point towards POL or NELSA										
32S&WC		Potentially affects different communities	Ilkley Moor								
32S&WD			Ilkley Moor								
32S&WE	Rejected after review as this does not fit with the Route Network as it does not point towards POL or NELSA										
32S&WF		Affects western Otley but takes some of the impact away from Burley-in-Wharfedale	AONB	Too many track miles in wrong direction	Uncertainty about requirement for additional CAS				Too many track miles in wrong direction		
32S&WG		Also brings Ilkley into the equation	AONB and Ilkley Moor								
32S&WH		Also brings Ilkley into the equation	AONB and Ilkley Moor								

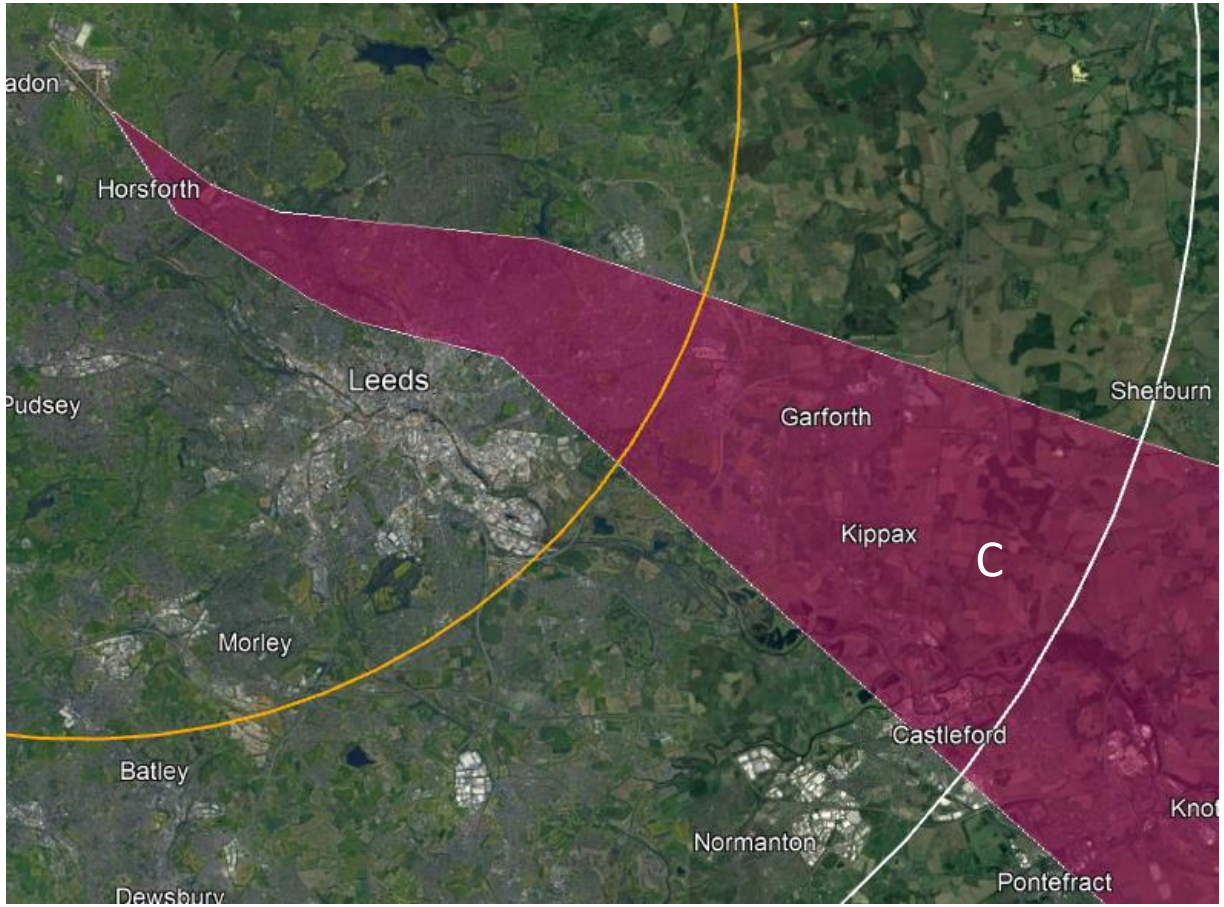
RW14 – South-Easterly Departures - MAMUL

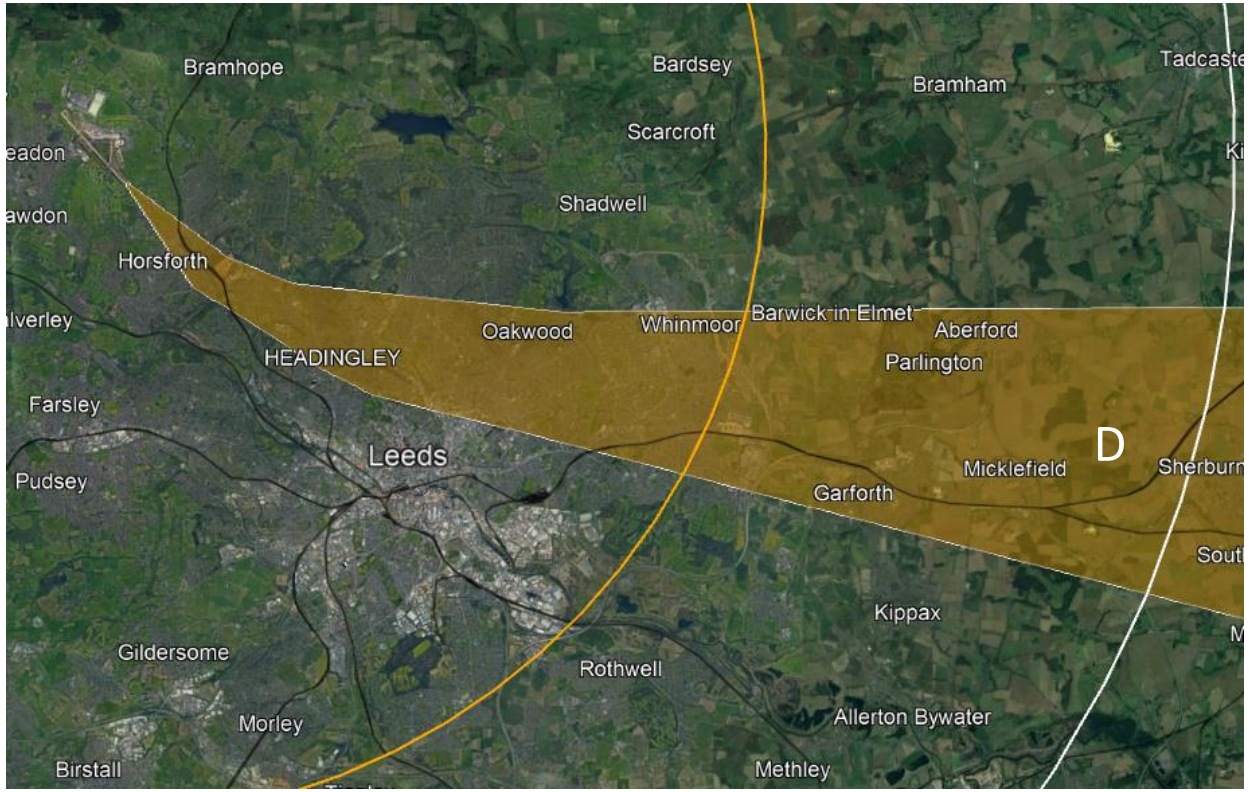


RW14 – South-Easterly Departures - MAMUL



RW14 – South-Easterly Departures - MAMUL



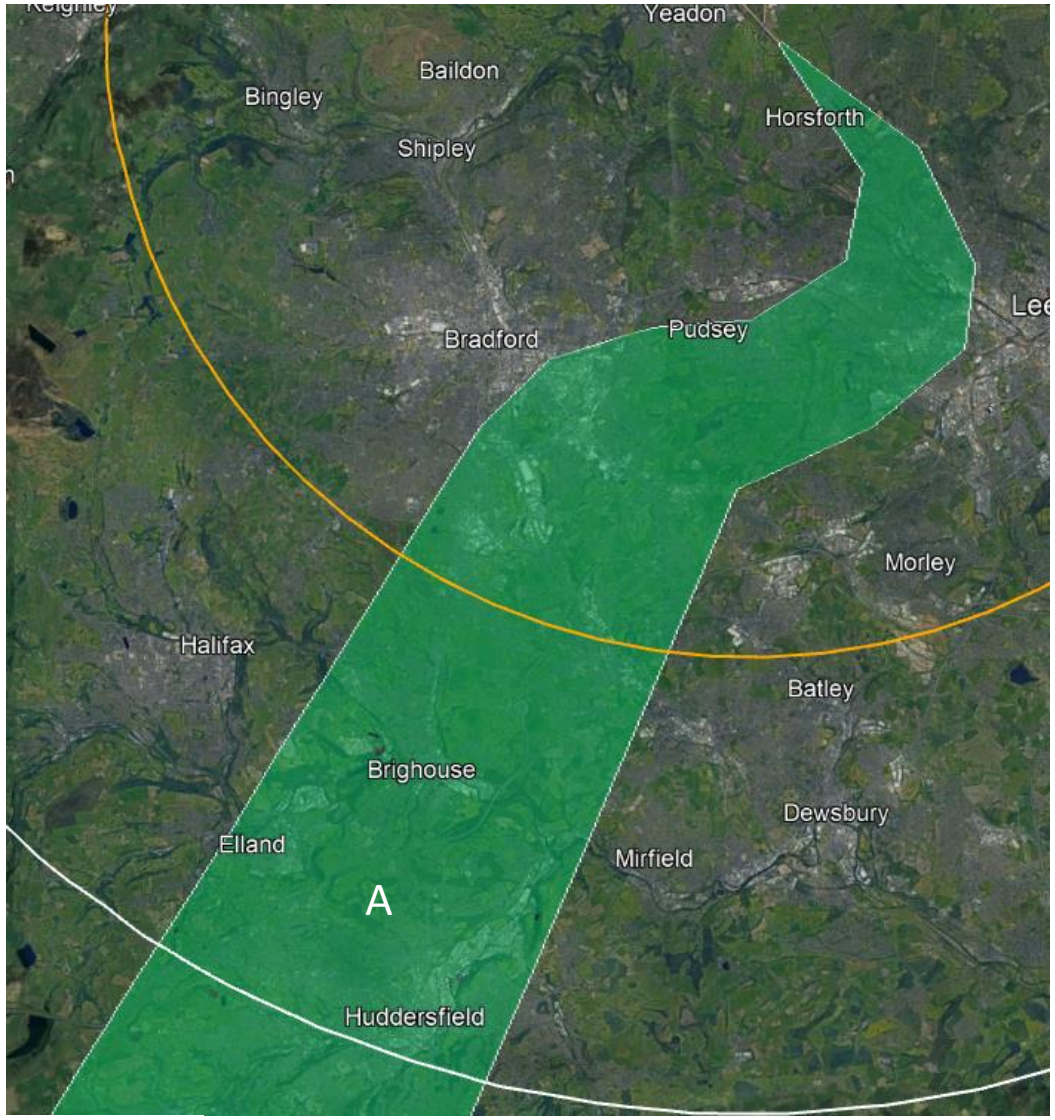


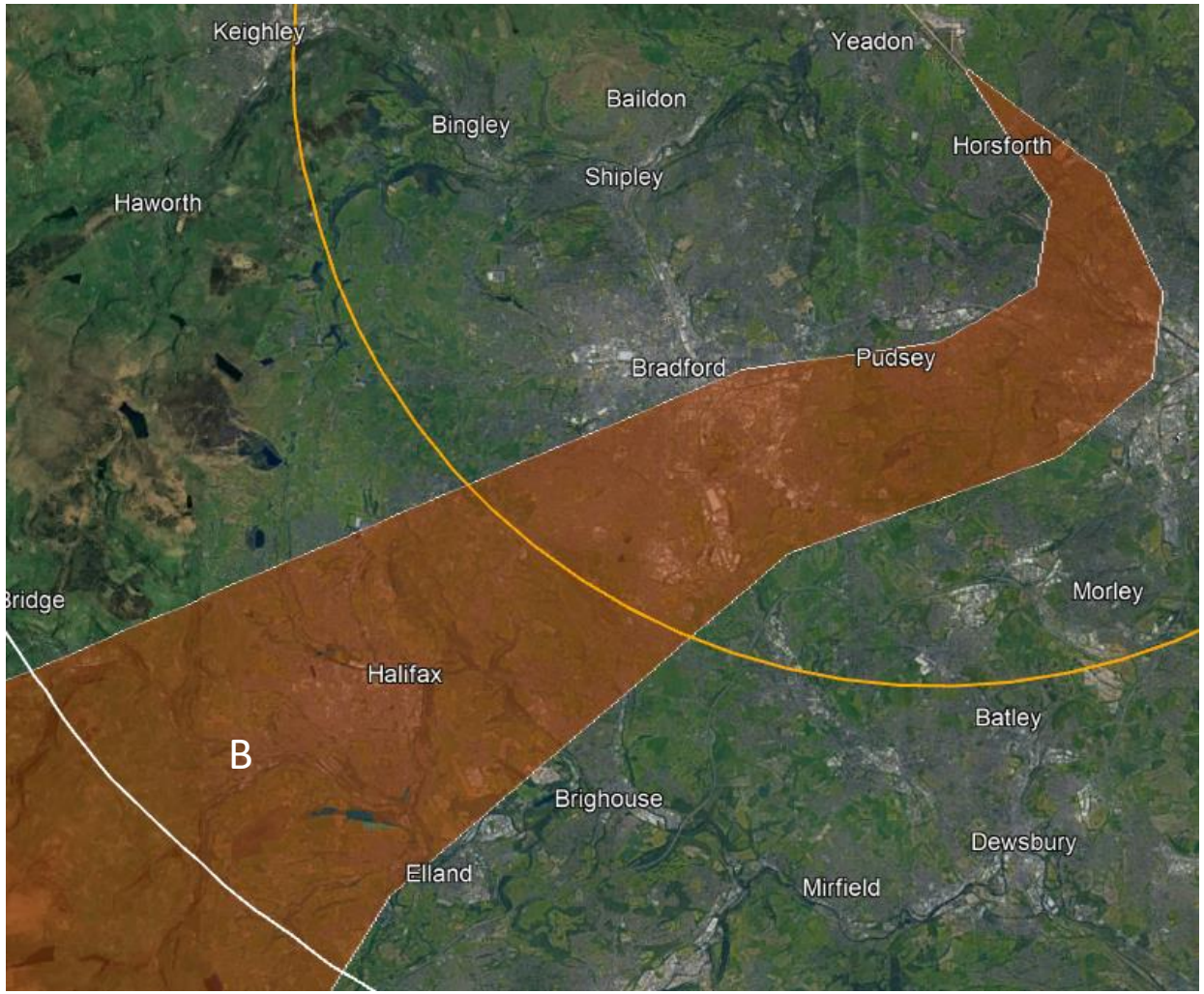
RW14 – South-Easterly Departures - MAMUL

Option	DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Airspace Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN
14SEA		Various different communities affected									
14SEB	Confliction with arrivals via GOLES	Various different communities affected				Confliction with arrivals via GOLES					
14SEC	Rejected at review as does not point to MAMUL or fit with Route Network and L975 flow										
14SED	Rejected at review as does not point to MAMUL or fit with Route Network and L975 flow										

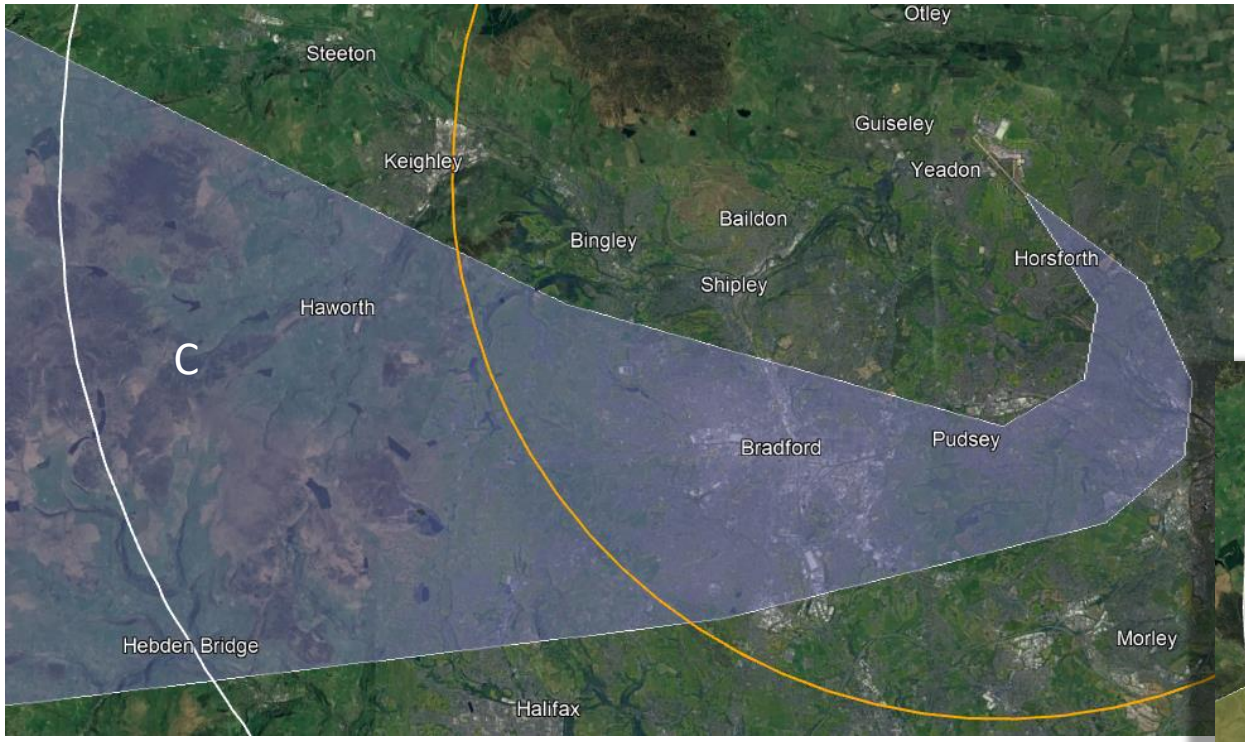
RW14 – South & West Departures – POL/NELSA

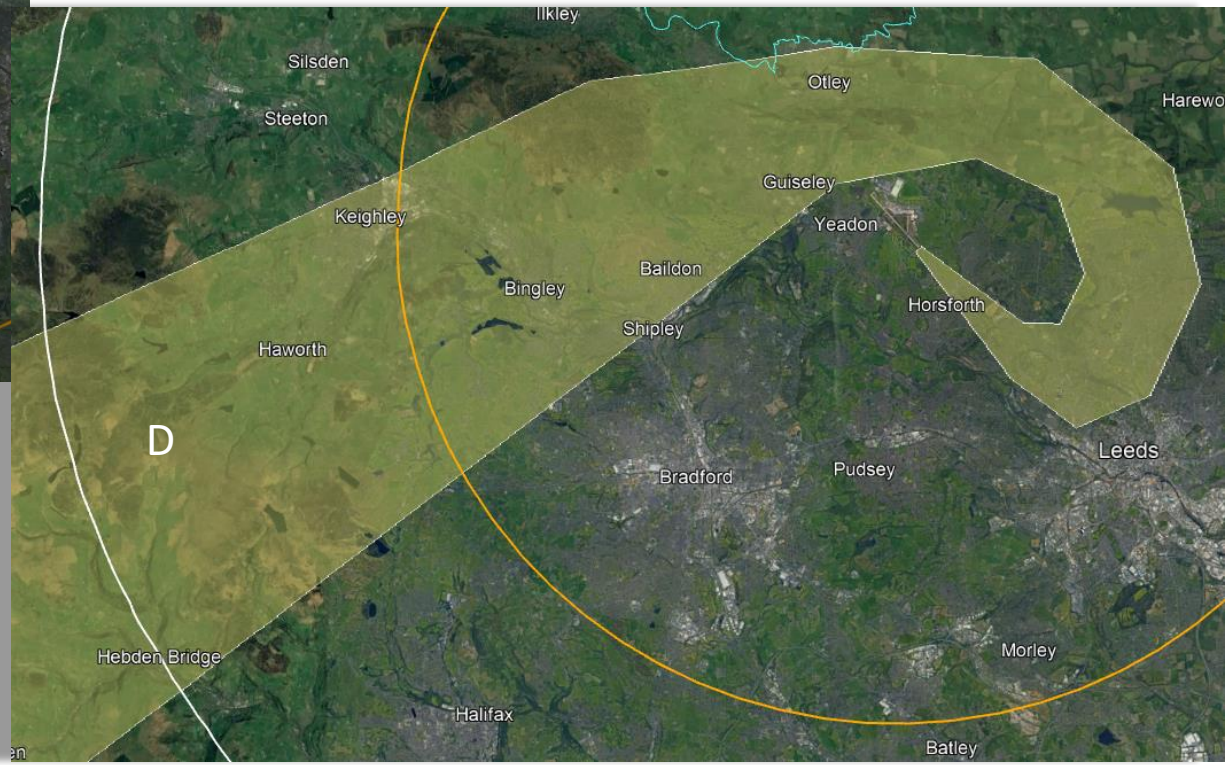
RW14 – South & West Departures – POL/NELSA



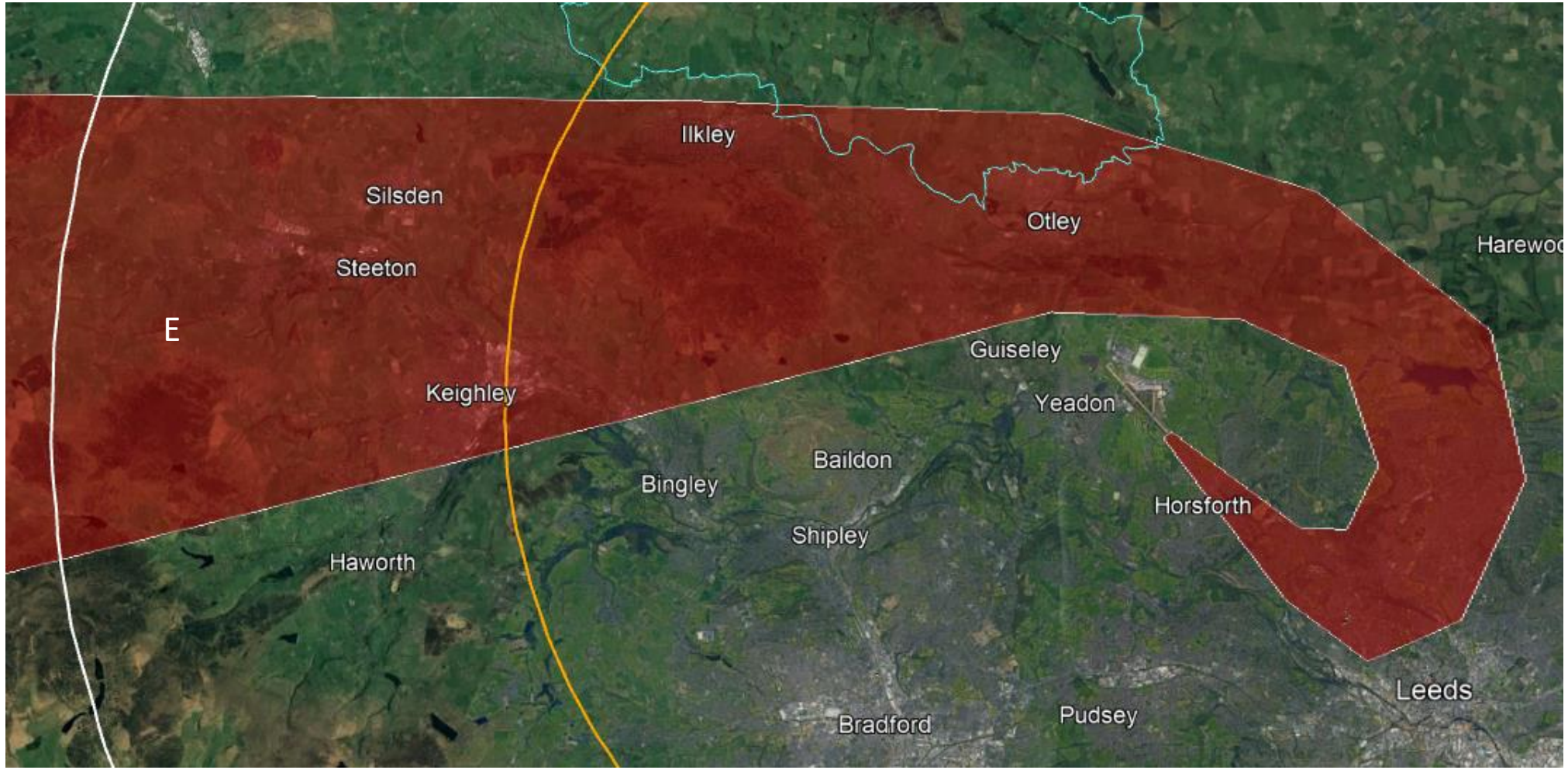


RW14 – South & West Departures – POL/NELSA





RW14 – South & West Departures – POL/NELSA



RW14 – South & West Departures – POL/NELSA

Option	DP1 Safety	DP2 Noise	DP3 Tranquillity	DP4 Emissions & Air Quality	DP5 Airspace Dimensions	DP6 Airspace Complexity	DP7 Technical	DP8 Systemisation	DP9 Operational Cost	DP10 AMS Realisation	DP11 PBN
14S&WA	Rejected on review as does not route towards the joining point at POL										
14S&WB	Rejected on review as does not route towards the joining point at POL										
14S&WC		Similar with potential for other communities affected									
14S&WD		Brings in denser populations ivo Headingley	Meanwood and Eccup	Continuous Climb offsets additional miles	Uncertainty on CAS containment				Continuous Climb offsets additional miles		
14S&WE		Brings in denser populations ivo Headingley	Meanwood, Eccup and AONB	Continuous Climb offsets additional miles	Uncertainty on CAS containment				Continuous Climb offsets additional miles		

Leeds Bradford Airport Future Airspace

Thank you for your time. We hope that you find this information on Leeds Bradford Future Airspace useful.

If you have any further queries, please address them to Airspace Change

We are very grateful for your assistance.

The Leeds Bradford ACP Team